General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.

- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.

- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.

- This document is paginated as submitted by the original source.

- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

NASA CR-141695
MDC E1153

FRACTURE MECHANICS DATA
FOR 2024-T861 AND 2124-T851 ALUMINUM

by

L. J. Pionke
R. K. Linback

25 October 1974

Prepared under Contract NAS9–13583

"Development of Fracture Mechanics Data
for 2024–T861 and 2124–T851 Aluminum Alloys"

for the period
29 June 1973 to 15 September 1974
by
McDonnell Douglas Astronautics Company
St. Louis, Missouri
for
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Lyndon B. Johnson Space Center
Houston, Texas 77058

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA CR		

4. Title and Subtitle	5. Report Date
FRACTURE MECHANICS DATA FOR 2024-T861 AND 2124-T851 ALUMINUM	October 1974
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
L. J. Pionke R. K. Linback	MDC E1153
	10. Work Unit No.

9. Performing Organization Name and Address	11. Contract or Grant No.
McDonnell Douglas Astronautics Co. East P. O. Box 516 St. Louis, Mo. 63166	NAS-9-13583
	13. Type of Report and Period Covered Contractor Final Report June 1972 thru October 1974

12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code
National Aeronautics and Space Administration Lyndon B. Johnson Space Center Houston, Texas 77058	

15. Supplementary Notes

Project Manager, Royce G. Forman
NASA - Lyndon B. Johnson Space Center
Houston, Texas 77058

16. Abstract

The fracture toughness and fatigue flaw growth characteristics of 2024-T861 and 2124-T851 aluminum were evaluated under plane stress conditions. Center cracked tension specimens were employed to evaluate these properties under a number of different test conditions which included variations in specimen thickness, specimen orientation, test environment, and initial flaw size. The effect of buckling was also investigated for all tests of thin gage specimens, and the effect of frequency and stress ratio was evaluated for the cyclic tests. Fracture toughness test results were analyzed and presented in terms of fracture resistance curves; fatigue flaw growth data was analyzed using empirical rate models.

The results of the study indicate that both fracture toughness and resistance to fatigue crack growth improve with increasing temperature and decreasing thickness. The presence of buckling during testing of thin gage panels was found to degrade the resistance to fatigue flaw growth only at elevated temperatures. Variations in cyclic frequency over the range 20-200 cpm had no observable effect on fatigue flaw growth. The toughness values obtained from toughness testing did not agree with those indirectly obtained from the cyclic data by curve fitting the empirical rate models; however, such differences are attributed to the lack of sufficient data at the high ΔK levels preceding instability.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aluminum Alloys Fracture Mechanics Fracture Toughness Fatigue Flaw Growth 2024-T861 2124-T851	Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	527	

*For sale by the National Technical Information Service, Springfield, Virginia 22151

Copy No. 4

NASA — JSC

FOREWORD

This report was prepared by McDonnell Douglas Astronautics Company - East (MDAC-E) under NASA-JSC Contract NAS 9-13583, Development of Fracture Mechanics Data for 2024-T861 and 2124-T851 Aluminum Alloys.

The work reported herein was accomplished under the direction of Mr. Royce G. Forman of the Structures and Mechanics Division of the Lyndon B. Johnson Space Center, National Aeronautics and Space Administration. Mr. L. J. Pionke was the Program Study Manager for MDAC-E; Mr. R. K. Linback assisted in data analysis and preparation of the final report. Mr. K. C. Garland conducted the majority of the laboratory testing and developed the many techniques that enabled the experimental work to be conducted smoothly and efficiently. The authors wish to gratefully acknowledge the assistance of other laboratory personnel, namely R. W. Bill, J. J. Slavick and R. E. Whaley, who assisted in many ways throughout the program.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF PAGES

NOMENCLATURE

a = Half crack length

$2a$ = Crack length

B = Specimen thickness

C = Specimen compliance

COD = Crack opening displacement

E = Elastic modulus

F_{ty} = 0.2 per cent offset yield strength

K = Stress intensity

K_c = Plane stress or mixed mode critical stress intensity

K_{Ic} = Plane strain critical stress intensity

K_i = Applied stress intensity

K_R = Stress intensity relating stable crack extension and applied load for a given material

ΔK = Stress intensity range for a fatigue cycle

ΔK_o = Threshold stress intensity range for fatigue crack propagation

l_e = Effective total crack length

N = Number of applied fatigue cycles

P = Applied load

R = Stress ratio for a fatigue cycle

= $\sigma_{MIN}/\sigma_{MAX}$

r = Residual

= Difference between the calculated and measured values of the dependent variable

t = Specimen thickness

w = Specimen width

NOMENCLATURE (Continued)

z = Finite width correction factor

= sec $(\pi a/w)$

σ = Applied stress

σ_n = Net section applied stress

Section 1
INTRODUCTION

Much of the Space Shuttle primary structure will use 2024-T861 aluminum sheet because of its proven history in the aircraft and aerospace industry, its inherent high strength at room and elevated temperatures, and its resistance to stress corrosion cracking. The newer and higher purity version of the alloy, 2124, offers the same basic properties plus improved short transverse ductility in thick plate sections.

Fracture mechanics design data is of prime importance in the Fracture Control Plan for the Space Shuttle. In order to establish damage tolerances and to select proper operating stresses for a safe-life structure, a knowledge of the fracture toughness and fatigue crack growth rate values for through-the-thickness cracks under plane stress conditions is essential. Even though the 2024-T861 alloy has been reasonably well characterized for aircraft use, additional data must be generated to encompass the wider operating temperature range, the higher operating stresses, and other mission environments for the Shuttle vehicle. Fracture mechanics theory, although considerably advanced from a decade ago, still lacks the predictive capability to handle a wide range of thicknesses, cyclic frequency, operating temperatures, environments, and stresses and stress states relative to fracture toughness and cyclic crack growth rates.

The primary objective of this program was to generate fracture mechanics data for 2024-T861 sheet and 2124-T851 plate materials. Both the fracture resistance and the cyclic crack growth behavior of these alloys were evaluated using a

variety of test variables, including specimen thickness, specimen orientation, test environment, initial flaw size/maximum applied stress, and restraint (thin gage only). Variations in frequency and stress ratio were also investigated for the cyclic tests.

Section 2
PRELIMINARY MATERIALS CHARACTERIZATION

2.1 MATERIALS

The materials for the present program were all procured against current McDonnell Douglas material specifications, which meet the chemistry and strength requirements of Federal Specification QQ-A-250 for 2024 and 2124 sheet and plate. Detailed information on the materials is summarized in Table 2-1.

2.2 SPECIMEN MANUFACTURE

The smooth tensile specimen shown in Figure 2-1 was used for determining the baseline mechanical properties for each alloy/thickness combination. The thickness of all 2024-T861 specimens was identical to that of the as-received sheet. The 2124-T851 specimens were machined from the 50.8 mm (2.0 inch) thick plate to a thickness of 6.35 mm (0.250 inch); the thickness dimension of these specimens was parallel to the short transverse direction of the plate. All specimens were selected so as to supply information on the mechanical properties of each sheet or plate of material used; for the 2124-T851 alloy, specimens were also selected to monitor any variation in properties through the thickness of the plate.

The center cracked tensile specimen shown in Figure 2-2 was used for both fracture toughness and cyclic flaw growth testing. A special tooling jig, shown in Figure 2-3, was fabricated in order to ensure that the flaw and loading holes were positioned symmetrically with respect to the centerline of each specimen. For the 2024-T861 specimens, appropriate size blanks were sheared from each sheet of material and then finish-machined using the tooling jig. For the 6.35 mm

Table 2-1

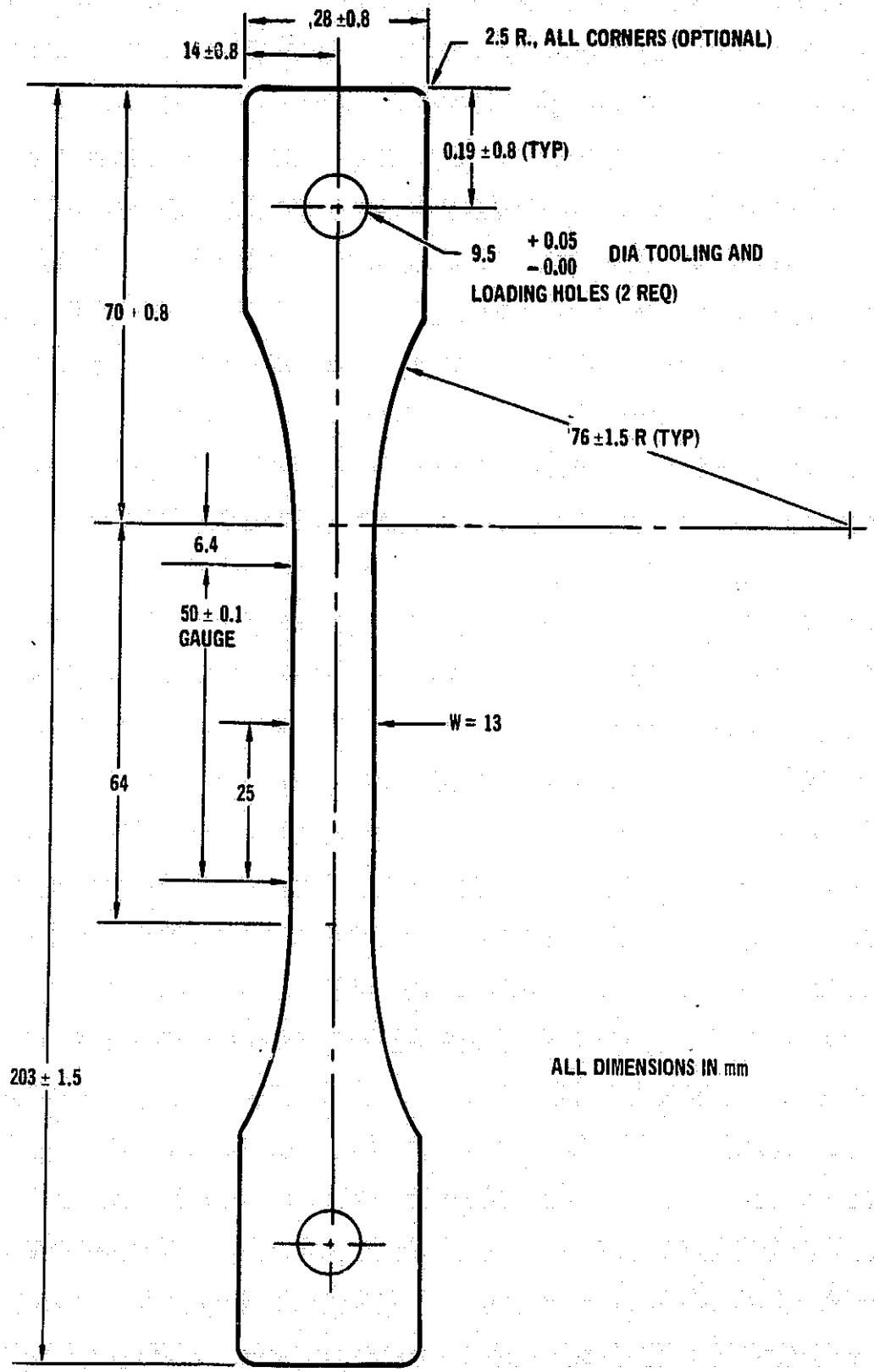
SUMMARY OF SUPPLIER'S INFORMATION

	2024-T861			2124-T851
SUPPLIER:	REYNOLDS			ALCOA
APPLICABLE SPECIFICATION: ° MCDONNELL DOUGLAS ° MILITARY	MMS 1408 QQ-A-250/4			MMS 149 QQ-A-250/29
HEAT TREATMENT * : ° SOLUTION TREATMENT (1) ° STRESS RELIEVED (2) ° AGING TREATMENT	766°K (920°F), WQ COLD ROLLED 464°K (375°F)/8 HOURS			766°K (920°F), WQ COLD STRETCHED 464°K (375°F)/12 HOURS
SIZE:				
° THICKNESS (mm) (in)	1.60 .063	3.18 .125	6.35 .250	50.8 2.000
° WIDTH (cm) (in)	122 48	122 48	122 48	122 48
° LENGTH (cm) (in)	366 145	366 144	366 144	244 96
QUANTITY:	7	7	4	6

* As specified in Reference (2-1)

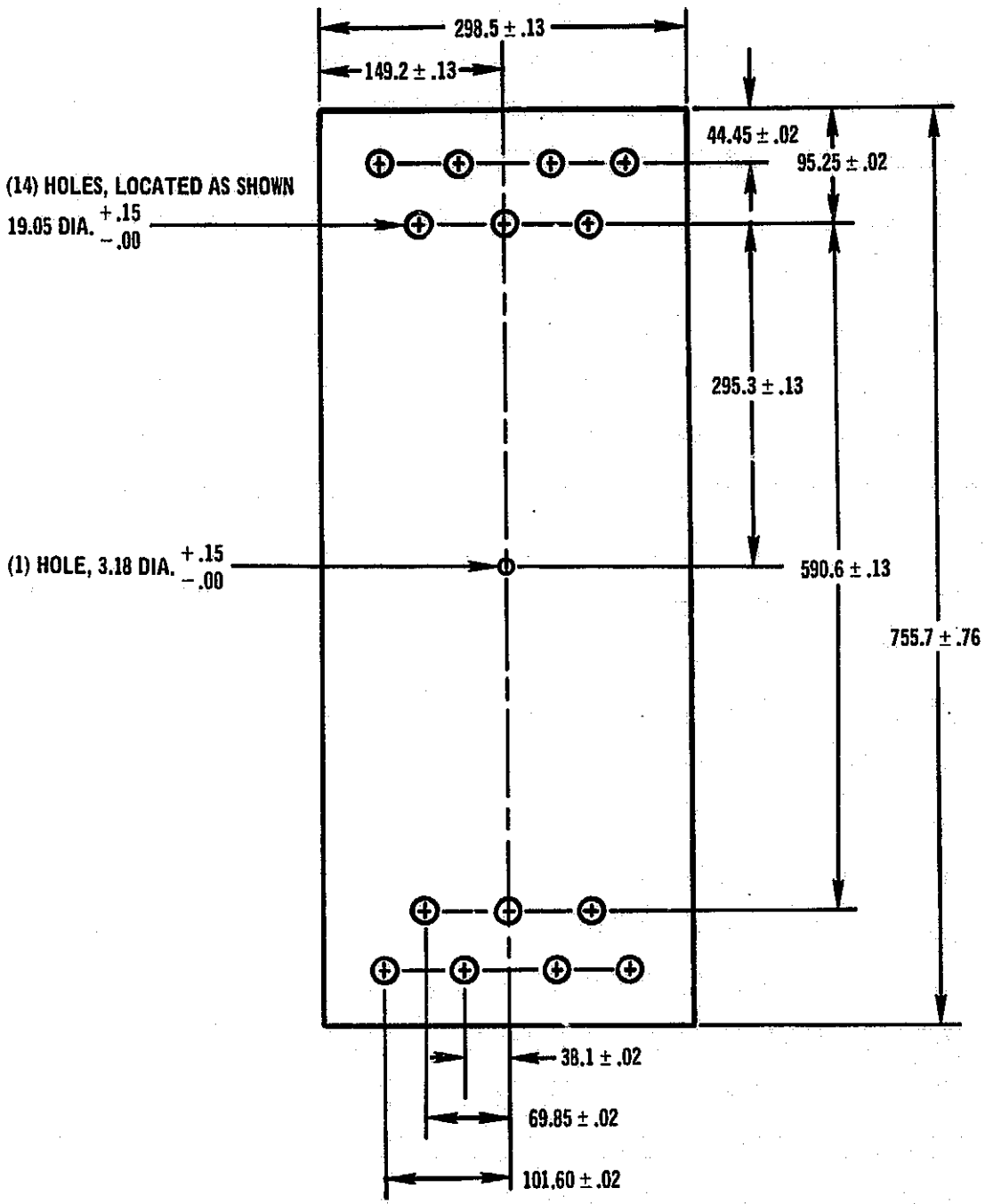
1 WQ: Water quenched

2 1.5-3.0 percent deformation



TENSILE SPECIMEN CONFIGURATION

FIGURE 2–1



ALL DIMENSIONS IN MM

FRACTURE TOUGHNESS/FATIGUE SPECIMEN CONFIGURATION

FIGURE 2-2

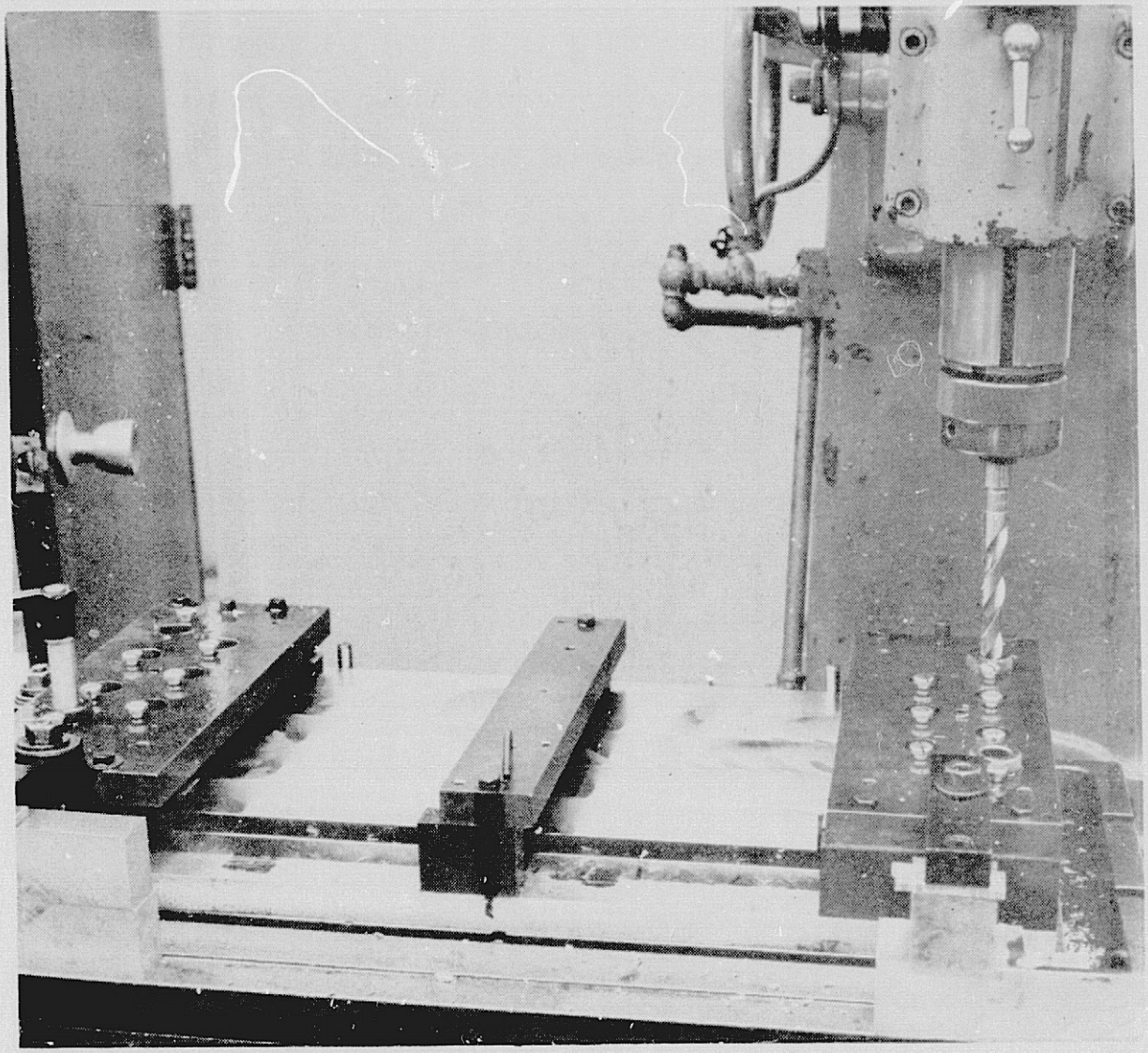


FIGURE 2-3
TOOLING JIG FOR SPECIMEN MACHINING

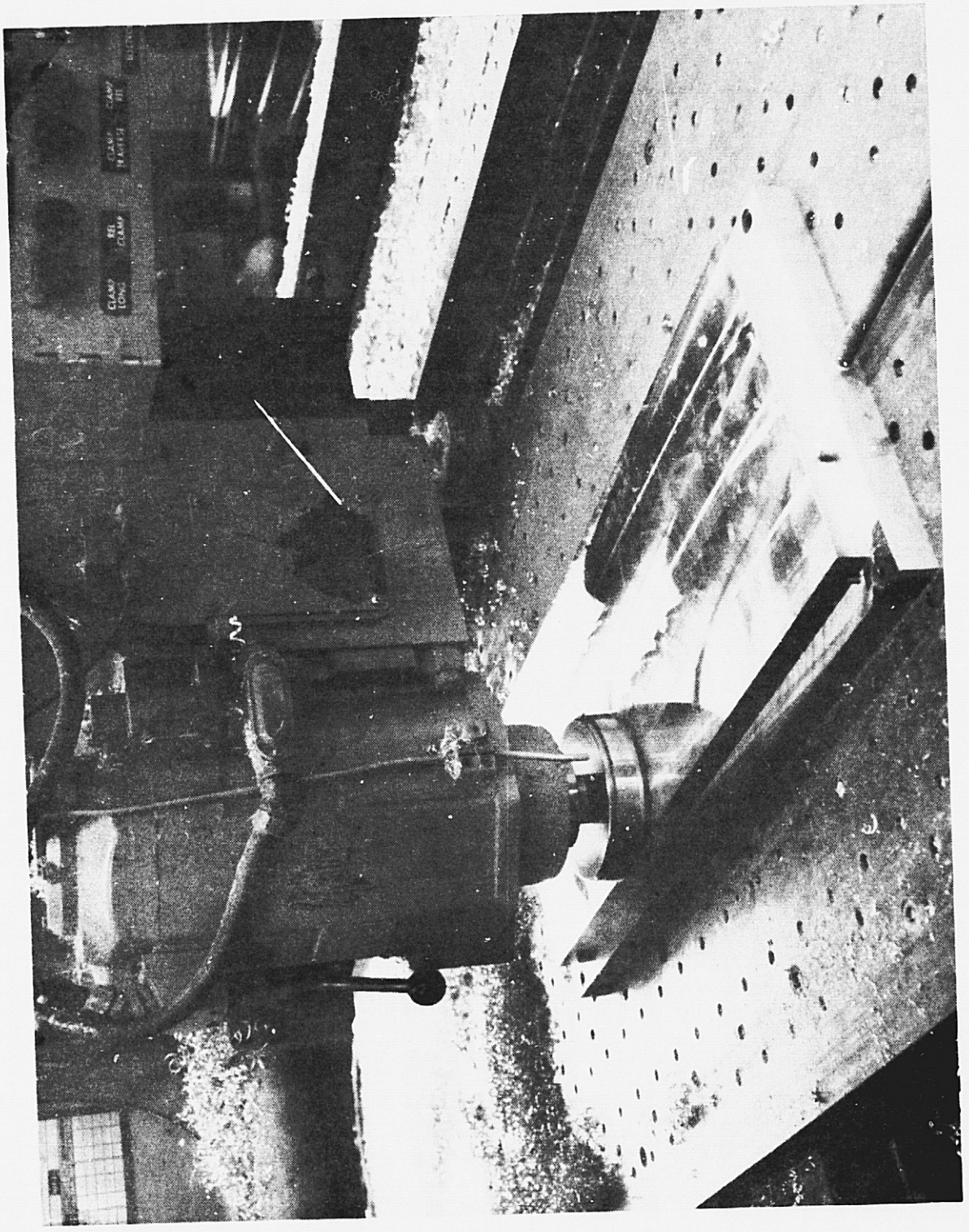
(0.25 inch) thick specimens to be tested at high stress levels, doublers were resistance welded onto the specimen grip areas in order to prevent bearing and tensile failures in the regions surrounding the loading holes.

The 2124-T851 specimens were machined by first sawing each 50.8 mm (2.00 inch) thick plate into blocks having the required specimen length and width dimensions.

These blocks were then sliced perpendicular to the short transverse direction of the plate using a band saw equipped with a carbide-tipped blade. As many as four specimens could be sliced from one 50.8 mm (2.00 inch) thick block; therefore, in order to maintain the surface of each specimen parallel to that of the original plate, the cut surface of each sliced block was milled parallel to the unsawed surface before another slice was made. A Hydrotel high-speed milling machine equipped with a flycutter (Figure 2-4) was used for this phase of machining; a special vacuum fixture was fabricated to hold and prevent flexing of the specimen block during this milling operation. For the 2124-T851 specimens to be tested at high stress levels, the thickness of the grip area was increased as necessary to prevent failure through the loading holes.

2.3 PRELIMINARY MATERIAL CHARACTERIZATION

In order to establish the baseline mechanical properties of each alloy/thickness combination, a total of 72 tensile tests were performed according to the schedule given in Table 2-2. All tests were performed in accordance with ASTM E8-69, Standard Methods of Tension Testing Metallic Materials. These tests were conducted on a Satec universal testing machine having a capacity of 133,000 N (30 kips). Prior to testing, each specimen was fitted with an ASTM Class B-1 extensometer. When necessary, a Conrad-Missimer environmental chamber was used to achieve the required temperatures. This chamber is a circulating air oven, with provisions that also permit the introduction of coolant (e.g., liquid nitrogen) and the attachment of the specimen to the loading train of the testing machine. For these tests, temperature was controlled to an accuracy of $\pm 2.8°K$ ($\pm 5°F$) by taping a thermocouple to the specimen gage length. Once the desired test temperature was acheived, each specimen was held at this temperature under zero load for 10 minutes to achieve thermal equilibrium. During testing, a strain rate of .005



SURFACE PREPARATION OF 2124-T851 SPECIMENS SECTIONED FROM 5.08 CM (2.00 INCH) THICK PLATE

FIGURE 2-4

Table 2-2

TENSILE TEST MATRIX

	2024-T861	2124-T851
TEST DIRECTIONS*	L, T	L, T
THICKNESSES, mm in	1.60, 3.18, 6.35 0.063, 0.125, 0.250	6.35 0.250
TEST TEMPERATURES, °K °F	144, 298, 450 -200, 70, 350	144, 298, 450 -200, 70, 350
TOTAL NUMBER OF SPECIMENS	54	18

*L: Longitudinal direction; load applied parallel to rolling direction of sheet or plate

T: Transverse direction; load applied perpendicular to a rolling direction of sheet or plate

mm/mm per minute was used until the 0.2% yield stress was achieved, at which point the extensometer was removed and the strain rate increased to 0.050 mm/mm per minute. The results of this testing are given in Appendix A, and summarized in the curves of Figures 2-5 to 2-8.

Examination of the test results in Appendix A indicates that the degree of scatter in the elastic modulus values are much larger for the low and elevated temperature tests than for the room temperature tests. Because an accurate value of this parameter was essential for the analysis of the fracture toughness test results, an independent measure of this property was obtained by instrumenting two 2024-T861 specimens with strain gages. Longitudinal and transverse SR-4 gages

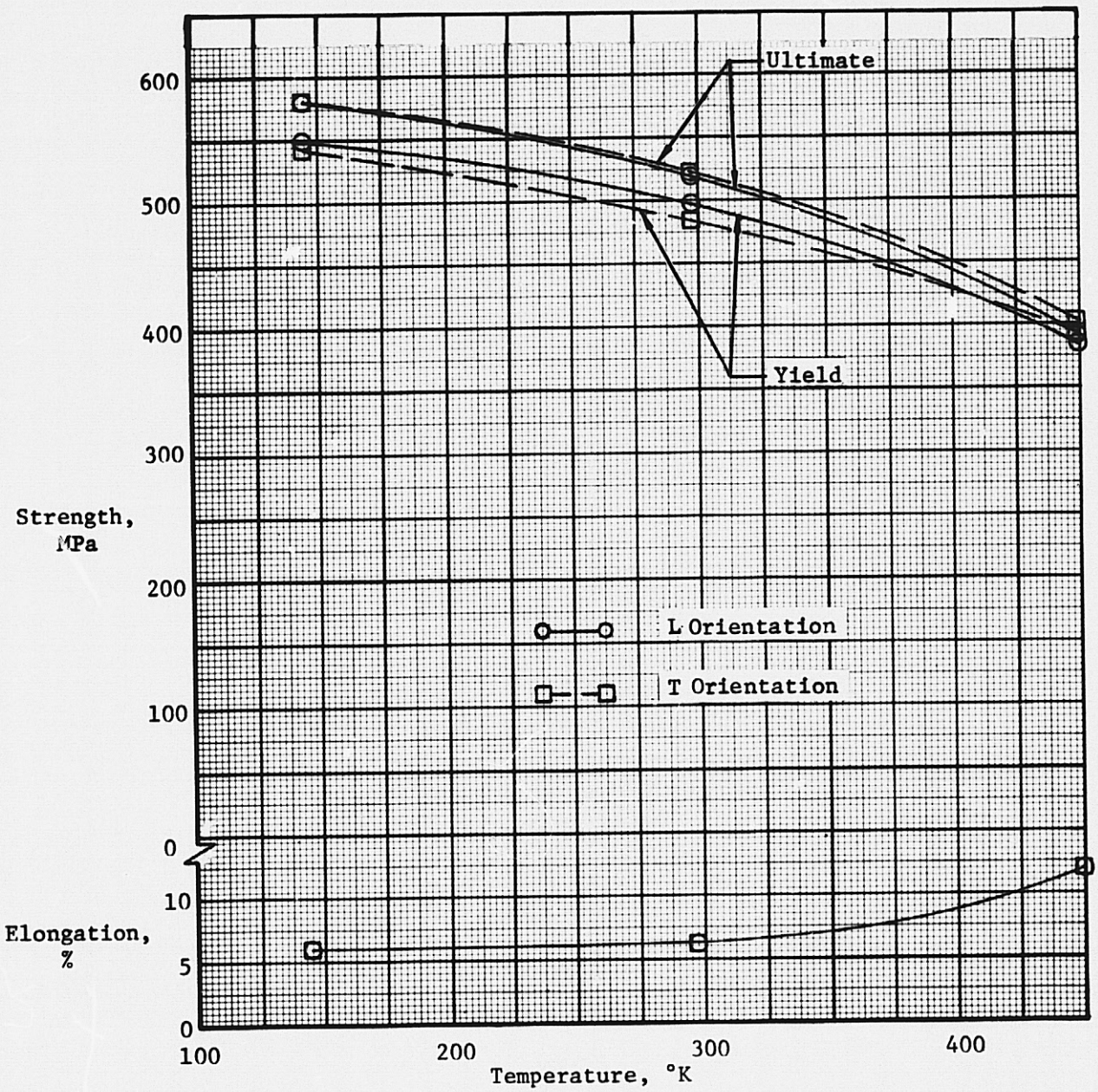


FIGURE 2-5

AVERAGE MECHANICAL PROPERTIES FOR 1.60 MM THICK 2024-T861 SHEET

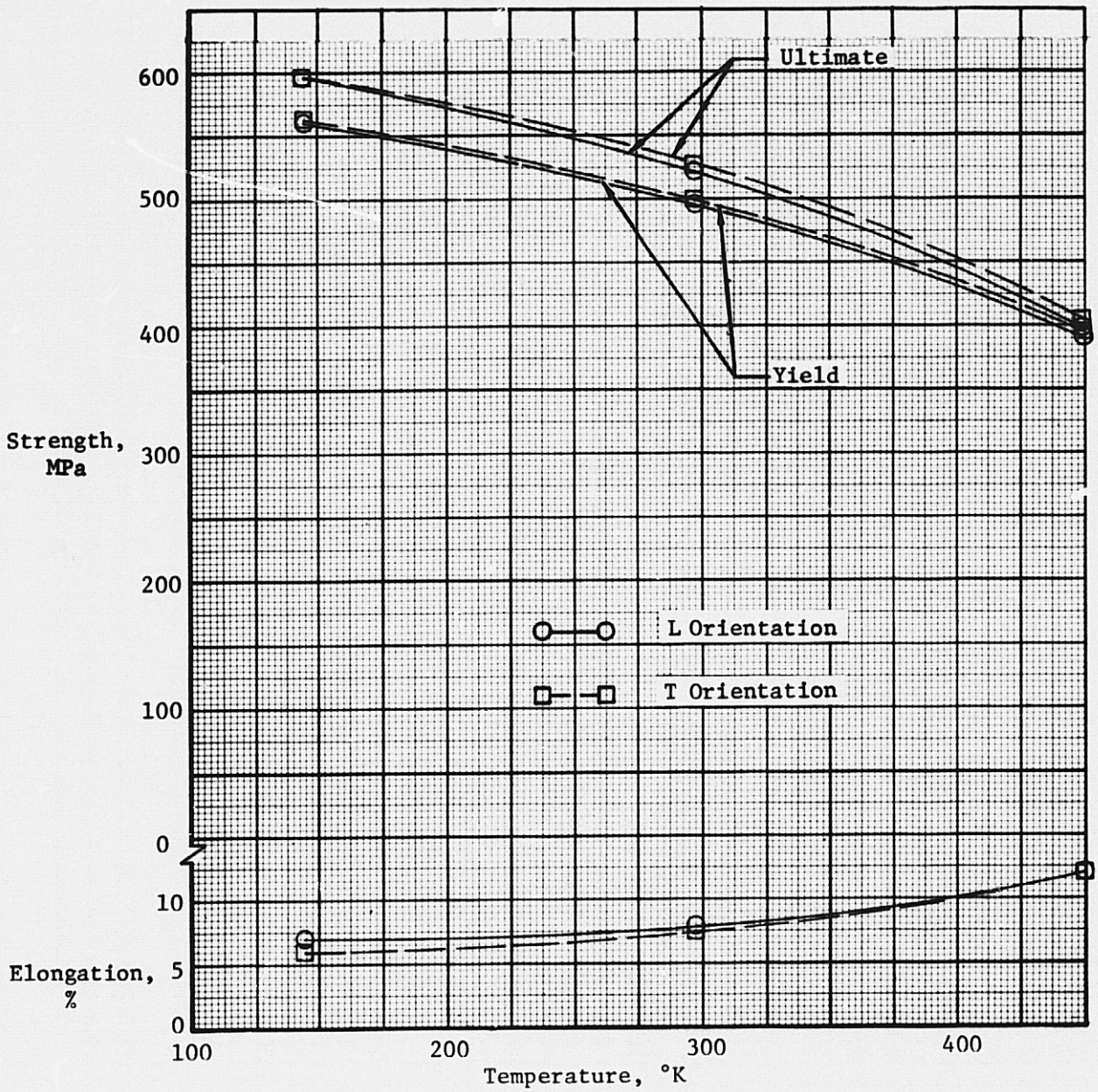


FIGURE 2-6

AVERAGE MECHANICAL PROPERTIES FOR 3.18 MM THICK 2024-T861 SHEET

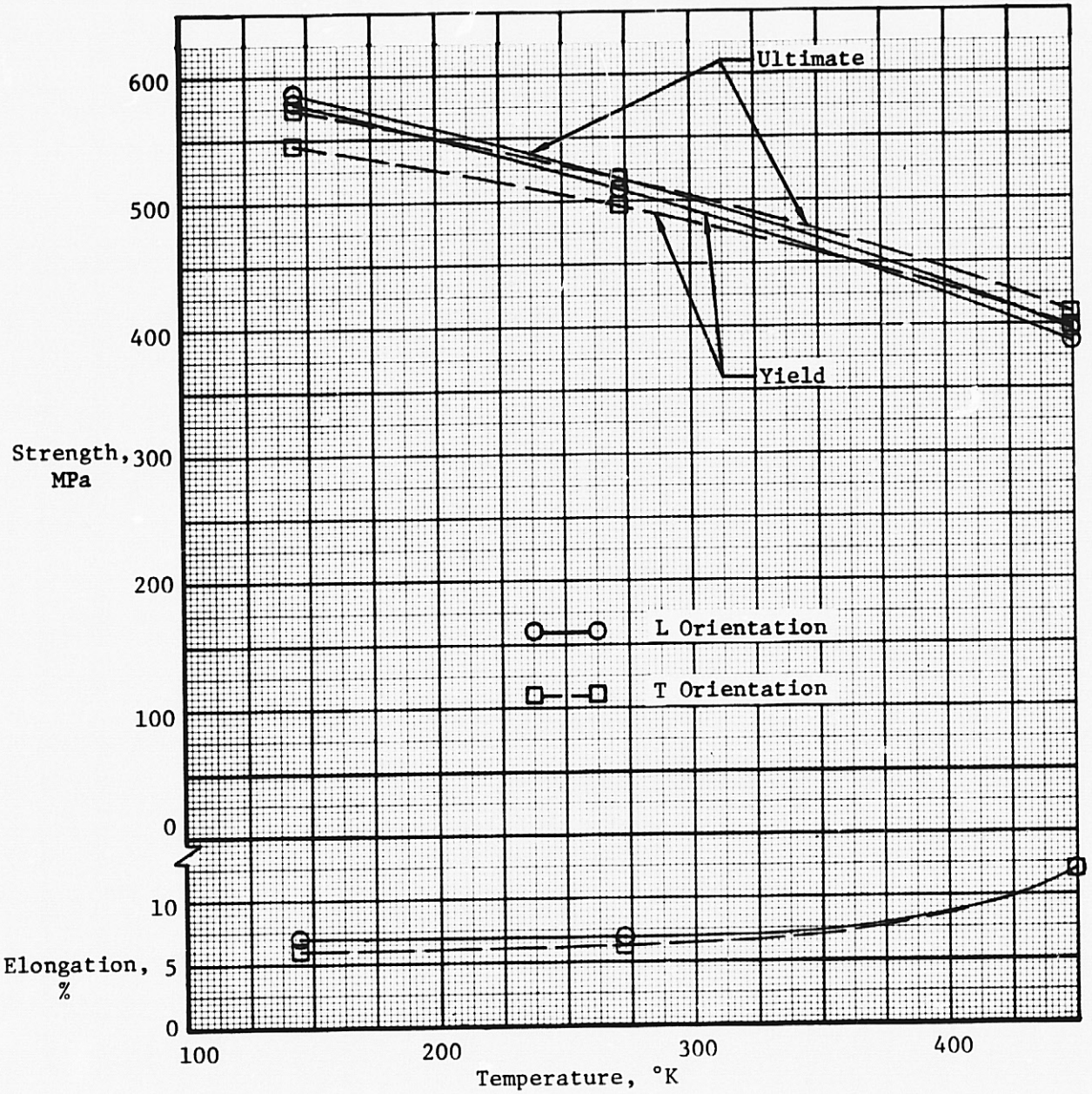


FIGURE 2-7

AVERAGE MECHANICAL PROPERTIES FOR 6.35 MM THICK 2024-T861 SHEET

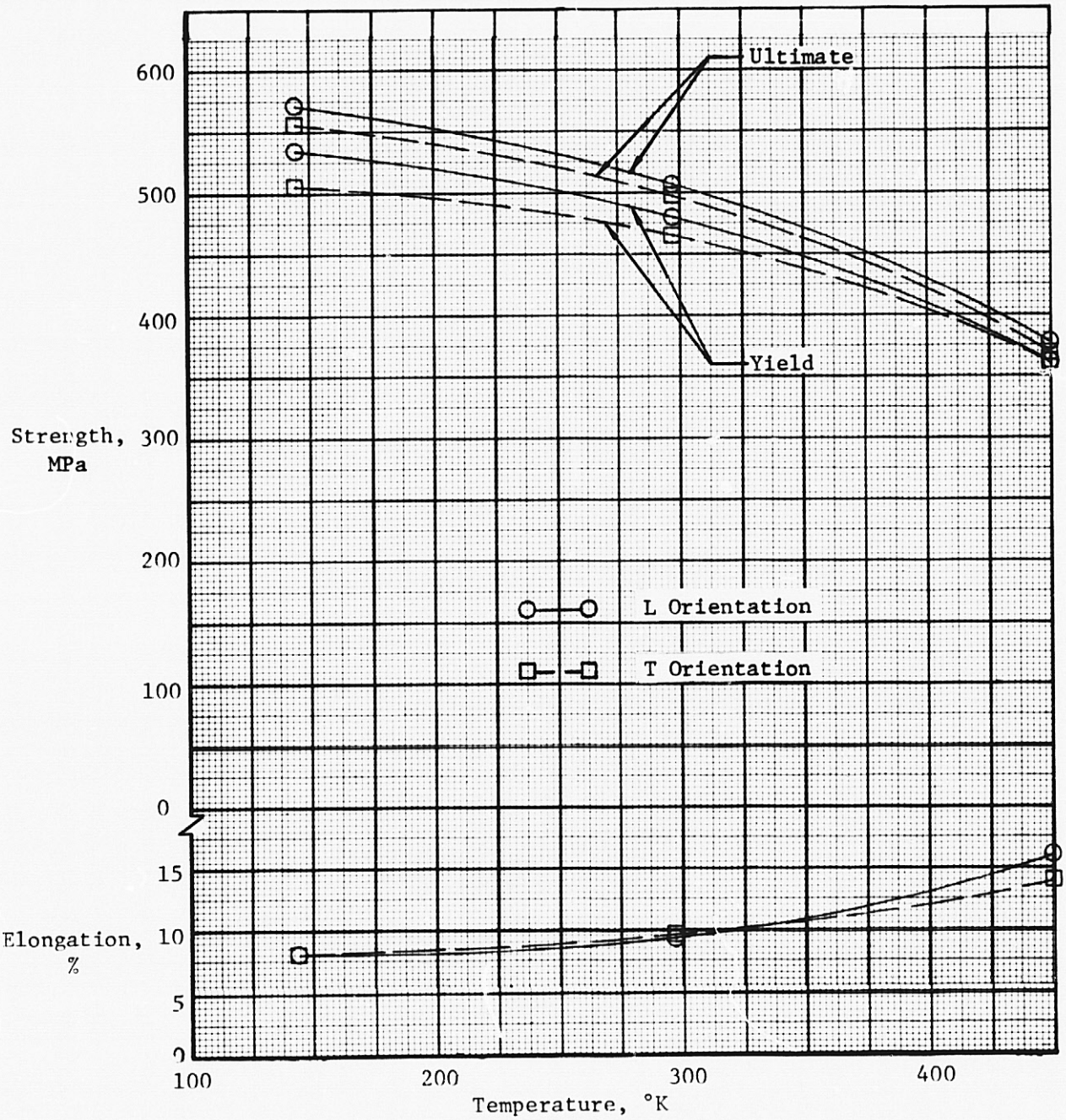


FIGURE 2-8

AVERAGE MECHANICAL PROPERTIES FOR 5.08 CM THICK 2124-T851 PLATE

Table 2-3

AVERAGE MECHANICAL PROPERTIES OF AS-RECEIVED 2024-T861 ALUMINUM ALLOY SHEET

SHEET THICKNESS mm	in	TEST TEMP. °K	°F	TEST DIRECTION	F_{ty} MPa	ksi	F_{tu} MPa	ksi	MODULUS* 10^3MPa	10^6psi	ELONGATION, % (5.08cm GAGE LENGTH)
1.60	.063	144	-200	L	549.3	79.7	581.5	84.3			6.0
		298	+ 70	L	497.8	72.2	518.5	75.2			6.3
		450	+350	L	385.0	55.8	391.9	56.8			12.0
1.60	.063	144	-200	T	543.0	78.8	582.6	84.5			6.0
		298	+ 70	T	484.4	71.7	522.6	75.8			6.3
		450	+350	T	393.0	57.0	402.2	58.3			12.0
3.18	.125	144	-200	L	560.8	81.3	597.6	86.7	78.53	10.7	7.0
		298	+ 70	L	496.4	72.0	522.6	75.8	71.02	10.1	7.8
		450	+350	L	391.3	56.8	397.6	57.7	58.54	9.8	12.0
3.18	.125	144	-200	T	563.1	81.7	596.4	86.5			6.0
		298	+ 70	T	498.5	72.3	528.8	76.7			7.5
		450	+350	T	396.5	57.5	403.4	58.5			12.0
6.35	.250	144	-200	L	579.2	84.0	586.1	85.0			7.0
		298	+ 70	L	510.2	74.0	517.1	75.0			6.8
		450	+350	L	386.1	56.0	396.5	57.5			12.0
6.35	.250	144	-200	T	546.5	79.3	574.6	83.3			6.0
		298	+ 70	T	497.8	72.2	517.1	75.0			6.3
		450	+350	T	397.8	57.7	409.1	59.3			12.0

*MODULUS VALUES OBTAINED FROM STRAIN-GAGED SPECIMENS

were mounted on both sides of the specimens and appropriately wired to eliminate bending effects. Each specimen was elastically loaded and unloaded several times in order to produce sets of load/strain data at 144, 294 and 450°K (-200, 70, 350°F). A least squares regression analysis was performed on each data set to yield an average value of elastic modulus. These average modulus values and the average values for the other mechanical properties listed in Appendix A are summarized in Tables 2-3 and 2-4.

Besides measuring the mechanical properties, the as-received materials were further characterized using spectrographic and metallographic techniques. A set of coupons representing each alloy/thickness combination was chemically analyzed using the spectrographic procedures set forth in ASTM-E-101-67. The results of

Table 2-4

AVERAGE MECHANICAL PROPERTIES OF AS-RECEIVED 2124-T851 ALUMINUM ALLOY PLATE

TEST TEMPERATURE °K	°F	SPECIMEN ORIENTATION	F_{ty} MPa	ksi	F_{tu} MPa	ksi	ELONGATION, % (5.08 cm GAGE LENGTH)
144	-200	L	534.4	77.5	571.1	82.8	8.0
294	+ 70	L	479.2	69.5	506.8	73.5	9.3
450	+350	L	362.0	52.5	377.2	54.7	16.0
144	-200	T	506.8	73.5	556.2	80.7	8.0
294	+ 70	T	465.4	67.5	497.8	72.2	9.5
450	+350	T	362.0	52.5	368.9	53.5	14.0

this analysis are presented in Table 2-5, together with the chemistry requirements of the applicable specifications. Examination of this table indicates that the chemistry of the alloys used in this program were within specifications.

A second set of coupons was examined metallographically; the results are shown in Figures 2-9 through 2-12. These photomicrographs all show the elongated grains that are typical of wrought products. The structures consist of an aged aluminum solid solution matrix with insoluble particles of Al-Cu-Fe-Mn intermetallic compounds. Comparison of the three photomicrographs of the 2024-T861 alloy (Figures 2-9, 2-10 and 2-11) shows that sheet thickness has little effect on microstructure. However, the structure of the 2124-T851 plate (Figure 2-11) shows that the volume fraction, average size, and distribution of the particles of intermetallic compounds have significantly decreased. This decrease can be

Table 2-5

ANALYSIS OF AS-RECEIVED MATERIAL

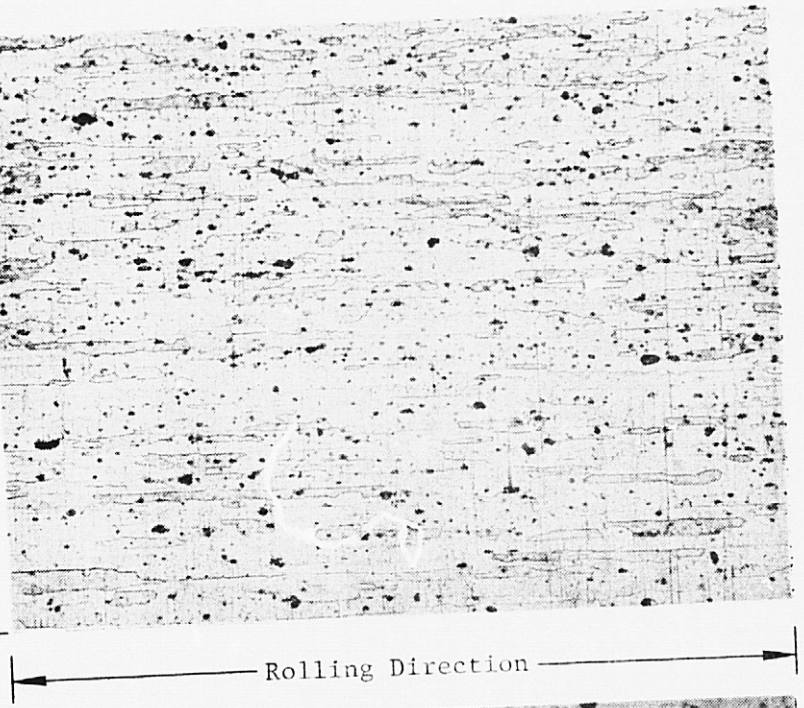
ELEMENT	2024-T861				2124-T851	
	QQA-250/4 SPECIFICATION	AS-RECEIVED THICKNESS			QQ-A-250/29 SPECIFICATION	AS-RECEIVED 50.8 mm (2.0 INCH) THICK
		1.60 mm (.063 INCH)	3.18 mm (.125 INCH)	6.35 mm (.250 INCH)		
Cu	3.8 - 4.9	4.67	4.40	4.70	3.8 - 4.9	4.43
Mg	1.2 - 1.8	1.31	1.25	1.36	1.2 - 1.8	1.21
Mn	0.3 - 0.9	0.53	0.58	0.63	0.3 - 0.9	0.48
Fe	0 - 0.5	0.23	0.24	0.24	0 - 0.3	0.12
Zn	0 - 0.25	0.20	0.13	0.12	0.- 0.25	<0.03
Si	0 - 0.50	0.20	0.19	0.19	0 - 0.20	0.15
Ti	-	0.032	0.036	0.035	0 - 0.15	0.023
Cr	0 - 0.10	0.016	0.016	<.01	0 - 0.10	<.002

attributed to the cleaner chemistry of the 2124 alloy, as indicated in Table 2-5. The slightly lower strength and higher ductility of the 2124 alloy is related to its cleaner chemistry, as well as the thermo-mechanical processing differences between the T851 and the T861 conditions.

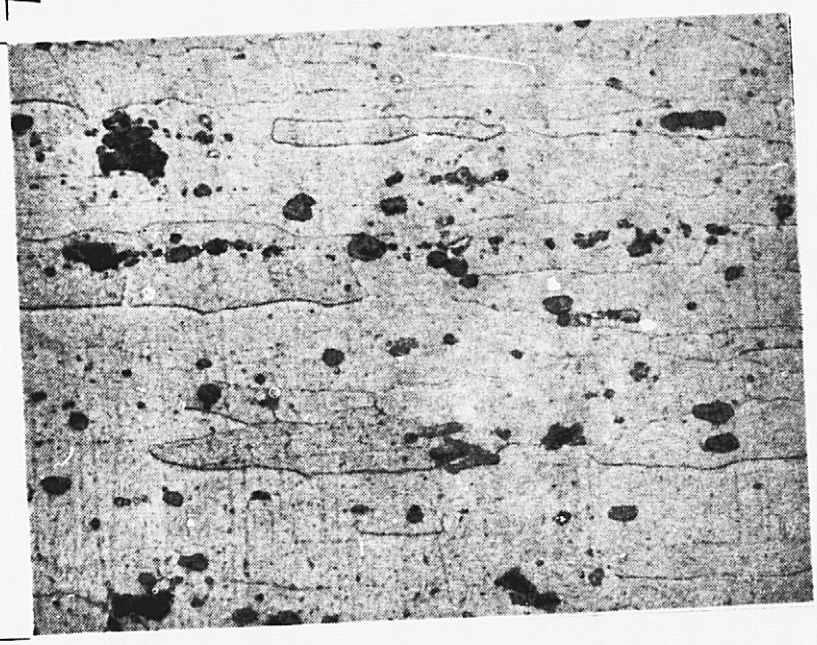
2.4 REFERENCES

2-1. Alcoa Aluminum Handbook, Aluminum Company of America, 1967.

MAGNIFICATION: 100X



MAGNIFICATION: 500X

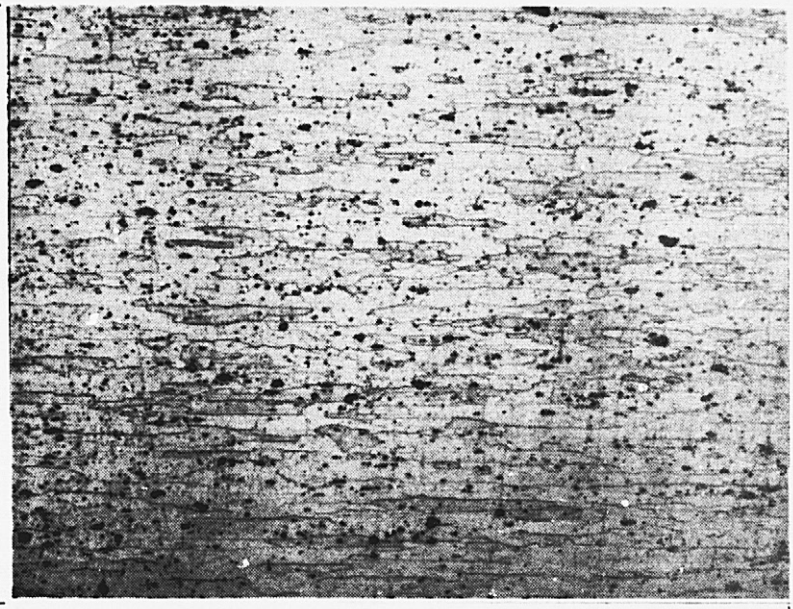


ETCHANT: 7 grams $(NH_4)_2 S_2O_8$, 1 ml HF, 99 ml H_2O

FIGURE 2-9

MICROSTRUCTURE OF AS-RECEIVED 1.60 MM THICK 2024-T861 SHEET

MAGNIFICATION: 100X



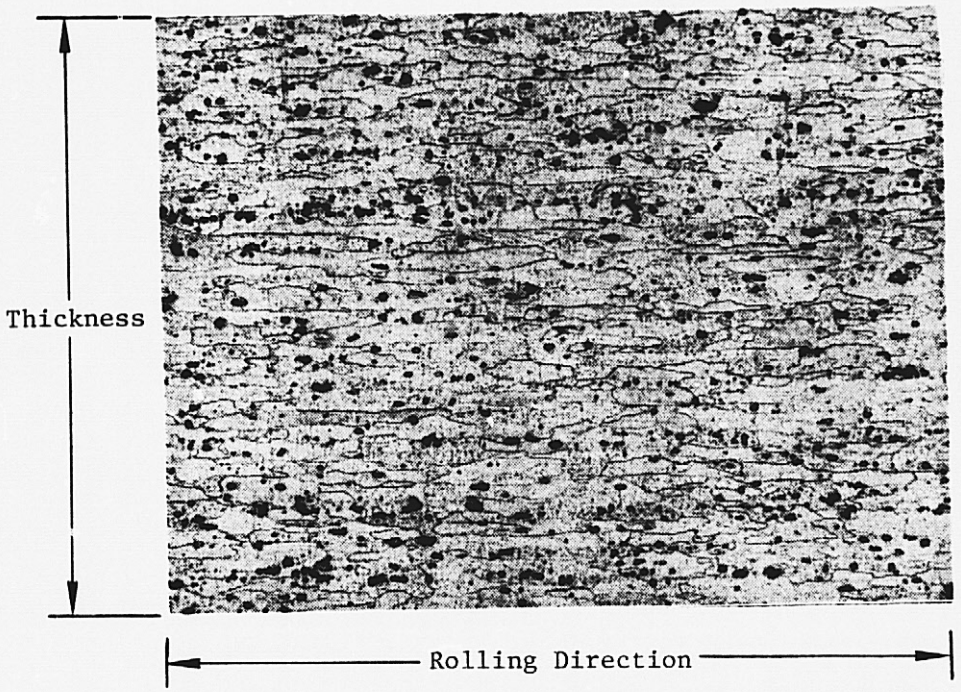
MAGNIFICATION: 500X

ETCHANT: 7 grams $(NH_4)_2 S_2O_8$, 1 ml HF, 99 ml H_2O

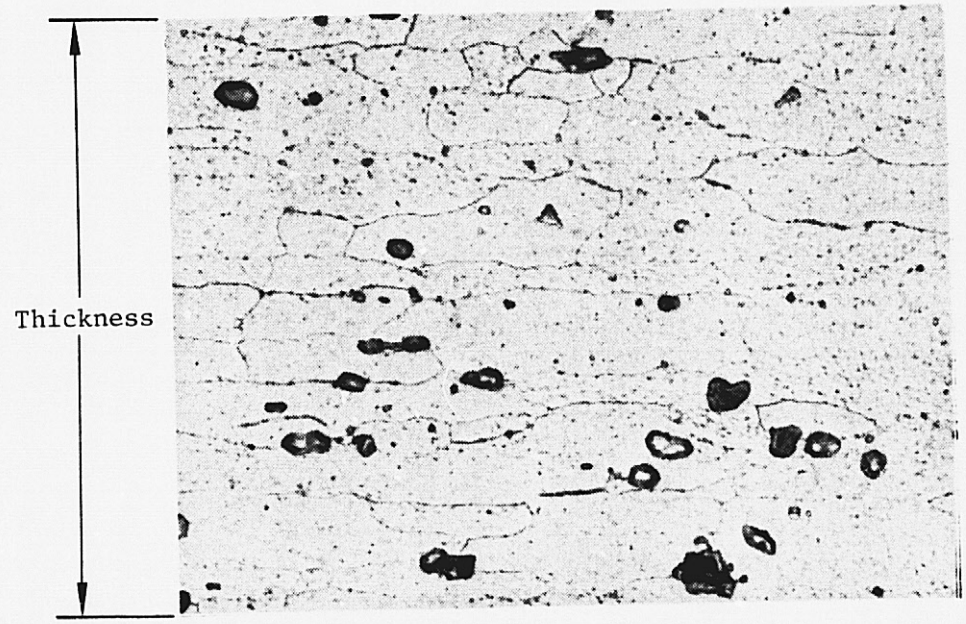
FIGURE 2-10

MICROSTRUCTURE OF AS-RECEIVED 3.18 MM THICK 2024-T861 SHEET

MAGNFIICATION: 100X



MAGNIFICATION: 500X

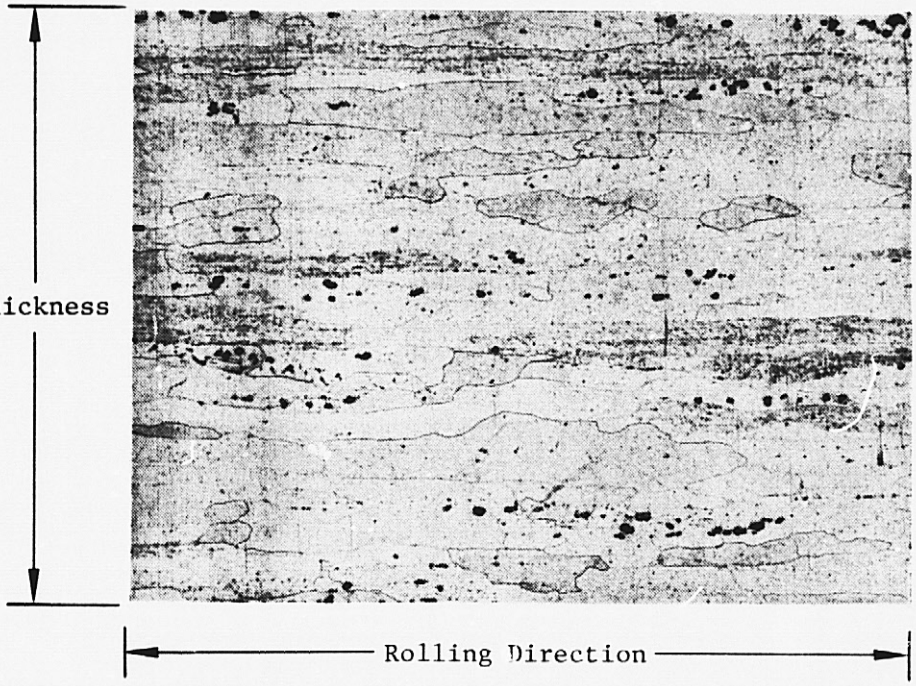


ETCHANT: 7 grams $(NH_4)_2\ S_2O_8$, 1 ml HF, 99 ml H_2O

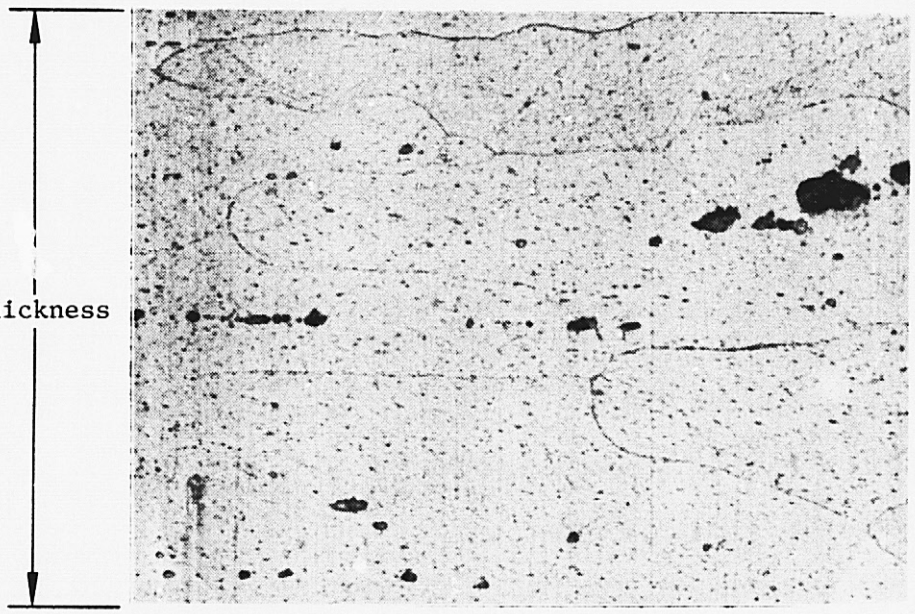
FIGURE 2-11

MICROSTRUCTURE OF AS-RECEIVED 6.35 MM THICK 2024-T861 SHEET

MAGNIFICATION: 100X



MAGNIFICATION: 500X



ETCHANT: 7 grams $(NH_4)_2 S_2O_8$, 1 ml HF, 99 ml H_2O

FIGURE 2-12

MICROSTRUCTURE OF AS-RECEIVED 5.08 CM THICK 2124-T851 PLATE

Section 3
FRACTURE TOUGHNESS TESTING

The specimen thicknesses selected for testing under this program were not thick enough to produce plane strain conditions over all expected stress ranges. As a result, stable flaw growth with significant plastic deformation at the crack tip was expected to occur prior to the onset of crack instability. Under plane strain conditions, little or no stable flaw growth occurs prior to instability because of the severe constraint imposed by the tritensile stress state at the crack tip; ASTM E-399-74 (Reference 3-1) defines the critical stress intensity, K_{Ic}, as the load at which two per cent crack extension occurs. Under such constraint, the size of the crack-tip plastic region is small compared with the crack size and the specimen dimensions. Because conditions of plane stress were expected to occur for all tests, the stress intensity at crack instability could not be defined using the procedure specified in Reference 3-1. The most informative method available for presenting plane stress fracture data is the crack growth resistance curve. These R-curves, plotted as stress intensity vs. crack extension, yield quantitative information as to the amount of slow stable crack growth that precedes fracture for a given material. Moreover, they can be used to define the plane stress critical stress intensity, K_c, for any structural configuration for which the interrelationship of stress intensity, applied load, and flaw size is known.

3.1 COMPLIANCE CALIBRATION

In order to produce crack growth resistance curves, the crack length must be monitored throughout each test. The primary method used in this program to obtain

this information is similar to that described in Reference 3-1, in which a double beam displacement gage monitors the relative displacement of two positions spanning the crack. For the fracture toughness tests conducted under this program, the double beam displacement gage described in Reference 3-1 was inserted between two knife edges attached to the specimen as shown in Figure 3-1. These knife edges were fabricated with probes on one side that had semicircular tips that fit the 3.18 mm (0.125 inch) diameter hole drilled at the center of the specimen.

Prior to the initiation of fracture toughness testing, the relationship between crack opening displacement, applied load and crack length had to be established for the particular specimen geometry and displacement gage position adopted for the testing. This relationship was established by conducting a series of elastic calibration tests for various combinations of crack opening displacement, applied load and crack length. The effect of specimen thickness and temperature was also investigated.

These calibration tests were performed in a manner similar to that described in Reference 3-2, in which measurements were made of the specimen compliance (i.e., the amount of displacement per unit of applied load) at successively longer crack lengths. For these calibration tests, narrow sawcuts were used to simulate fatigue cracks; crack lengths varied from 1.27 cm (0.500 inch) to 20.3 cm (8.0 inches). At each crack length, the specimen was incrementally loaded to some maximum static load which was calculated to produce a predetermined value of stress intensity, K_{max}. At each load level, the crack-opening-displacement (COD) of the 3.18 mm (0.125 inch) diameter hole at the center of the sawcut was measured with the displacement gage. The specimen compliance, (COD)/P, at each crack length was calculated by performing a least squares analysis on the data pairs.

Initial calibration tests were conducted using two 6.35 mm (0.250 inch) and one 1.60 mm (0.063 inch) thick 2024-T861 specimens and a maximum stress intensity

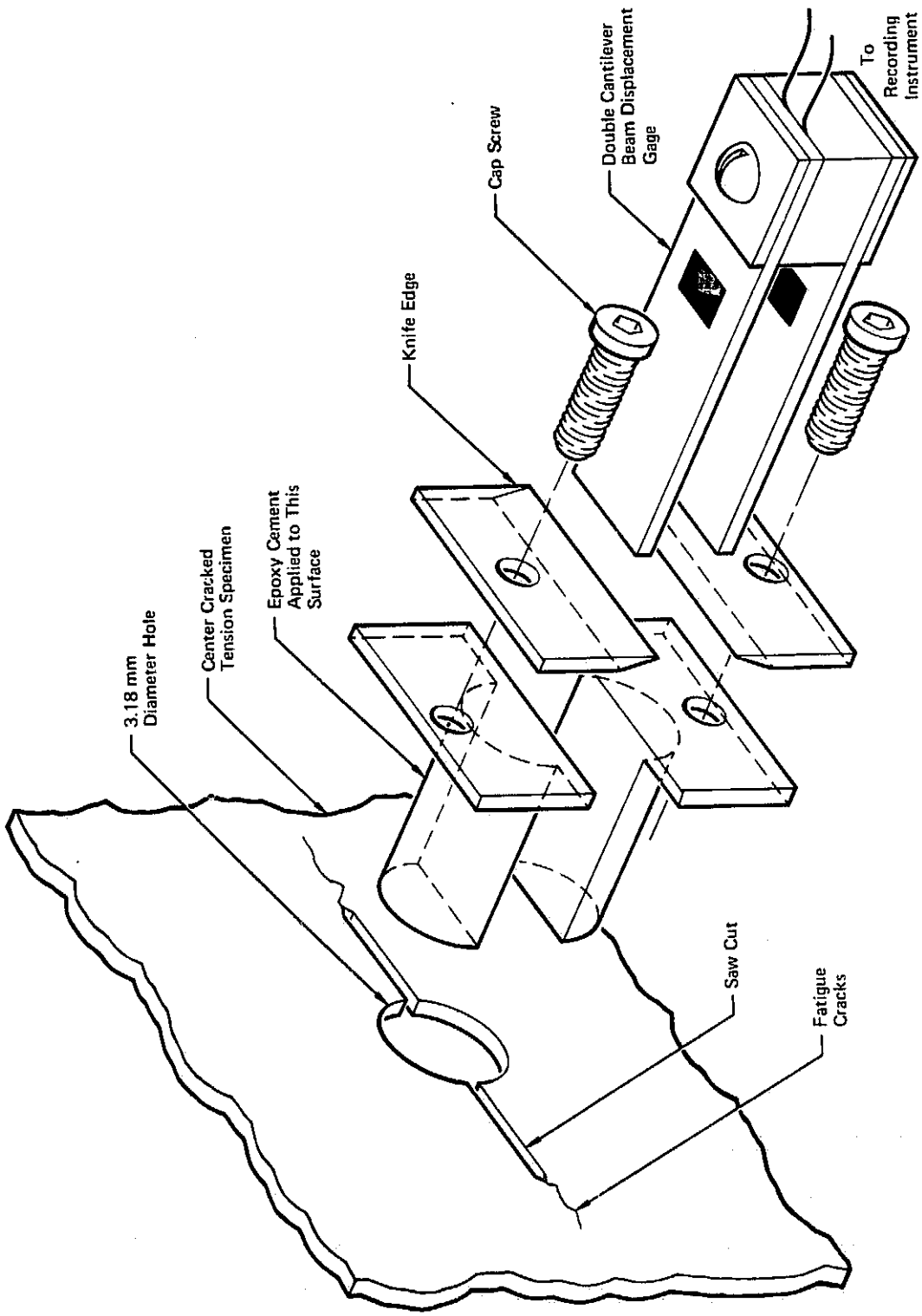


FIGURE 3-1

INSTRUMENTATION TECHNIQUE FOR OBTAINING CRACK OPENING DISPLACEMENT (COD) MEASUREMENTS

of 13.1 MPa $\sqrt{m}$ (12 ksi $\sqrt{in.}$), a value approximately half the K_{Ic} value (References 3-3 to 3-6). In order to maintain this value as crack size increased, the maximum static load was decreased. The following equation was used to relate stress intensity, full section stress and crack length:

$$K = \sigma \sqrt{\pi a}\, Z \qquad (3\text{-}1)$$

where σ = full section stress

a = half crack length

Z = finite width correction factor

$= \sec(\pi a/w)$

The compliance/crack length data obtained from these three specimens were normalized to account for differences in thickness and specimen width. Inspection of this normalized data indicated an unacceptably high degree of scatter. Analysis of the experimental technique showed that the scatter could be attributed to the condition of the test specimens and the loads used in calibration. Inspection of several as-machined specimens of 2024-T861 sheet of various thicknesses showed the flatness to be within 0.2 per cent, measured over a 75.57 cm (29.75 inch) contact length. Although this curvature is well within AMS specifications for aluminum sheet (i.e., AMS 2202J), inconsistent compliance readings were obtained because the uniaxial tensile loads used during this initial phase of compliance testing were not great enough to fully eliminate the curvature. This sensitivity of specimen compliance to applied load is well portrayed in the load/deflection data of Figure 3-2. This data was obtained on a 6.34 mm (0.250 inch) thick 2024-T851 specimen that contained a 20.3 cm (8.0 inch) long sawcut. For loads up to 44,500 N (10 kips), the specimen compliance ($\Delta COD/\Delta P$) is 4.344 mm/MN (0.7586×10^{-6} in./lb.); for loads up to 80,100 N (18 kips), this value increases approximately four percent to 4.513 mm/MN (0.7×10^{-6} in./lb.). This higher load corresponds to a stress

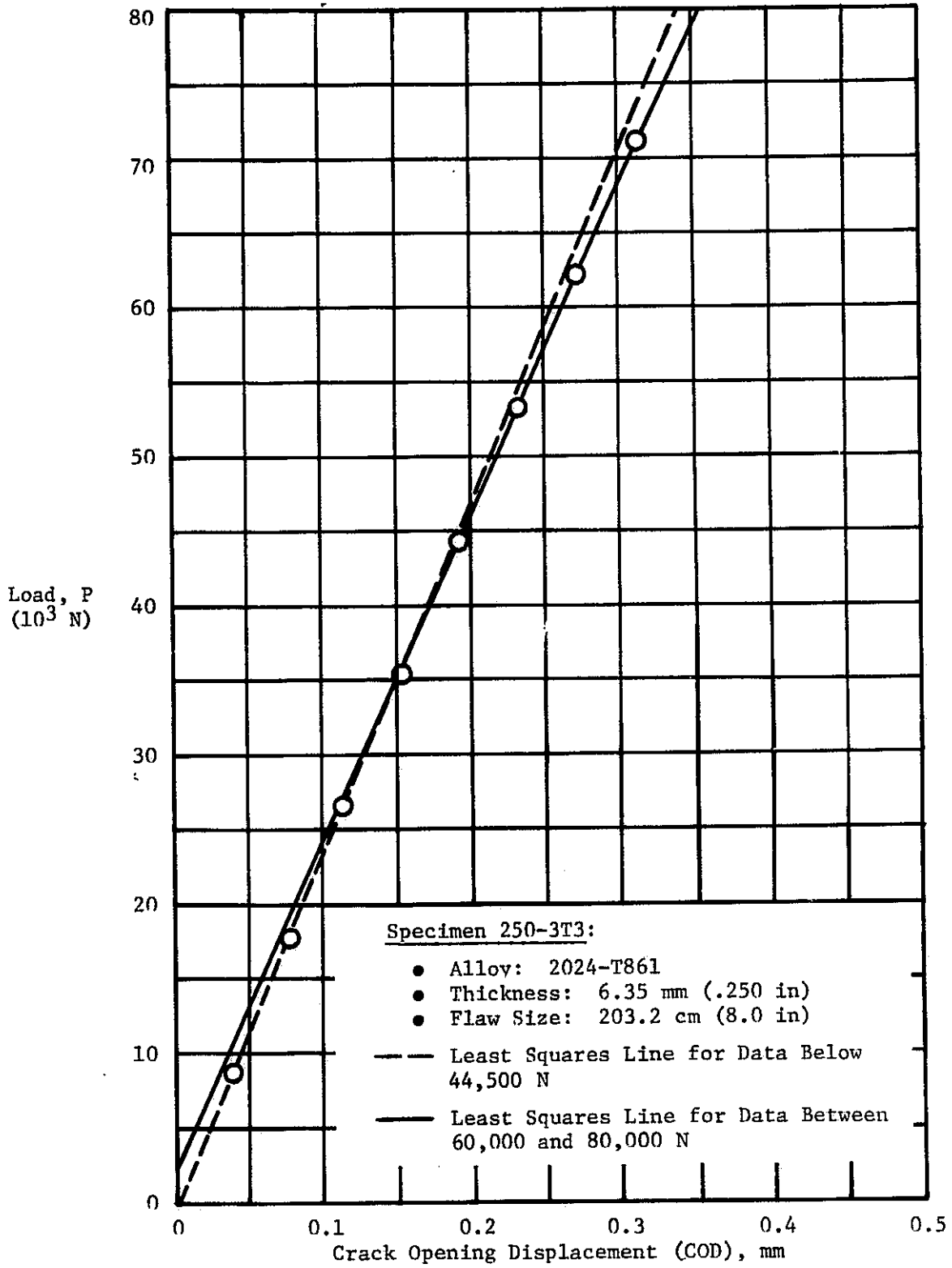


FIGURE 3-2

LOAD/CRACK OPENING DISPLACEMENT DATA FOR SPECIMEN 250-3T3

intensity of approximately 22.0 MPa $\sqrt{m}$ (20 ksi $\sqrt{in.}$), or approximately 80 percent of the average K_{Ic} value used previously.

In order to produce more consistent compliance calibration curves, four additional specimens were calibrated using a maximum stress intensity of 22.0 MPa $\sqrt{m}$ (20 ksi $\sqrt{in.}$). The specimens used for these tests were a 2124-T851 specimen with a thickness of 11.4 mm (0.450 inch) and three 2024-T861 specimens with thicknesses of 1.60, 3.18 and 6.35 mm (0.063, 0.125 and 0.250 inch). The 6.35 mm (0.250 inch) thick 2024-T861 specimen was calibrated at 144, 294 and 450°K (-200, 70 and 350°F) by cooling or heating the specimen to the desired temperature for each crack length investigated. The low and elevated temperatures were obtained using the procedures described in Section 3.2.2. Because buckling effects were expected to influence the compliance readings, the two thinnest gage 2024-T861 specimens were calibrated both with and without Teflon-coated stiffener plates clamped across the specimen width above and below the crack. For the 3.18 mm (0.125 inch) thick specimen, compliance data was obtained over the same range of crack lengths for both the stiffened and unstiffened conditions. However, for the 1.60 mm (0.063 inch) thick specimen, compliance data in the unstiffened condition could only be obtained for crack lengths less than half of the specimen width. Crack lengths larger than this value caused such large out-of-plane deflections that the compliance gage could no longer be supported on the knife edges attached to the specimen. When stiffener plates were used, compliance data was obtained over the full range of crack lengths investigated.

For the compliance tests performed at higher stress intensities, load/COD data was obtained for K values between 0 and 22 MPa $\sqrt{m}$ (0-20 ksi $\sqrt{in.}$); however, only data in the range 13.1-22 MPa $\sqrt{m}$ (12-20 ksi $\sqrt{in.}$) was used to compute compliance values; such procedures avoided undesirable bending effects introduced by specimen curvature at the lower loads. The elastic compliance data obtained from these

calibration tests, including the actual load/displacement data, is reported in Appendix B.

The elastic compliance data shown in Appendix B was compared to a mathematical model of the center cracked tension specimen. Since crack-opening-displacement (COD) measurements were made at either end of a 3.18 mm (0.125 inch) diameter hole drilled at the center of the crack in each specimen, the experimentally measured compliance values could be compared directly with those predicted by the equation presented below, as taken from Reference 3-7. The vertical deflection (V_o) along the positive y-axis in Figure 3-3 under an elastic load can be described by the equation:

$$V_o = \frac{2a\,\sigma}{E} \tag{3-2}$$

where a = half crack length

σ = applied stress

= P/(tw)

P = applied load

t = specimen thickness

w = specimen width

E = modulus

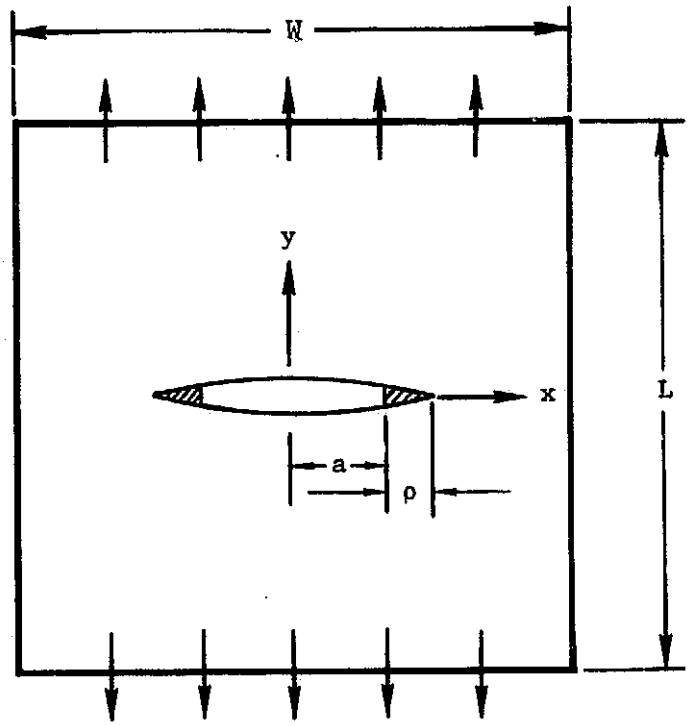
Because of symmetry, the COD measured across a 3.18 mm (0.125 inch) diameter hole is

$$(COD) = 2\,V_o = \frac{4a\,\sigma}{E} \tag{3-3}$$

Since compliance is defined as the amount of deflection per unit applied load, the elastic compliance of the specimen across the hole is

$$C = \frac{2\,V_o}{P} = \frac{4a}{twE} \tag{3-4}$$

Equation (3-4) predicts the elastic compliance of a center cracked tensile specimen having a flaw length that is small compared to the specimen width. For larger flaws, finite width effects can be accounted for by employing a finite width correction factor;



a = half crack length

ρ = radius of plastic zone

W = specimen width

L = specimen length

FIGURE 3-3

DUGDALE MODEL OF A CENTER-CRACKED TENSION SPECIMEN

the secant function described in Reference 3-8 has been shown to accurately account for such effects. Incorporating this term, equation (3-4) can be rewritten as:

$$C = \frac{4a}{twE} \cdot Z \qquad (3\text{-}5)$$

where Z = finite width correction factor

= sec ($\pi a/w$)

Equation (3-5) was used to predict the compliance data of Appendix B for each flaw size/temperature/thickness combination investigated. The results of this

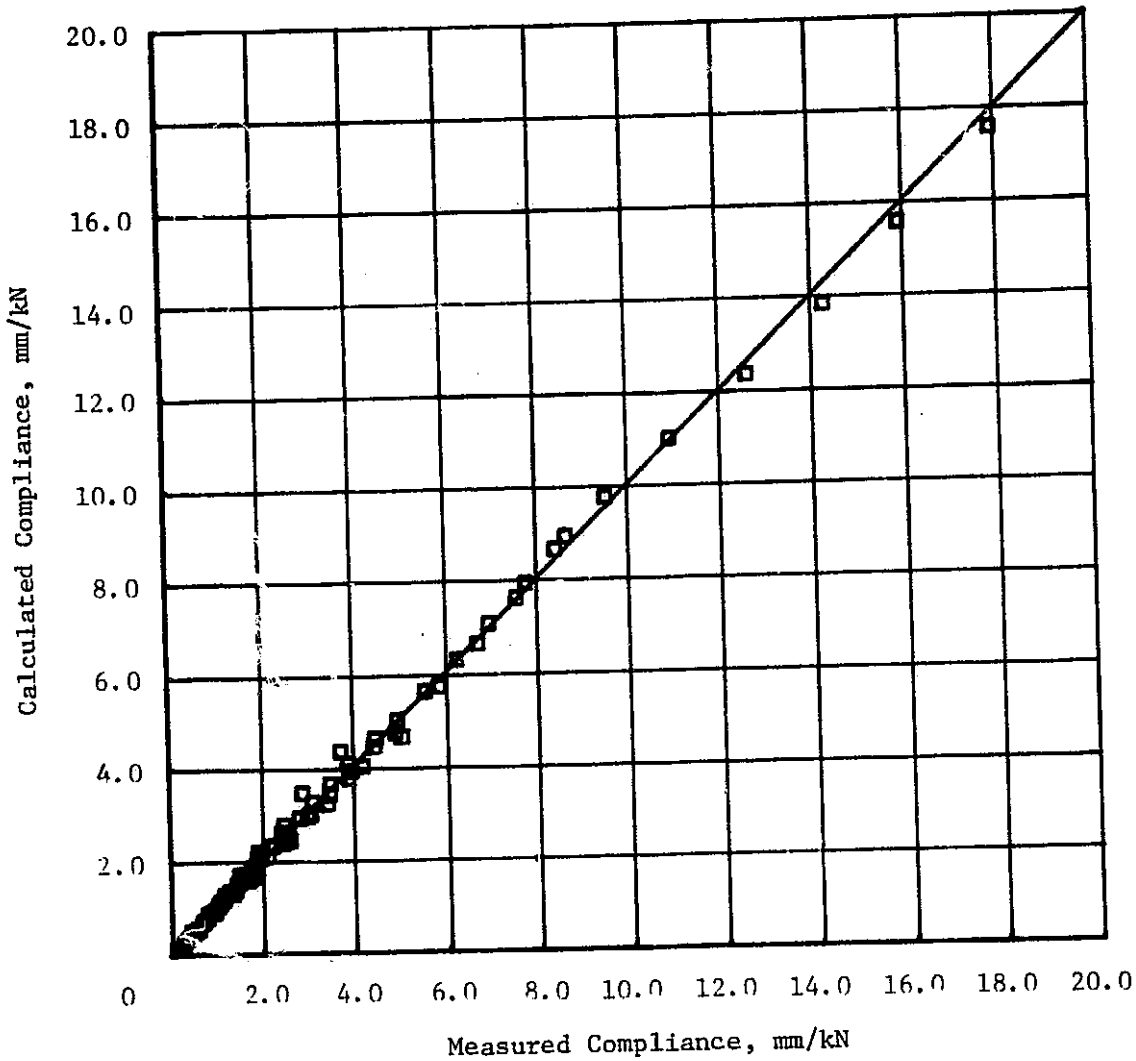


FIGURE 3-4

CALCULATED VS MEASURED COMPLIANCE VALUES FOR STIFFENED THIN GAGE SPECIMENS
(Equation 3-5 used to obtain calculated values)

analysis, shown in Figure 3-4, indicate excellent agreement between calculated and measured compliance values for all data where buckling effects were suppressed. A regression analysis was performed on the compliance data of Appendix B using equation (3-5); a correlation coefficient of 0.993 and a standard error of estimate of 0.072 was obtained.

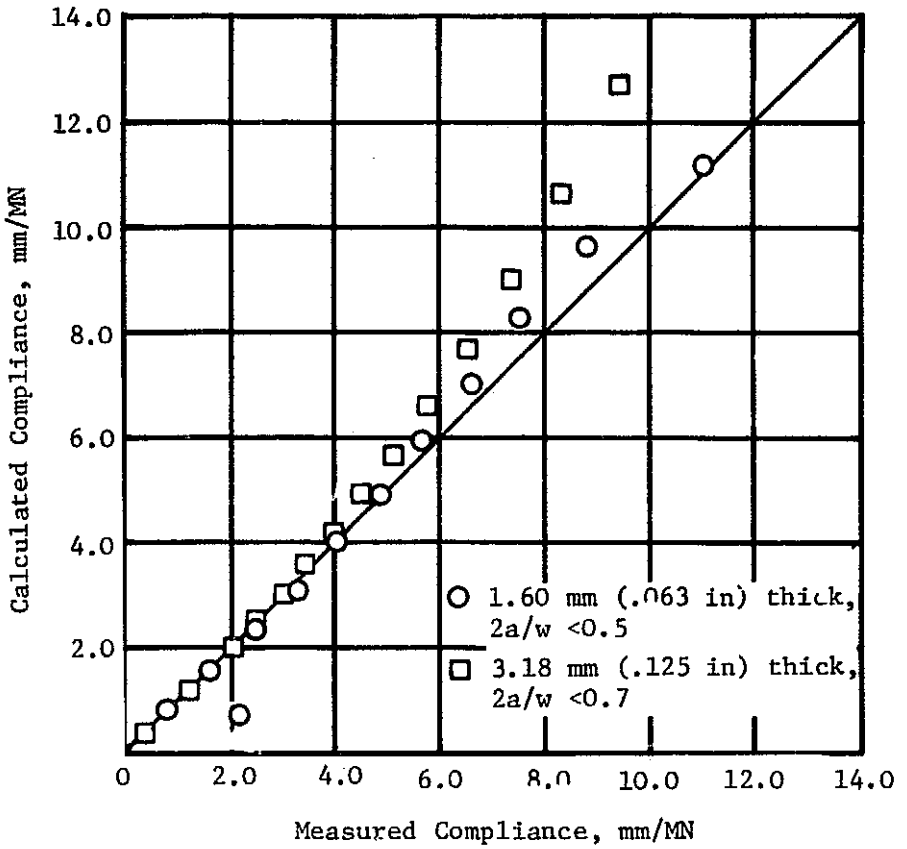


FIGURE 3-5

CALCULATED VS MEASURED COMPLIANCE VALUES FOR UNSTIFFENED THIN GAGE SPECIMENS

Attempts were made to use equation (3-5) to predict the compliance of specimens when buckling was allowed to occur. The results, shown in Figure 3-5, indicate that, at the higher values, the elastic compliance calculated using equation (3-5) does not agree well with that measured from the slope of the appropriate load/COD data in Appendix B. Such results are expected, since out-of-plane deflections essentially reduce the vertical in-plane displacement component at the edges of the crack. It is known (Reference 3-9) that such out-of-plane deflections increase with both crack size and applied load. As a result, larger

than actual flaw sizes would be predicted using equation (3-5). Since no mathematical model has yet been developed to accurately relate flaw size to crack opening displacement when buckling occurs, it was concluded that the displacement gage technique is not applicable to unstiffened toughness tests.

Although equation (3-5) can be used to interpret the load/COD data obtained from the toughness tests where buckling does not occur, its use would introduce some error into the prediction of crack length, since it is valid only for elastic loading conditions. At high loads, significant plastic deformation is likely to occur ahead of the crack tip, thus making some contribution to the crack opening displacement measurement. If such contributions are ignored, a larger crack length than actually exists will be predicted by equation (3-5), and any fracture toughness parameter based on this flaw size will be unrealistically high. Since the data generated under this program is to be used for fracture control analyses, such predictions might result in inaccurate predictions of component life as well as optimistic standards for nondestructive inspection. As a result, another relationship was investigated that takes into account the size of the plastic zone ahead of the crack tip. This equation, developed by Forman (Reference 3-10), is based on the Dugdale model (Figure 3-3) for a crack in tension under plane stress with a yield zone at the crack tip. The vertical deflection along the positive y-axis for this case is predicted to be:

$$V_o = \frac{\sigma a}{E(2\beta)} \ln\left[\frac{\sin\beta + 1}{\sin\beta - 1}\right]^2 \qquad (3\text{-}6)$$

where $\beta = \frac{\pi}{2} \frac{\sigma}{F_{TY}}$

F_{TY} = yield strength

This equation can be simplified to:

$$V_o = \frac{a F_{TY}}{\pi E} \ln\left[\frac{\sin\beta + 1}{\sin\beta - 1}\right]^2 \qquad (3\text{-}7)$$

The compliance can then be expressed as:

$$C = \frac{2\ V_o}{P} = \frac{2a\ F_{TY}}{\pi\ EP} \quad \ln \left[\frac{\sin\ \beta + 1}{\sin\ \beta - 1}\right]^2 \qquad (3\text{-}8)$$

The use of equation (3-8) is strictly limited to materials which undergo no strain hardening. However, the use of this equation was considered appropriate because the strain hardening exhibited by the alloys evaluated was small; i.e., the ratio of yield to ultimate strength varied from .91 to .98.

To determine the accuracy of equation (3-8), several fracture toughness specimens were loaded, unloaded and reloaded prior to failure in an attempt to separate plasticity effects from actual crack extension. Initial attempts at applying equation (3-8) to these load/COD curves resulted in crack length predictions which significantly underestimated the actual values at the point of unloading. A procedure similar to that outlined in Reference 3-11 was used in which equation (3-5) is first used to compute the initial flaw size from the elastic portion of the load/COD curve. These values and the actual values obtained from measurements of the fracture surface are compared and any differences added or subtracted from subsequent determinations of flaw size made using the load/COD curve and equation (3-8). Frequently, this adjustment was of the same order of magnitude as the amount of actual flaw extension.

Analysis of this procedure indicated that the conservative results obtained using this procedure were primarily caused by a difficulty in determining the actual origin of each load/COD curve. Due to such effects as crack closure forces, slack in the loading train, and specimen warpage, the first few thousand pounds of applied load usually produced a load/COD curve which was nonlinear, even though the applied load was fully elastic. This nonlinearity near the origin makes it extremely difficult to make accurate crack length predictions using equation (3-8). This equation is especially sensitive to the position of the origin of the load/COD

curve, since actual load/COD coordinates are required for computation of flaw size. Such is not the case for equation (3-6), which requires only that the slope of the load/COD curve be established.

To circumvent these problems, a procedure was developed that involved using equation (3-5) to plot an "ideal" load/COD curve for each specimen based on the initial flaw size measurement obtained from the fracture surface. This curve was plotted on transparent paper using the same scale factors as the experimental load/COD curve; it was then superimposed on the experimental curve and adjusted until a tangency condition was obtained. The intersection of the "ideal" curve with the COD axis at zero load was then defined as the true origin for the experimental curve.

Using this procedure, crack length predictions based on equation (3-8) were made for the specimens which had been loaded and reloaded. The results, shown in Table 3-1 and plotted in Figure 3-6, indicate that more accurate crack length predictions can be made when plasticity effects are taken into account (i.e., by equation (3-8)) than if such effects are ignored, as in equation (3-5). These results are significant since all specimens analyzed were stressed to loads of more than 80 per cent of the subsequent failure load prior to unloading.

3.2 TEST PROCEDURE

A total of 126 fracture toughness tests were conducted during this phase of the program. A detailed test matrix for each alloy is presented in Table 3-2.

3.2.1 Specimen Preparation

As shown in Table 3-2, three specimens were tested for each alloy/thickness/temperature/orientation combination. A different initial flaw size was introduced into each one of these three specimens in order to cause the largest possible spread in full section failure stresses. In order to more easily ascertain the

Table 3-1

RESULTS OF CRACK EXTENSION PREDICTIONS

SPECIMEN	THICKNESS mm	THICKNESS in	INITIAL FLAW SIZE, a_o mm	INITIAL FLAW SIZE, a_o in	CRACK LENGTH AT UNLOADING ACTUAL[1] mm	ACTUAL[1] in	DUGDALE[2] mm	DUGDALE[2] in	ELASTIC[3] mm	ELASTIC[3] in	CRACK EXTENSION, Δa ACTUAL[1] mm	ACTUAL[1] in	DUGDALE[2] mm	DUGDALE[2] in	ELASTIC[3] mm	ELASTIC[3] in
63-2L3	1.64	.0647	12.68	0.499	15.16	0.597	14.35	.565	15.67	.617	2.49	.098	1.68	.066	3.00	.118
63-6T5	1.64	.0647	31.83	1.253	35.56	1.400	35.92	1.414	39.80	1.567	3.76	.148	4.11	.162	7.98	.314
125-6T1	3.26	.1282	12.95	0.510	13.74	0.541	12.95	0.510	13.21	0.520	0.79	.031	0.00	.000	0.28	.011
125-2L11	3.23	.1273	32.64	1.285	35.36	1.392	35.92	1.414	40.87	1.609	2.72	.107	3.28	.129	8.23	.324
125-3T9	3.21	.1265	35.05	1.380	41.53	1.635	42.93	1.690	47.19	1.858	6.50	.256	7.87	.310	12.17	.479
125-3T4	3.26	.1282	48.18	1.897	51.87	2.042	51.54	2.029	54.13	2.131	3.68	.145	3.38	.133	5.94	.234
1L2-256-3	6.40	.2520	28.09	1.106	15.88	0.625	15.54	0.612	17.30	0.681	1.83	.072	1.50	.059	3.25	.128
3T8-259-3	6.36	.2503	6.15	0.242	15.80	0.622	13.77	0.542	16.66	0.656	9.65	.380	7.65	.301	10.52	.414
5L1-453-1	11.43	.4500	44.17	1.739	48.54	1.911	46.81	1.843	48.29	1.901	4.39	.173	2.64	.104	4.14	.163

1. Determined from the slope of the unloading curve
2. Determined using the Dugdale model (Equation 3-8) and coordinates at point of unloading.
3. Determined using the elastic model (Equation 3-5) and coordinates at point of unloading.

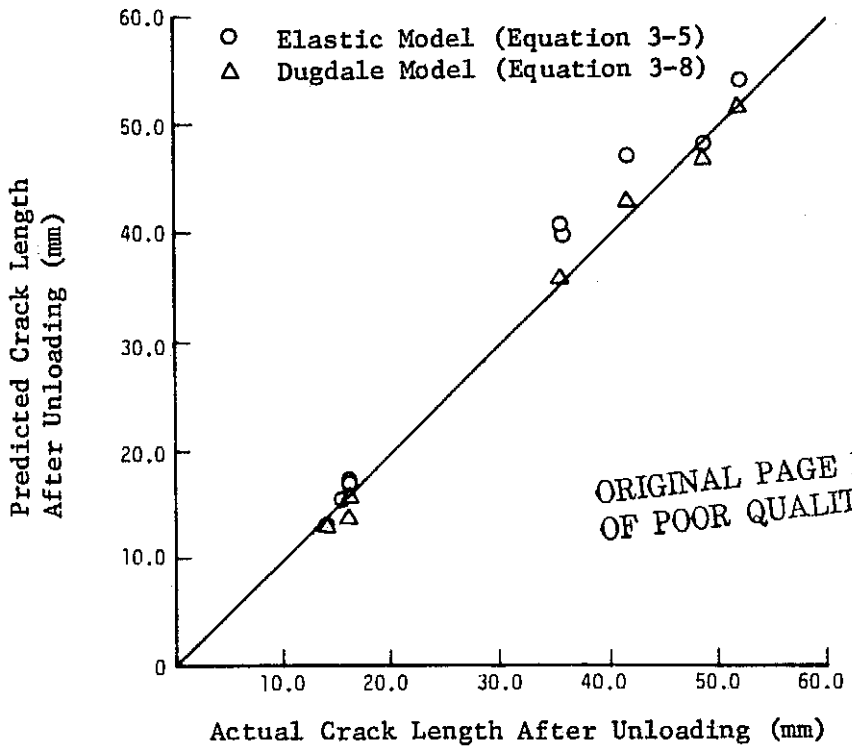


FIGURE 3-6

PREDICTED VS ACTUAL CRACK LENGTH FOR SPECIMENS LOADED AND RELOADED

Table 3-2

TEST MATRIX FOR FRACTURE TOUGHNESS TESTING

ALLOY CONSTRAINT [1] TEST DIRECTION [2]	2024-T861 STIFFENED L T	2024-T861 UNSTIFFENED L T	2124-T851 UNSTIFFENED L T
THICKNESS	1.60 mm (.063 INCH) 3.18 mm (.125 INCH)	1.60 mm (.063 INCH) 3.18 mm (.125 INCH) 6.35 mm (.250 INCH)	6.35 mm (.250 INCH) 12.70 mm (0.50 INCH)
TEMPERATURE/ENVIRONMENT	144°K (-200°F)/N_2 298°K (70°F)/LAB AIR 450°K (350°F)/LAB AIR	144°K (-200°F)/N_2 298°K (70°F)/LAB AIR 450°K (350°F)/LAB AIR	144°K (-200°F)/N_2 298°K (70°F)/LAB AIR 450°K (350°F)/LAB AIR
INITIAL FLAW SIZE [3]	SMALL MEDIUM LARGE	SMALL MEDIUM LARGE	SMALL MEDIUM LARGE
TOTAL SPECIMENS	36	54	36

1 Stiffened: Teflon-coated guide plates used to restrain buckling.
Unstiffened: No guide plates used.

L: Longitudinal
T: Transverse

3 Initial flaw sizes selected to cause the largest possible spread in full section failure loads.

effects of panel buckling, each stiffened and unstiffened test was conducted using companion specimens which contained identical initial flaw sizes.

Prior to fracture toughness testing, a sharp central notch was cut in each specimen using a 0.25 mm (0.010 inch) thick saw blade. In order to allow room for fatigue precracking, this notch was cut to a length approximately 12.7 mm (0.5 inch) less than the desired final flaw size and was of equal length on both sides of the 3.18 mm (0.125 inch) diameter starter hole. The flaw was then extended to the desired final length using axial fatigue at frequencies of 5 to 10 Hz and at loads that corresponded to approximately 50 percent of the estimated failure load. All fatigue precracking was performed using a Model 810.04A MTS system having a capacity of 0.45 MN (100,000 pounds).

3.2.2 Attainment of Environmental Conditions

To obtain the 144°K (-200°F) test temperature, a special environmental chamber was clamped about the central 45.7 cm (18 inches) of the specimen gage length; attaching the chamber so far away from the central crack permitted the thinner gage specimens to buckle when no stiffener plates were used. This chamber was constructed from two appropriately sized aluminum electrical chassis boxes that were lined with styrofoam insulation. Each chamber half contained a 20.3 cm (8 inch) diameter viewing port of thermopane glass. To cool the specimen to 144°K (-200°F), liquid nitrogen was introduced into the chamber; the amount introduced was controlled by a thermocouple taped to the specimen near the crack. This thermocouple was connected to a temperature controller, which was also connected to a solenoid valve that regulated the LN_2 flow. Using this procedure, chamber temperature was maintained within $\pm$2.8°K ($\pm$5°F) of the desired 144°K (-200°F) temperature.

This environmental chamber was also used in an attempt to obtain the 450°K

(350°F) environment; a hot air heat exchanger connected to the chamber served as the heat source. However, the desired 450°K (350°F) temperature could not be obtained using this technique. An alternate method was developed that employed quartz heating lamps positioned on one side of the specimen. To prevent heat loss, the opposite side of the specimen was covered with insulating material; a narrow slit in this material allowed attachment of the compliance gage and viewing of the crack throughout the test. Thermocouples taped to both sides of the specimen indicated a temperature differential of no more than 2.8°K (5°F) using this technique.

3.2.3 Fracture Toughness Testing

Two types of universal testing machines were used for the fracture toughness tests conducted under this program. When failure was expected to occur at loads below 445 kN (100,000 lbs), the MTS universal test system shown in Figure 3-7 was used. This closed-loop, servo-controlled test system was operated in the load-control mode and programmed for ramp loading; load output was monitored by a load cell positioned in the loading train. For specimens expected to fail at higher loads, a Baldwin universal testing machine with a capacity of 1.8 MN (400,000 lb) was used, as shown in Figure 3-8. In order to produce the required load signal during the test, this machine was modified by connecting the core of a linear position transducer (LVDT) to the dial indicator drive. The LVDT was then adjusted to produce a 10 volt output signal for a full-scale deflection of the testing machine's dial indicator.

Specimen testing was accomplished using a set of match-drilled grips. These grips were bolted to the ends of the specimen and connected to the appropriate testing machine using 63.5 mm (2.5 inch) diameter loading pins. After each specimen was installed in the test machine, a double-beam displacement gage was mounted on the knife edges previously attached to the specimen; the displacement

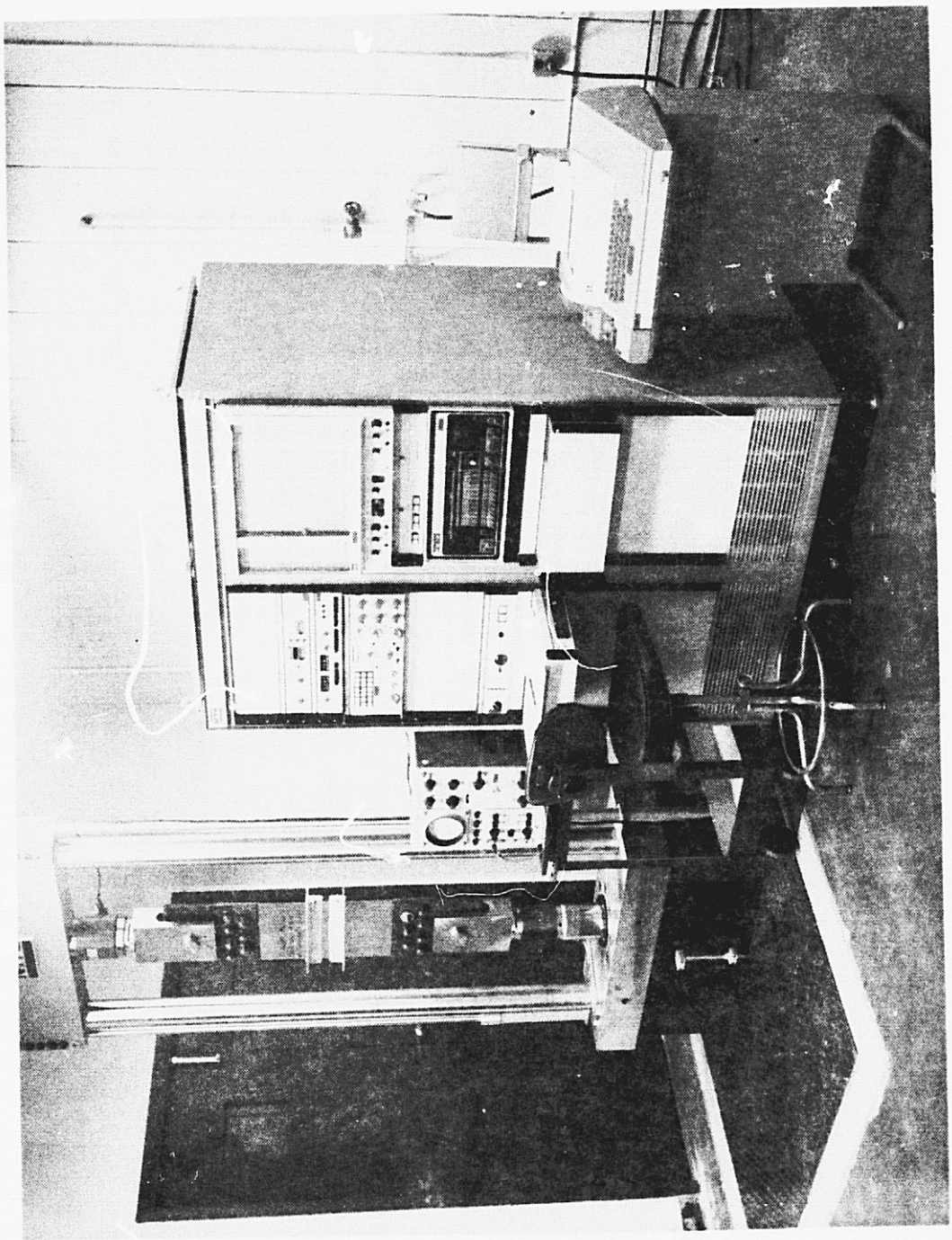


FIGURE 3-7

MTS UNIVERSAL TEST SYSTEM

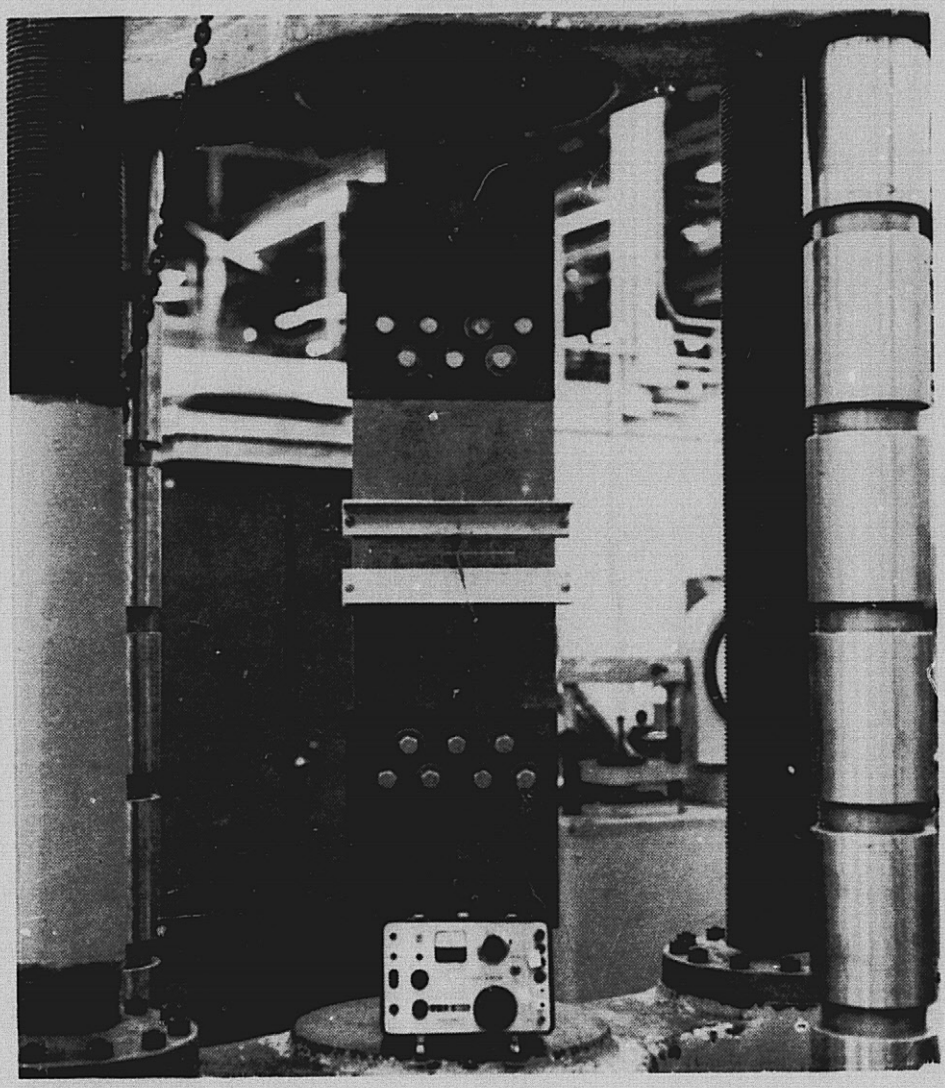


FIGURE 3-8

BALDWIN UNIVERSAL TESTING MACHINE USED FOR FRACTURE TOUGHNESS TESTING

gage and the attachment techniques employed were identical to those used for specimen compliance calibration, as described in Section 3.1. For those tests which required buckling effects to be suppressed, Teflon coated stiffner plates were clamped across the specimen width, above and below the flaw. For those tests not conducted at room temperature, the necessary environmental control equipment was mounted on or near the specimen and the required temperature obtained. For

these tests, no load was applied for a period of 10 minutes in order to insure that thermal equilibrium was achieved. During testing, the load signal from the testing machine was connected to the Y-channel of an X-Y recorder; the displacement output from the displacement gage was connected to the X-channel. To compensate for the variation in the thickness of the specimens, the loading rate was adjusted to provide a constantly increasing stress rate of 96.5 MPa/minute (14 ksi/minute).

In most cases the load/COD curves obtained from these tests supplied all the information necessary to completely characterize the flaw growth and fracture process for each specimen. However, such load/COD data has been shown to be inadequate (Section 3.1) for tests of thin gage specimens where buckling was permitted. As a result, each of these tests was recorded on 16 mm motion picture film. Several techniques were used in an attempt to obtain a single film that would show both load and crack length throughout the test. The technique finally adopted was similar to that described in Reference 3-12 in which two cameras were employed - one to photograph the specimen and the other to photograph the X-Y recorder. Synchronized stop watches, placed in the field of view of each camera, enabled a correlation to be made between crack length and applied load to obtain stress intensity values. Repeated practice trials indicated that the stop watches could be synchronized to an accuracy of $\pm$0.1 second.

3.3 TEST RESULTS

3.3.1 The Crack Growth Resistance Concept

Under plane stress conditions, no singular value of critical stress intensity, K_c, can be defined for all structural configurations; the amount of stable crack growth that occurs prior to failure is dependent not only upon the response of the material to the presence of a sharp crack under load, but also upon the geometry

of the structure that contains the flaw. For any given configuration, the point of instability is unique and can be defined as that value of stress intensity where the applied stress intensity, K_i, balances the response of the material, K_R, to such crack growth. The K_c value for other structural configurations, however, is not necessarily identical, primarily because the relationship between stress intensity, applied load, and crack length is dependent on structure geometry.

For the center cracked tension specimen used in this program, the crack driving force for crack extension is described by equation (3-1); this equation defines a family of stress intensity/crack length curves for various values of applied load. If the crack growth resistance characteristics of the material are known (K_R), the point of instability, K_c, for this configuration occurs when the stress intensity factor at the crack tip, K_i, begins to increase more rapidly than K_R; i.e., when

$$\left(\frac{\partial K_i}{\partial a}\right)_{\sigma=\sigma_c} = \left(\frac{\partial K_R}{\partial a}\right)_{\sigma=\sigma_c} \qquad (3\text{-}9)$$

This condition, illustrated schematically in Figure 3-9, represents the point of tangency between the K_R curve and the unique K_i curve defined by

$$K_i = \sigma_c \sqrt{\pi a Z} \qquad (3\text{-}10)$$

3.3.2 Data Reduction

In order to establish the K_R curve for all test conditions investigated, the load/COD data obtained from each fracture toughness test was converted into stress intensity/flaw size data using equations (3-1) and (3-6). The data was then plotted as stress intensity versus crack extension to develop fracture resistance curves for each alloy/thickness/temperature/orientation combination. These curves, together with the tabulated data, are collected in Appendix C; the room temperature K_R curves for both alloys in the longitudinal test direction are shown in Figure 3-10.

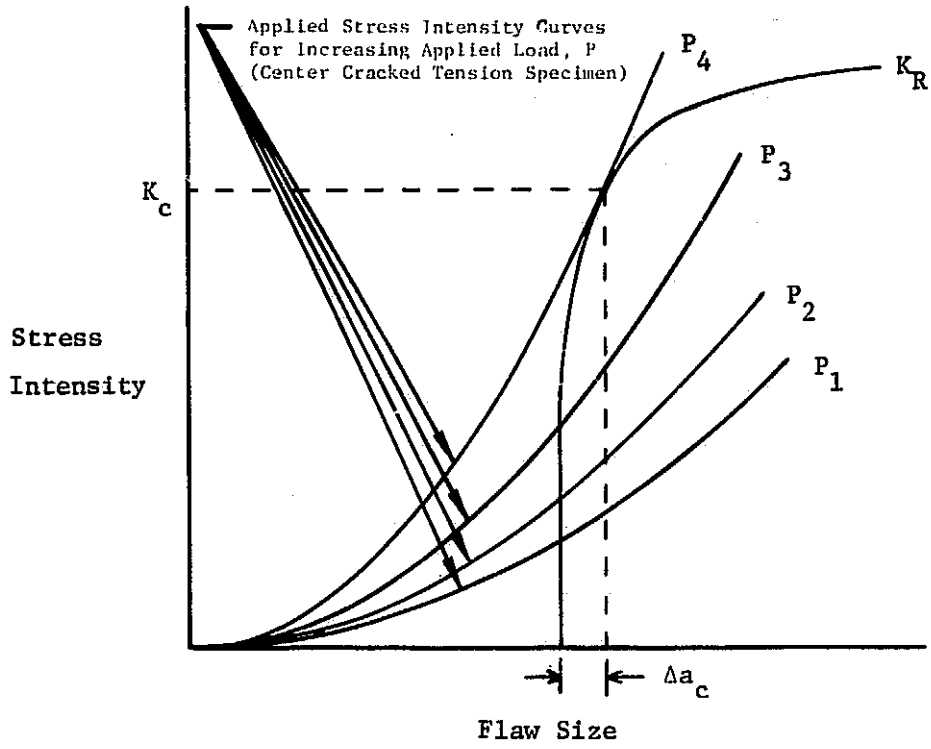


FIGURE 3-9

SCHEMATIC REPRESENTATION OF K_R AND APPLIED STRESS INTENSITY CURVES

For tests of several of the high temperature specimens, so much crack extension occurred prior to failure that the net section stress exceeded 90 per cent of the 0.2 per cent offset yield strength. For these tests, stress intensity data is reported only for those flaw sizes where the net section stress is less than 0.9 F_{ty}. Such net section yielding during high temperature testing is an indication that the specimen width used was insufficient to promote conditions of crack instability.

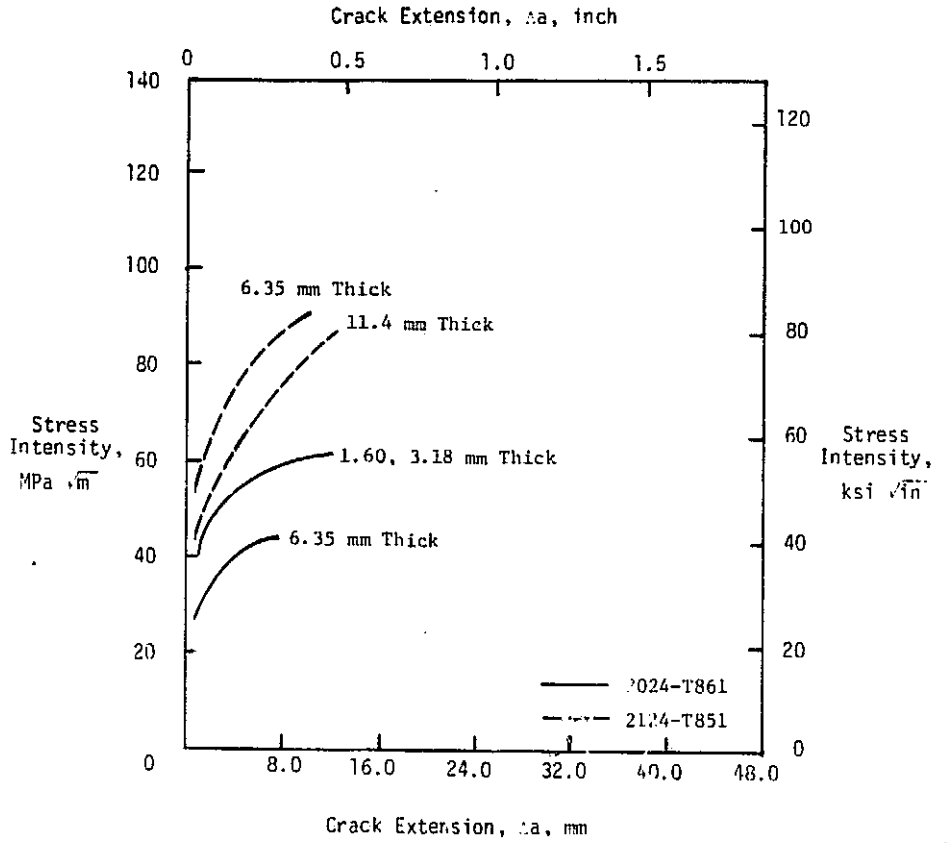


FIGURE 3-10

ORIGINAL PAGE IS
OF POOR QUALITY

CRACK GROWTH RESISTANCE CURVES FOR 2024-T861 AND 2124-T851

3.3.3 Data Analysis

The technique described in Section 3.3.1 was used to obtain critical stress intensity (K_c) values from each fracture toughness test; this data is listed in Tables 3-3 and 3-4. These values represent those which satisfy the tangency condition described by equation (3-9) for each test condition. To obtain this data, the stress intensity/crack length test data was plotted as (K) versus ($\sqrt{a}$). Such a procedure was used because equation (3-1) becomes linear, thus allowing the tangency condition between it and the test data to be more easily established.

Table 3-3

FRACTURE TOUGHNESS (K_c) VALUES FOR 2024-T861 *

ALLOY	THICKNESS mm	THICKNESS in	TEMPERATURE K	TEMPERATURE F	TEST DIRECTION		K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$
2124-T851	6.35	.250	144	-200	L		94.6	86.1
							86.0	78.3
							87.3	79.4
						AVG:	89.3	81.3
					T		76.4	69.5
							58.3	53.0
							56.7	51.6
						AVG:	63.1	58.0
			294	70	L		100.0	91.0
							84.6	77.0
							77.4	70.4
						AVG:	87.2	79.5
					T		54.7	49.8
							52.9	48.2
							58.9	53.6
						AVG:	55.5	50.5
	11.45	.450	144	-200	L		114.6	104.3
							78.3	71.2
						AVG:	96.5	87.8
					T		47.7	43.4
							43.9	39.9
							41.9	38.1
						AVG:	44.5	40.5
			294	70	L		88.1	80.2
							70.1	63.8
						AVG:	79.1	72.0
					T		51.9	47.2
							45.4	41.3
							36.1	33.0
						AVG:	44.5	40.5

* From Appendix C.

Table 3-4

FRACTURE TOUGHNESS (K_c) VALUES FOR 2124-T851

ALLOY	THICKNESS mm	THICKNESS in	TEMPERATURE K	TEMPERATURE F	TEST DIRECTION	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$
2024-T861	1.60	.063	144	-200	L	61.4	55.9
						55.4	50.4
						58.4	53.2
					AVG:	58.4	53.2
					T	44.1	40.2
						50.3	45.8
					AVG:	60.9	55.4
			294	70	L	61.0	55.5
						56.7	51.6
						65.0	59.2
					AVG:	60.9	55.4
					T	56.1	51.1
						52.6	47.8
						49.7	45.2
					AVG:	52.8	48.0
	3.18	.125	144	-200	L	51.9	47.2
						56.1	51.1
						51.0	46.4
					AVG:	53.0	48.2
					T	38.3	34.8
						36.0	32.8
						37.7	34.3
					AVG:	37.5	34.0
			294	70	L	68.3	62.1
						58.1	52.9
						55.5	50.5
						58.6	53.3
					AVG:	60.1	54.7
					T	46.4	42.3
						43.8	39.9
						43.7	39.8
					AVG:	44.6	40.7
	6.35	.250	144	-200	L	35.1	32.0
						38.9	35.4
						35.4	32.2
					AVG:	36.5	33.2
					T	30.7	28.0
						28.3	25.7
						32.1	29.3
					AVG:	30.4	27.7
			294	70	L	43.6	39.7
						42.1	38.4
						45.4	46.3
					AVG:	43.7	39.8
					T	32.5	29.6
						32.9	29.9
						35.7	32.5
					AVG:	33.7	30.7
			450	350	L	95.9	87.2
						96.4	87.8
						89.0	81.0
					AVG:	93.8	85.3
					T	68.3	61.4
						75.7	68.9
						67.9	61.8
					AVG:	70.6	64.0

* From Appendix C.

No finite width correction factor need be applied to such plots, since this factor has already been incorporated in the reduction of the fracture toughness test data. Such curves, as well as the stress intensity/crack extension curves shown in Appendix C, represent the fracture characteristics of an infinitely wide center cracked tension specimen.

3.4 DISCUSSION

Examination of the data in Appendix C shows that the test variables studied exert a strong influence on the plane stress fracture toughness of the materials investigated. The effects of each of the test variables are discussed below, in the order they appear in Table 3-2.

3.4.1 Effect of Alloy Composition/Heat Treatment.

The effect of this variable on fracture toughness is shown in Figure 3-11, which shows that, for equivalent section thicknesses, the K_c values for 2124-T851 alloy are almost twice those of the 2024-T861 alloy. The higher toughness of the 2124-T851 material can be attributed to the combined effect of its higher purity and its different thermo-mechanical processing relative to the T861 condition. Both effects must be active, since other data (Reference 3-13) indicates that the plane strain fracture toughness (K_{Ic}) of 2124-T851 plate are superior to those of comparable 2024-T851 plate.

3.4.2 Effect of Panel Constraint.

It has been observed (Reference 3-9) that the large out-of-plane deflections associated with the buckling of a thin center-cracked tension specimen under load can significantly reduce its static tensile strength relative to the strength of similar specimens tested with such deflections suppressed by stiffener plates. In the present study, no such strength reductions were observed for the cryogenic and

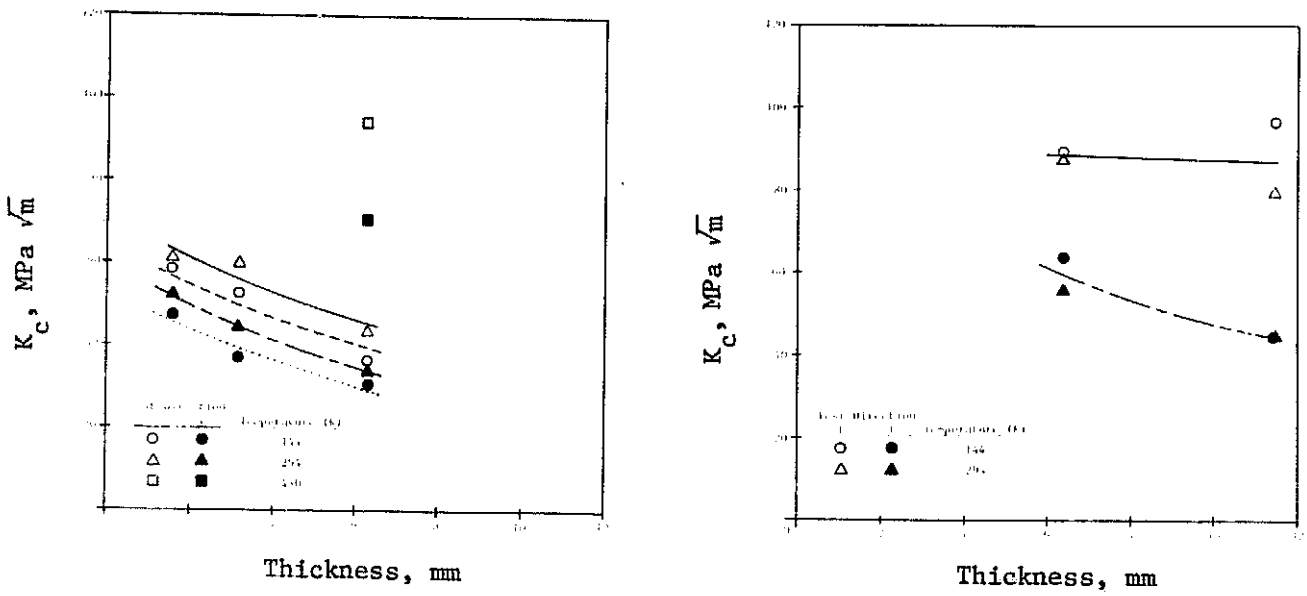


FIGURE 3-11

EFFECT OF THICKNESS ON THE PLANE STRESS FRACTURE TOUGHNESS OF 2024-T861 AND 2124-T851

room temperature tests of unstiffened thin gage specimens (see Figure 3-12). The lack of sensitivity of this test data to the presence or absence of buckling restraints during testing can only be attributed to the lack of significant out-of-plane deflections in the specimens prior to failure.

The fact that buckling effects were absent in most of these tests can be confirmed through an analysis of the interrelationship between crack instability and the stress required to cause buckling. The net section stress, σ_n, required to cause buckling has been shown (Reference 3-14) to agree quite well with that predicted by the following equation, obtained from Reference 3-15:

$$\sigma_n = \frac{\pi^2 Et^2}{12\, l_e^2} \qquad (3\text{-}11)$$

where l_e = effective total crack length.

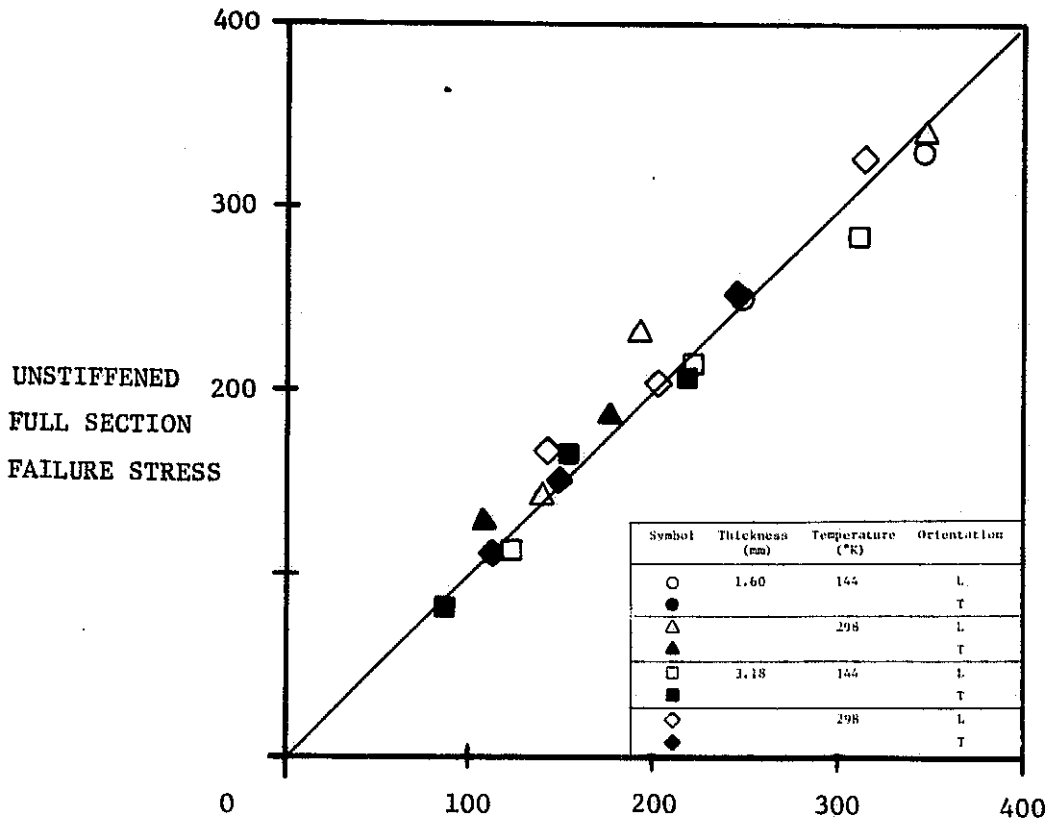


FIGURE 3-12

EFFECT OF STIFFENING ON THE FULL SECTION FAILURE STRESS OF 2024-T861
(constant initial flaw size)

The results obtained in Reference 3-14 indicate that l_e has a value between 33 and 50 percent of the actual total crack length, 2a. The net section stress can also be derived for conditions of crack instability from equation 3-1:

$$\sigma_n = \left(\frac{W}{W-2a}\right)\left(\frac{K_c}{\sqrt{\pi\, a\, Z}}\right) \qquad (3\text{-}12)$$

Provided K_c is known, equations (3-11) and 3-12) can be used to develop a plot of net section stress as a function of total crack length for a given specimen size.

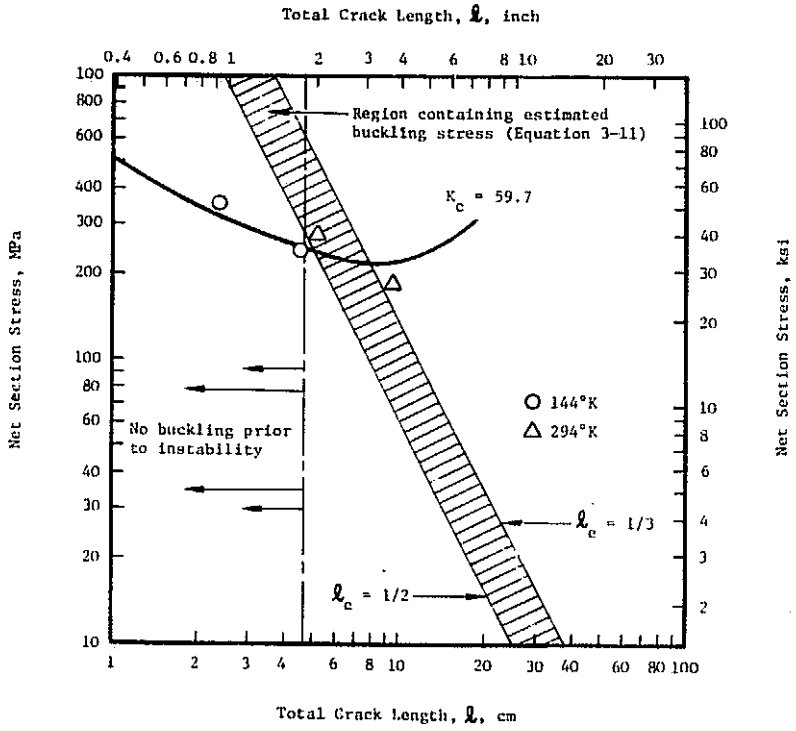


FIGURE 3-13

NET SECTION STRESS AS A FUNCTION OF TOTAL CRACK LENGTH FOR UNSTIFFENED 1.60 MM (.063 INCH) THICK 2024-T861 SPECIMEN

Such a plot is shown in Figure 3-13 for 2024-T861 having a nominal thickness of 1.60 mm (.063 inch) and a K_c value of 59.7 MPa $\sqrt{m}$ (54.3 ksi $\sqrt{in}$); the latter value was obtained by averaging the cryogenic and room temperature K_c data obtained from tests of the corresponding stiffened specimens. It should be noted that the intersection of the crack instability curve with the lower bound of the buckling stress region defines the minimum total flaw size at which buckling will occur prior to failure. For the conditions shown, this minimum total flaw size is approximately 4.8 cm (1.9 inch) or a value of 2a/w of approximately 0.10. Also shown in Figure 3-13 is the unstiffened test data for which critical crack length values are available.

From Figure 3-13 it can be seen that most of the flaw sizes associated with the unstiffened test data fall below the minimum buckling flaw size. Such results show that in most cases, buckling did not occur during the testing of these unstiffened specimens. For one test, however, the flaw size at failure was approximately twice the minimum buckling flaw size (see Table C2-9, Appendix C). This specimen did buckle prior to failure, since its strength was reduced approximately 10 percent relative to that of the corresponding stiffened specimen (see Table C1-13, Appendix C). Since equation (3-11) is a function of $(\text{thickness})^2$, the minimum buckling flaw size for the thicker 3.18 mm (.125 inch) unstiffened specimens is approximately four times larger than that for the thinner 1.60 mm (.063 inch) specimens. As a result, buckling effects were entirely absent during the testing of these thicker unstiffened specimens. It can be concluded, therefore, that because of the relatively low toughness of 2024-T861 when compared to lower strength alloys, buckling is likely to have little effect of the fracture behavior of this material at cryogenic and room temperatures for gages as thin as 1.60 mm (.063 inch).

3.4.3 Effect of Test Direction.

Figure 3-11 also shows that, for all thickness/alloy combinations, transverse K_c values are approximately 15-20 percent lower than the corresponding longitudinal value.

3.4.4 Effect of Section Thickness.

The effect of section thickness is shown in Figure 3-11, which contains the average K_c data shown in Table 3-3. For the 2024-T861 alloy, increasing section thickness from 1.60 to 6.35 mm (.063 to .250 inch) causes an approximate 30 percent decrease in fracture toughness at temperatures of 144°K and 294°K (200°F and 70°F). For 2124-T851, section thicknesses in the range of 6.35 to 11.45 mm (.250 to .450 inch) cause a less severe reduction (approximately 13 percent) in toughness.

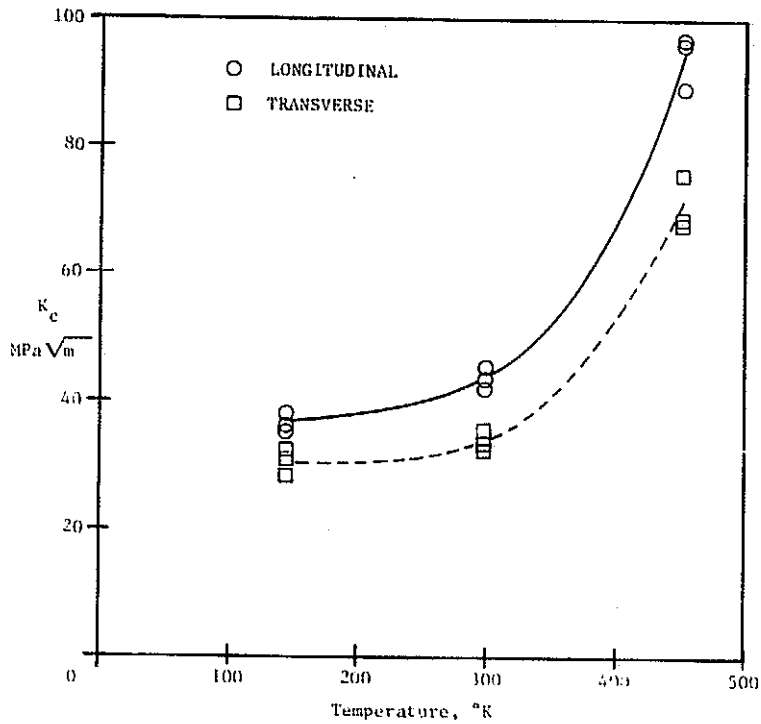


FIGURE 3-14

EFFECT OF TEMPERATURE ON THE PLANE STRESS FRACTURE TOUGHNESS FOR 2024-T861

3.4.5 Effect of Test Temperature.

The effect of test temperature on K_c is not immediately apparent from Figure 3-11, due to the lack of data at 450°K (350°F); the determination of an accurate K_c value at this temperature was in most instances precluded by net section yielding. However, the fracture toughness of 6.35 mm (.250 inch) thick 2024-T861 at this temperature was low enough to permit an accurate measurement with the specimen geometry employed in this program. The variation of K_c with temperature for this alloy/thickness combination is shown in Figure 3-14; from this figure it is apparent that the 450°K (350°F) K_c value for this alloy is twice that at room temperature. Conversely, this figure, as well as Figure 3-11, indicate that the toughness at 144°K (-200°F) is decreased approximately 20 percent relative to the room temperature value.

3.4.6 Effect of Initial Flaw Size.

Examination of the data listed in Tables 3-3 and 3-4 shows no systematic variation of critical stress intensity with initial flaw size for any test condition investigated. These results were obtained for crack length to specimen width ratios (2a/w) between .03 and .35.

3.5 REFERENCES

3-1. "Standard Method of Test for Plane-Strain Fracture Toughness of Metallic Materials", ASTM E399-74, 1974 Annual Book of ASTM Standards, Part 10.

3-2 W. F. Brown, Jr., J. E. Srawley, "Plane Strain Crack Toughness Testing of High Strength Metallic Materials," ASTM STP 410 (1966).

3-3 McDonnell Aircraft Company, Phase B Test Program, Report MDC A0913 (May 18, 19741).

3-4 M. J. Harrigan, "B-1 Fracture Mechanics Data for Air Force Handbook Usage," North American Rockwell, Los Angeles Division, Report TFD-72-501, (April 21, 1972).

3-5 A. W. Gunderson, "Tensile, Fracture, and Fatigue Properties of 2024-T851 Aluminum Thick Plate," Air Force Materials Laboratory Report LA-72-24 (May 26, 1972).

3-6 J. G. Kaufman, et. al., "Fracture Toughness of Aluminum Alloys," Metals Engineering Quarterly (August 1969), pp. 39-47.

3-7 Proceedings of the Royal Society, A272, 1963, p. 304.

3-8 C. E. Feddersen, in Plane Strain Crack Toughness Testing of High Strength Metallic Materials, ASTM STP 410, 1966, p. 77.

3-9 R. L. Carlson, G. F. Zielsdorff and J. C. Harrison, Buckling the Thin Cracked Sheets, in Proc. Air Force Conf. on Fatigue and Fracture of Aircraft Structures and Materials, AFFDL-TR-70-144 (1970).

3-10 R. G. Forman, "Effect of Plastic Deformation on The Strain Energy Release Rate in A Centrally Notched Plate Subjected to Uniaxial Tension," Transactions of the ASME, Journal of Basic Engineering, March 1966.

3-11 A. M. Sullivan, C. N. Freed, "A Review of the Plane-Stress Fracture Mechanics Parameter K_c Determined Using the Center-Cracked Tension Specimen", Naval Research Laboratory Report 7460 (December, 1972).

3-12 C. M. Carmen, "Plane Stress Fracture Testing Using Center-Cracked Panels," Fracture Toughness Evaluation by R-Curve Methods, ASTM STP 527, American Society for Testing and Materials, 1973, pp. 62-84.

3-13 K. A. Fudge, R. E. Jones, "Engineering Design Data for Aluminum Alloy 2124-T851 Thick Plate", AFML-TR-73-310, January 1974.

3-14 R. G. Forman "Experimental Program to Determine Effect of Buckling and Specimen Dimensions on Fracture Toughness of Thin Sheet Materials," AFFDL-TR-65-146 (1965).

3-15 H. W. Liu, "Discussion of Papers", Proceedings of the Crack Propagation Symposium, Volume II, College of Aeronautics, Cransfield, England, September 1961; pp. 514-517.

Section 4
CYCLIC FLAW GROWTH TESTING

A total of 258 center cracked tension specimens were tested during this phase of the program. A detailed test matrix is presented in Table 4-1.

4.1 TEST PROCEDURE

4.1.1 Selection of Cyclic Stress Levels

The maximum cyclic stress levels selected for use in this phase of the program are summarized in Table 4-2. Each specimen was tested at a unique stress level, and two to three stress levels were investigated for each alloy/thickness/orientation/stress ratio/environment combination. One of these stress levels was held constant for each alloy tested in order to compare cyclic life for a constant initial flaw size. The other stress levels were selected as a certain percentage of the 0.2 percent offset yield strength.

4.1.2 Attainment of Environmental Conditions

The equipment and procedures used to obtain the cryogenic and elevated temperatures for cyclic flaw growth testing were identical to those used for fracture toughness testing (Section 3.2.2). To obtain the room temperature environmental conditions, a plastic chamber was attached to the central 15.2 cm (6.0 inches) of the specimen gage length. Because both stiffened and unstiffened thin gage specimens were to be tested, two types of environmental chambers were employed. For tests where buckling effects were to be suppressed, an integral stiffener/environmental chamber was constructed from two pieces of plexiglass and

Table 4–1

TEST MATRIX FOR CYCLIC FLAW GROWTH TESTING

ALLOY CONSTRAINT [1] TEST DIRECTION [2]	2024-T861 STIFFENED L T	2024-T861 UNSTIFFENED L T	2124-T851 UNSTIFFENED L T
THICKNESS	1.60 mm (.063 INCH) 3.18 mm (.125 INCH)	1.60 mm (.063 INCH) 3.18 mm (.125 INCH) 6.35 mm (.250 INCH)	6.35 mm (.250 INCH) 12.70 mm (.500 INCH)
TEMPERATURE/ENVIRONMENT	144°K (-200°F)/N_2 298°K (70°F)/ARGON 298°K (70°F)/WET AIR 422°K (300°F)/LAB AIR 450°K (350°F)/LAB AIR 478°K (400°F)/LAB AIR	144°K (-200°F)/N_2 298°K (70°F)/ARGON 298°K (70°F)/WET AIR 422°K (300°F)/LAB AIR 450°K (350°F)/LAB AIR 478°K (400°F)/LAB AIR	144°K (-200°F)/N_2 298°K (70°F)/ARGON 298°K (70°F)/WET AIR 422°K (300°F)/LAB AIR 450°K (350°F)/LAB AIR 478°K (400°F)/LAB AIR
APPLIED STRESS [3]	LOW MEDIUM HIGH	LOW MEDIUM HIGH	LOW MEDIUM HIGH
CYCLIC FREQUENCY	200	20 200	20 200
STRESS RATIO [4]	.05 150	.05	.05 .50
TOTAL SPECIMENS:	72	81	105

1 STIFFENED: TEFLON-COATED GUIDE PLATES USED TO RESTRAIN BUCKLING.
UNSTIFFENED: NO GUIDE PLATES USED

2 L: LONGITUDINAL
T: TRANSVERSE

3 SEE TABLE 4-2 FOR ACTUAL STRESS LEVELS USED.

4 RATIO OF MINIMUM TO MAXIMUM APPLIED STRESS.

Table 4-2

STRESS LEVELS SELECTED FOR CYCLIC TESTING

ALLOY	TEST DIRECTION	TEST TEMPERATURE		FULL SECTION STRESS, σ_G		F_{TY}		σ_G/F_{TY}
		°K	°F	MPa	ksi	MPa	ksi	
2024-T861	L	144	-200	118.6	17.2	563.3	81.7	0.21
				168.9	24.5			0.30
		294	70	75.2	10.9	501.3	72.7	0.15
				118.6	17.2			0.23
				225.5	32.7			0.40
		422	300	118.6	17.2	-	-	-
		450	350	118.6	17.2	391.6	56.8	0.30
				195.8	28.4			0.50
				302.7	43.9			0.75
		478	400	118.6	17.2	-	-	-
	T	144	-200	118.6	17.2	550.9	79.7	0.22
				164.8	23.9			0.30
		294	70	118.6	17.2	496.4	72.0	0.24
				148.9	21.6			0.30
				198.6	28.8			0.40
		422	300	118.6	17.2	-	-	-
		450	350	118.6	17.2	391.6	56.8	0.30
				195.8	28.4			0.50
				302.7	43.9			0.75
		478	400	118.6	17.2	-	-	-
2124-T851	L	144	-200	217.2	31.5	534.4	77.5	0.41
				293.7	42.6			0.55
		294	70	144.1	20.9	479.2	69.5	0.30
				217.2	31.5			0.45
				335.8	48.7			0.70
		422	300	144.8	21.0	-	-	-
		450	350	108.9	15.8	362.0	52.5	0.30
				217.2	31.5			0.60
				307.5	44.6			0.85
		478	400	144.8	21.0	-	-	-
	T	144	-200	217.2	31.5	506.8	73.5	0.43
				278.6	40.4			0.55
		294	70	140.0	20.3	465.4	67.5	0.30
				217.2	31.5			0.47
				325.8	47.3			0.70
		422	300	144.8	21.0	-	-	-
		450	350	108.9	15.8	362.0	52.5	0.30
				217.2	31.5			0.60
				307.5	44.6			0.85
		478	400	144.8	21.0	-	-	-

the stiffener plates used for suppressing buckling effects during fracture toughness testing. Teflon was used to completely seal the plexiglass panes to the surfaces of the specimen. The required gas (argon or water-saturated air) was bled into the chamber on one side of the specimen and exhausted through a small hole in the plexiglass on the opposite side. For tests of thin gage specimens where buckling was permitted, a flexible environment chamber was fabricated from two sheets of mylar sealed to the specimen surface using a relatively thick layer of putty. Rubber hoses embedded in the putty on opposite sides of the specimen permitted argon gas or water saturated air to enter and leave the chamber.

To attain the water-saturated air environment, filtered compressed air was bubbled through a bottle containing distilled water. Relative humidity readings of 95 to 100 percent were obtained by passing this airstream through a bell jar containing a stationary wet and dry bulb hygrometer. Bottled argon, having a dew point of 210°K (-82°F), was used to obtain an inert environment. Prior to test, the chamber was purged by bleeding the argon or water-saturated air through the chamber at a relatively high flow rate for five minutes.

4.1.3 Cyclic Flaw Growth Testing

One of three types of closed loop, electro-hydraulic universal testing machines was employed for testing the specimens under this program. For those specimens requiring low cyclic loads (less than 222 kN, or 50,000 lbs.), the MTS universal testing system, operated in the load control mode, was used. For those specimens requiring higher loads, hydraulic fatigue machines with capacities of 667 kN (150,000 lbs.) and 1.33 MN (300,000 lbs.) were used. These machines were also operated in the load control mode; a loading accuracy of two percent was obtained using closed loop servo controls employing the principle of variable gain feedback. These controls employ linear variable feedback amplifiers

that were adjusted for a predetermined feedback voltage using a calibrated resistor shunted across the load cell bridge. All load signals were monitored with a strip chart recorder and an oscilloscope.

Each specimen was installed in the appropriate testing machine after a starter notch was introduced using a 0.25 mm (0.010 inch) thich saw blade. The proper environmental equipment was then placed around or near the specimen. A photo of the test setup for a cryogenic test is shown in Figure 4-1. Once the proper environmental conditions were obtained for each test, cycling was initiated using sinusoidal loading at constant amplitude. When a fatigue crack was observed emanating from each side of the sawcut, cycling was temporarily halted while a measurement of total crack length to the nearest 0.025 mm (0.001 inch) was made with a coordinate cathetometer. Such measurements, made approximately every 1.27 mm (0.050 inch) of crack extension, were continued until each specimen failed.

These intermittent crack length measurements were supplemented with 16 mm motion picture records of each specimen that allowed crack length measurements to be obtained up to specimen failure. Such movies were obtained using a pulsed movie camera that was triggered each time the specimen reached peak load. Because of the relatively slow shutter speed of the camera, the motion of the specimen was frozen by a strobe light; the position of the strobe and the lens aperture was controlled in such a way as to prevent ambient light from exposing the film while the shutter was open. A ruler or a transparent plastic grid was taped to the specimen to allow crack length measurements to be made from the film.

4.2 TEST RESULTS

Because no standard technique has yet been established to reduce and analyze raw cyclic specimen data, several techniques were considered. The following

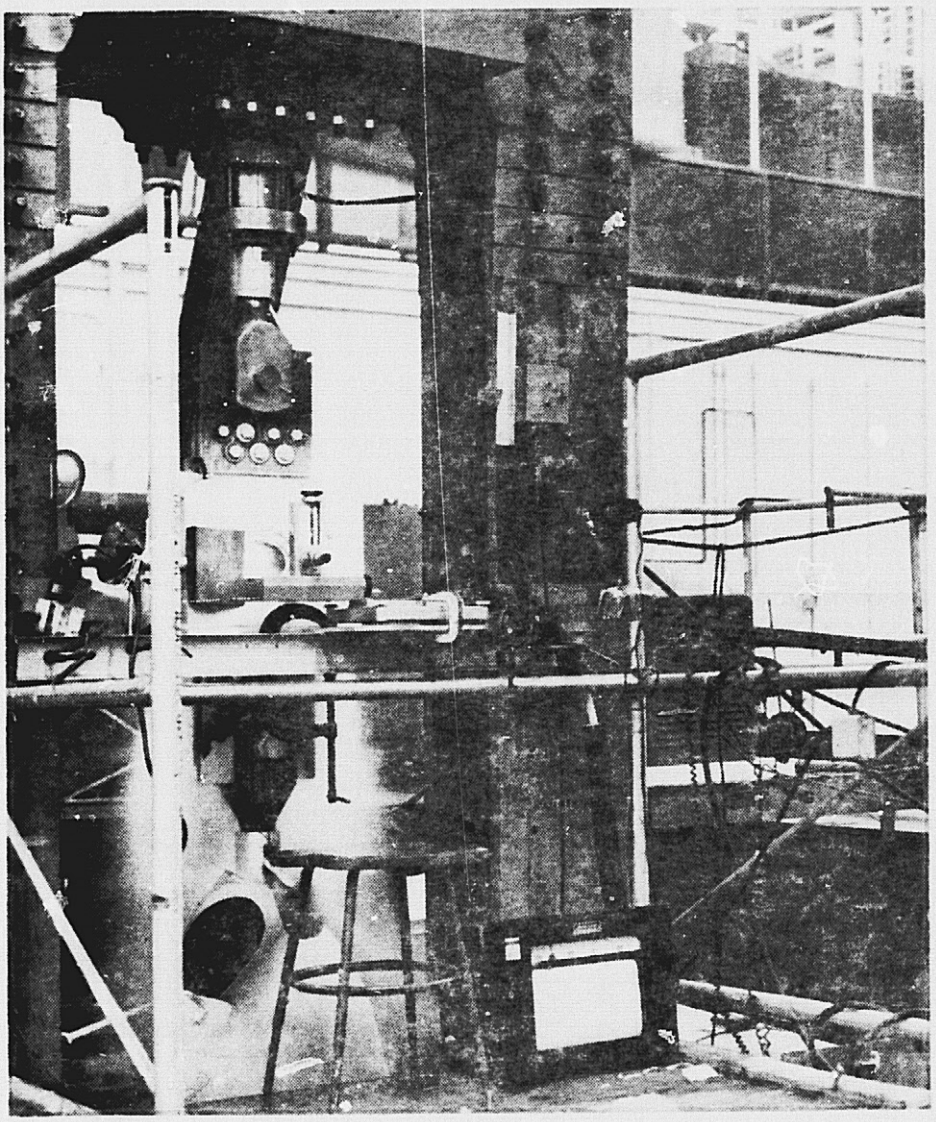


FIGURE 4-1

TEST SETUP FOR CRYOGENIC FATIGUE FLAW GROWTH TESTING

sections describe the techniques finally adopted; Appendix F contains a description and evaluation of the other methods considered.

The cyclic test data obtained under this phase of the program is presented in Appendix D in both tabular and graphical formats. For tests of several of the high temperature specimens, the flaw size was found to be come so large prior to failure that the net section stress exceeded 90 percent of the 0.2 percent offset yield strength. For these tests, growth rate/stress intensity data is reported only for those flaw sizes for which the net section stress is less than 0.9 F_{ty}. No such data is reported for larger flaw sizes, since the stress intensity approach is based on elastic conditions prior to instability.

4.2.1 Data Reduction

Because of the great quantity of data generated during this phase of the program, computer techniques were employed to reduce and analyze the test data. The raw crack length/cycle measurements obtained during each test were recorded directly on computer coding forms; tab cards were keypunched from these records and given a preliminary analysis by a specially developed computer program entitled ACCE (for "Analysis of Cyclic Crack Extension"). This program has the capability of examining the raw data and checking it for transcription errors and other inconsistencies. Once these errors are liminated, the derivative, da/dN, is approximated using a divided difference:

$$\frac{da}{dN} \cong \frac{(a_{n+1} - a_n)}{N_{n+1} - N_n} \qquad (4\text{-}1)$$

The corresponding average stress intensity range, ΔK, is computed using the relation:

$$\Delta K = \Delta\sigma \sqrt{\pi a_{avg}} \cdot Z \qquad (4\text{-}2)$$

where $\Delta\sigma = \sigma_{max} - \sigma_{min}$

$$a_{avg} = (a_{n+1} + a_n)/2$$

$$Z = \sec(\pi a_{avg}/W)$$

Also included in this program is a Calcomp plotting routine that plots the resulting ($\Delta a/\Delta N$, ΔK) data on log-log coordinates. The data from each specimen was then analyzed visually to detect and eliminate, if possible, any abrupt discontinuities in flaw growth rate. Such discontinuities were found to be caused by a minor transcription error or by too small an interval (less than 0.76 mm, or 0.030 inch) between any two successive crack length measurements. The latter type of discontinuity is likely to be related to the nonhomogeneous nature of the fatigue crack growth process in real materials at the microscopic level.

4.2.2 Data Analysis Techniques

The cyclic test data shown in Appendix D was analyzed to determine the parameters associated with either of the following two empirical flaw growth rate models:

Forman (Reference 4-1): $$\frac{da}{dN} = \frac{C\Delta K^n}{(1-R)K_c - \Delta K} \qquad (4\text{-}3)$$

where C, n = Forman rate equation constants

R = ratio of minimum to maximum stress

K_c = critical stress intensity

Colliepriest (Reference 4-2): $$\frac{da}{dN} = C_1 \text{ EXP}\left[C_2 \tanh^{-1}\phi\right] \qquad (4\text{-}4)$$

where C_1, C_2 = rate equation constants

$$\phi = \frac{\ln(\Delta K^2/(1-R)\ K_c \Delta K_o)}{\ln((1-R)K_c/\Delta K_o)}$$

ΔK_o = threshold stress intensity range

A third model, originally proposed by Paris (Reference 4-3) was not used,

primarily because of its inability to account for the high growth rates that occur prior to instability. This model has the form:

$$\frac{da}{dN} = C\Delta K^n \tag{4-5}$$

where C, n = Paris rate equation constants

Although the Paris model was not directly incorporated into the data analysis procedure, the Paris rate equation constants were indirectly evaluated by using an alternate form of equation (4-4). As first proposed (Reference 4-4), this equation had the more lengthy form:

$$da/dN = C\ (K_c\Delta\ K_o)^{n/2}\ EXP\left[\ln(K_c/\Delta K_o)^{n/2}\ \arctanh\left(\frac{\ln\left[\Delta K^2\ /\ \{(1-R)K_c\ \Delta K_o\}\right]}{\ln\ (1-R)K_c/\Delta K_o}\right)\right] \tag{4-6}$$

The constants C_1 and C_2 in equation (4-4) are related to the Paris equation constants by:

$$C_2 = \ln\left(\frac{K_c}{\Delta K_o}\right)^{n/2} \tag{4-7}$$

$$C_1 = C\ (K_c\ \Delta K_o)^{n/2} \tag{4-8}$$

Evaluation of the rate constants for equations (4-3) and (4-4) would ordinarily involve complex non-linear regression techniques. These equations can be transformed into linear form using logarithms; however, such transformations can introduce error, the sources of which are described in Appendix F. In its linear form, equation (4-3) can be rewritten as:

$$\ln\left[\frac{da}{dN}\ .\ \{(1-R)\ K_c-\Delta K\}\right] = \ln C + n\ \ln \Delta K \tag{4-9}$$

The linear equivalent of equation (4-4) is:

$$\ln \frac{da}{dN} = \ln C_1 + C_2 \cdot \tanh^{-1}\phi \qquad (4\text{-}10)$$

Evaluation of the rate constants in equations (4-9) and (4-10) can easily be performed using an ordinary least squares analysis, provided values of K_c and ΔK_o are supplied. The former value is usually obtained from a fracture toughness test, while the latter is an estimated value. However, in order to obtain an independent measure of these values, a special computer program was developed to optimize not only the rate constants but also the K_c value and, for equation (4-8), the value of ΔK_o for each data set. This program, entitled RACD (for "Regression Analysis of Cyclic Data"), is designed to optimize the rate constants using least square techniques; iterative convergence routines are then used to determine the value of K_c and/or ΔK_o that produces the best fit of each equation to the experimental data. The convergence routines employed are an extension to multiple dimensions of a one-dimensional root finder; this root finder is based upon a combination of the secant method (Reference 4-5) and Aitken's delta squared procedure (Reference 4-6). The procedure involves evaluating the rate constants for each model using least squares techniques and an assumed value for K_c and, when necessary, ΔK_o. Once obtained, the total amount of error between this computed curve and each data point (i.e., the sum of the residuals) is computed using the relation,

$$r_i = \sum \left[\left(\frac{da}{dN}\right)_m - \left(\frac{da}{dN}\right)_c \right]^2 \qquad (4\text{-}11)$$

where $\left(\frac{da}{dN}\right)_m$ = "measured" value of flaw growth rate (i.e., using equation 4-1)

$\left(\frac{da}{dN}\right)_c$ = calculated value of flaw growth rate

Table 4-3

EQUATIONS USED FOR CONVERGENCE ANALYSIS OF CYCLIC TEST DATA

FLAW GROWTH RATE MODEL	PARAMETER OPTIMIZED	EQUATION SATISFIED
Forman (Equation 4-9)	K_c	$\frac{\partial r}{\partial K_c} = 0 = \sum_i \left\{ (1-R)\left(\frac{da}{dN}\right)_i \ln\left(\frac{da}{dN}\right)_i - (\ln C + n \ln(\Delta K)_i) \right\}$
Colliepriest (Equation 4-10)	K_c	$\frac{\partial r}{\partial K_c} = 0 = \sum_i \left\{ \frac{C_2}{1-\phi_i^2} \left(\frac{-\ln \frac{(\Delta K)_i^2}{(1-R)K_c \Delta K_0}}{2K_c \ln \frac{(1-R)K_c}{\Delta K_0}} - \frac{1}{K_c \ln \frac{(1-R)K_c}{\Delta K_0}} \right) \left(\ln\left(\frac{da}{dN}\right)_i - (\ln C_1 + C_2 \tanh^{-1}(\phi)_i) \right) \right\}$
	ΔK_0	$\frac{\partial r}{\partial \Delta K_0} = 0 = \sum_i \left\{ \frac{C_2}{1-\phi_i^2} \left(\frac{\ln \frac{(\Delta K)_i^2}{(1-R)K_c \Delta K_0}}{2\Delta K_0 \ln\left(\frac{(1-R)K_c}{\Delta K_0}\right)} - \frac{1}{\Delta K_0 \ln\left(\frac{(1-R)K_c}{\Delta K_0}\right)} \right) \left(\ln\left(\frac{da}{dN}\right)_i - (\ln C_1 + C_2 \tanh^{-1}(\phi)_i) \right) \right\}$

where $\phi = \frac{\ln((\Delta K)_i / (1-R) K_c \Delta K_0)}{\ln((1-R) K_c / \Delta K_0)}$

Equation (4-11) can be rewritten using the appropriate rate model expression for $(da/dN)_c$; best fit values for K_c were obtained by finding that value which satisfied the following condition:

$$\frac{\partial r}{\partial K_c} = 0 \qquad (4\text{-}12)$$

Similarly, the best fit values for ΔK_0 were obtained by finding the value such that:

$$\frac{\partial r}{\partial \Delta K_0} = 0 \qquad (4\text{-}13)$$

The exact form of Equation (4-12) and (4-13) used are summarized in Table 4-3.

While using this program, it was found that convergence was not always obtained for each data set. In some cases, failure to converge on a K_c value was caused by insufficient data at the high ΔK levels; conversely, failure to converge on a ΔK_0 value was caused by insufficient data at the low ΔK levels. In other cases, failure to converge was caused by a high degree of scatter in the data. The results of this analysis are collected in Appendix E.

4.3 DISCUSSION

4.3.1 Effect of Cyclic Test Variables

Examination of the data in Appendix D shows that several common trends can be established, and that the effect of the eight test variables can be classified as to their general effect on the shape of the flaw growth rate curve. For example, such variables as specimen thickness, test direction, stress ratio, and buckling constraint all exert a similar influence on the flaw growth rate curve in that they primarily affect flaw growth rate at the high ΔK levels preceding instability. These particular test variables appear to affect fatigue flaw growth by altering the fracture toughness of the material (e.g., test direction) or by changing the stress pattern imposed on the specimen (e.g., thickness, stress ratio, and buckling). On the other hand, variables such as test temperature and alloy/heat treatment affect the flaw growth rate over the entire ΔK range. These test variables appear to affect the very nature of the cyclic flaw growth process. The effect of each test variable is discussed in greater detail below.

Effect of Alloy Composition/Heat Treatment. The effect of this test variable on flaw growth rate is shown in Figure 4-2. It can be observed that for constant values of ΔK, crack propagation occurs at a faster rate in the 2024-T861 alloy than in the 2124-T851 alloy. This effect is quite likely related to the higher toughness of the 2124-T851 alloy, caused by the combined effect higher purity and different thermo-mechanical processing.

Effect of Panel Constraint. At the 144°K (-200°F) or the 294°K (70°F) test temperatures, no significant difference between the stiffened and unstiffened flaw growth rate curves is apparent for any test direction/thickness combination. These observations agree well with those of Section 3.4, which found that flaw lengths were generally too small to cause significant buckling at these temperatures.

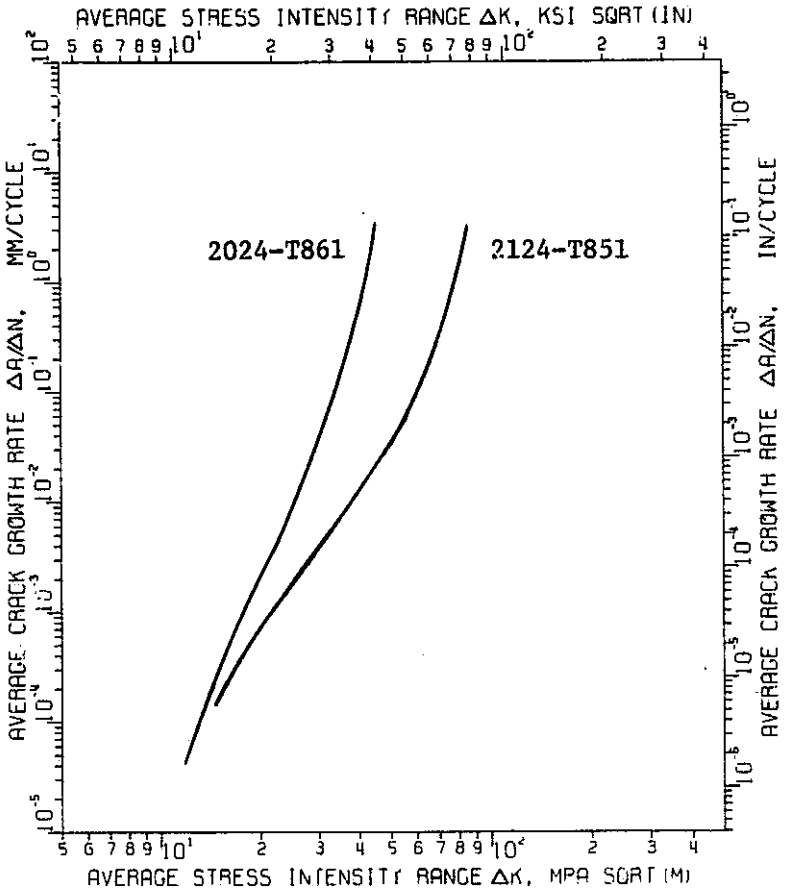


FIGURE 4-2

EFFECT OF ALLOY COMPOSITION/HEAT TREATMENT ON ROOM TEMPERATURE FLAW GROWTH RATE
(curves are hand-faired from Appendix D, Figures D3-2a and D3-3a)

However, at elevated temperatures, a distinct layering effect can be observed for both the 1.60 mm (.063 inch) and the 3.18 mm (.125 inch) thicknesses, as shown in Figure 4-3. No conclusion could be reached in Section 3.4 as to the effect of panel buckling on fracture toughness at elevated temperatures, due to the lack of data caused by net section yielding. However, in view of the results of the elevated temperature cyclic tests, it is likely that buckling would also decrease toughness if a wide enough specimen were employed.

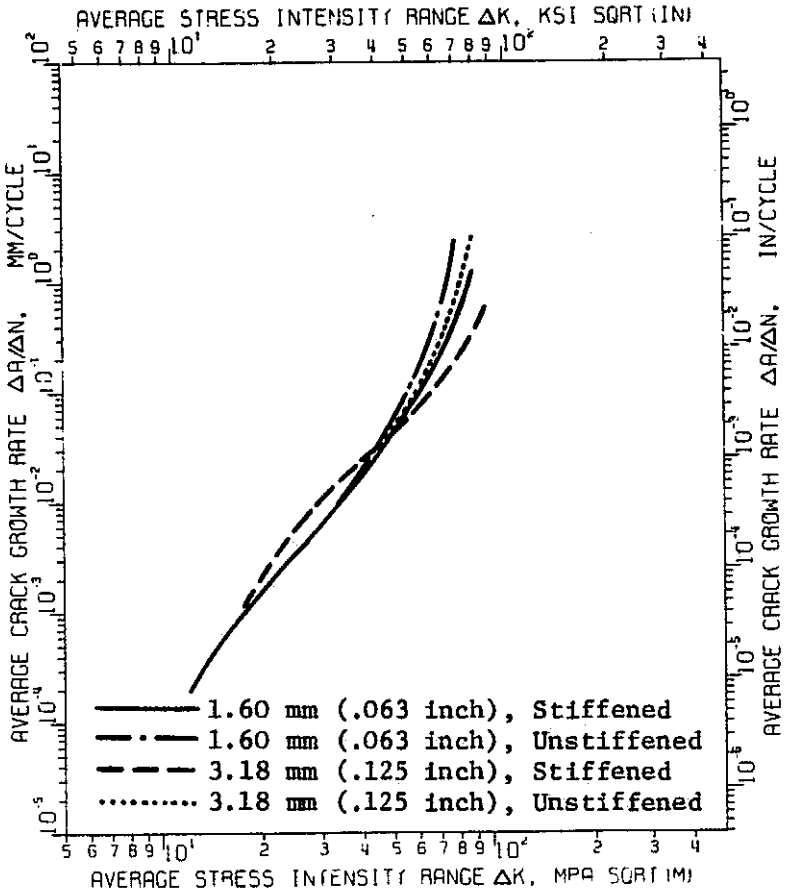


FIGURE 4-3

EFFECT OF STIFFENING ON THE 450°K (350°F) FLAW GROWTH RATE OF 2024-T861
(curves are hand-faired from Appendix D, Figures D1-7a, D1-9a, D2-7a, and D2-9a)

Effect of Test Direction. The effect of test direction relative to the rolling direction of the sheet or plate is shown in Figure 4-4. It can be observed that crack propagation is slightly faster for the transverse test direction than for the longitudinal direction. Similar layering effects are observed in the data obtained at other temperatures and for other thicknesses.

Effect of Specimen Thickness. As shown in Figure 4-5 for the 2024-T861 alloy tested at room temperature in argon at a stress ratio of 0.05, increasing section

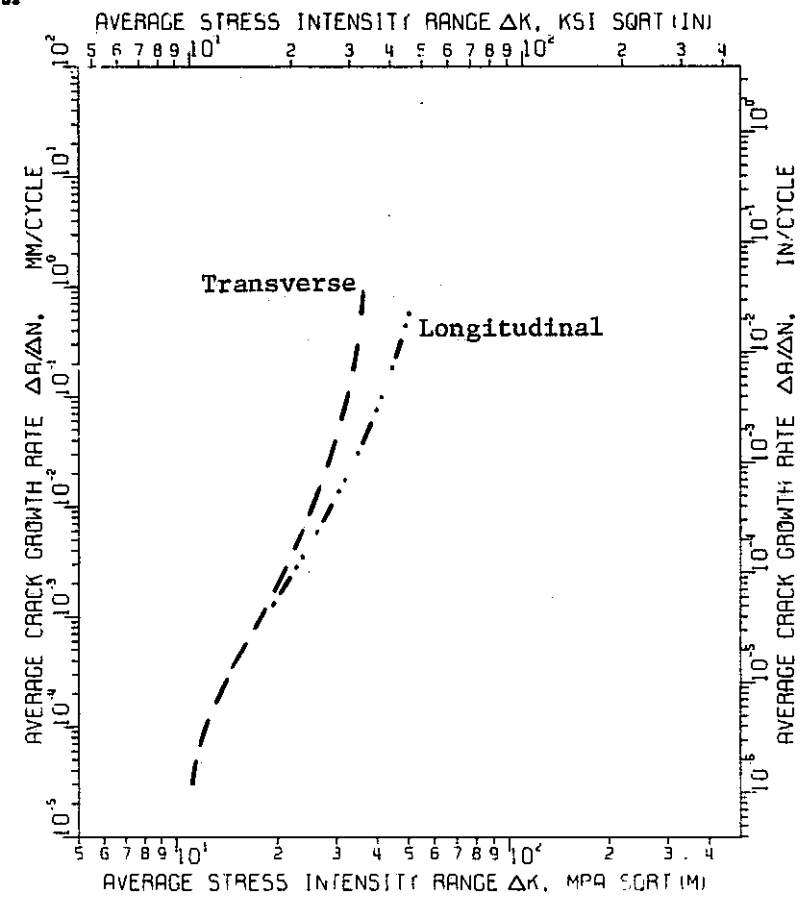


FIGURE 4-4

EFFECT OF TEST DIRECTION ON THE ROOM TEMPERATURE FLAW GROWTH RATE OF 2024-T861
(curves are hand-faired from Appendix D, Figure D2-4)

thickness tends to increase crack growth rate for equivalent stress intensity conditions. The layering observed in this figure is also evident for data at the higher stress ratio (R=0.5) and at lower temperatures (144°K or 200°F). The effect appears to be lost at elevated temperatures, primarily because net section yielding precluded the attainment of the high ΔK levels necessary to observe the effect.

Effect of Test Temperature/Environment. Test temperature was found to exert a strong influence on the flaw growth rate of 2124-T851, as shown in Figure 4-6;

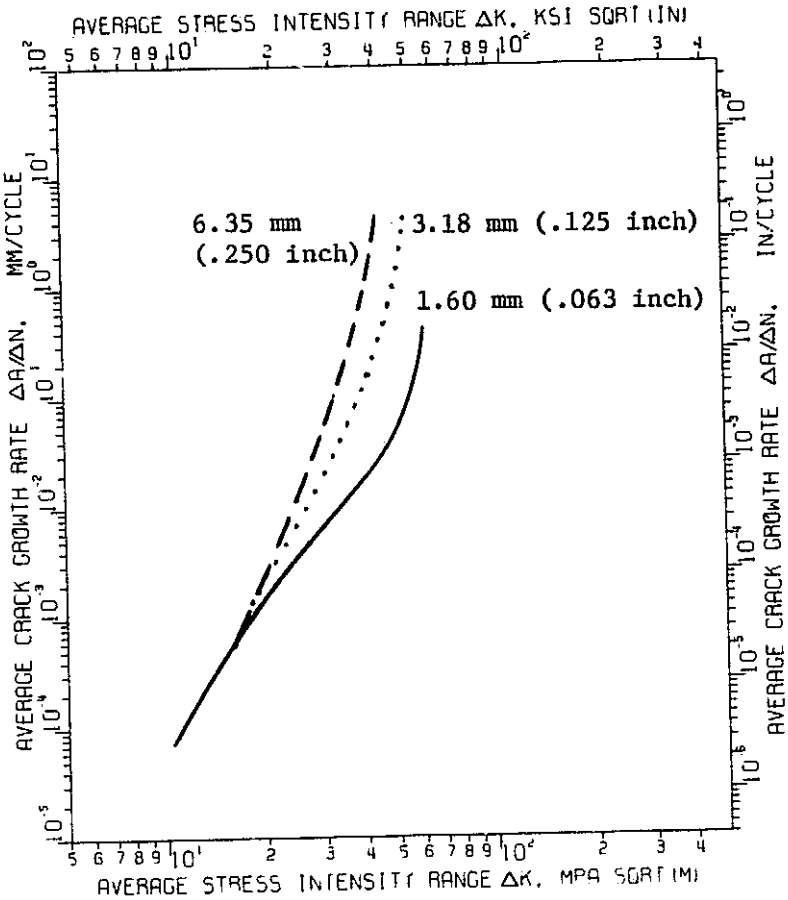


FIGURE 4-5

EFFECT OF THICKNESS ON THE ROOM TEMPERATURE FLAW GROWTH RATE OF 2024-T861
(curves are hand-faired from Appendix D, Figures D1-4a, D2-4a, and D3-2a)

similar effects were observed for the other alloy/thickness combinations investigated. Cryogenic temperatures were found to primarily affect the flaw growth rate in the high ΔK range preceding instability; in this region, the growth rate is accelerated relative to that at room temperature due to a decrease in the toughness of the material. Similarly, elevated temperatures promote an increase in material toughness and cause the flaw growth in the high ΔK range to decrease relative to that at room temperature. However, this trend is not observed as the temperature is increased

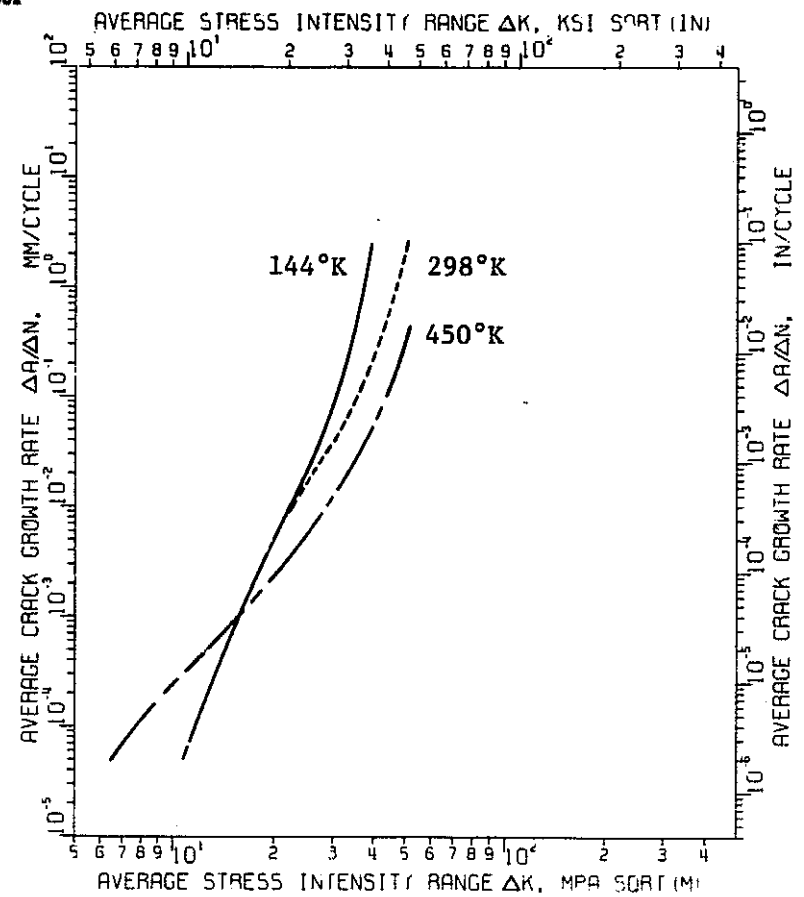


FIGURE 4-6

EFFECT OF TEST TEMPERATURE ON THE FLAW GROWTH RATE OF 2124-T851
(curves are hand-faired from Appendix D, Figures D6-2a, D6-4a, and D6-6a)

from 422°K (300°F) to 478°K (400°F), as an examination of the flaw growth rate curves in Appendix D will prove. Although there is a tendency for this high temperature data to have wider scatter bands than the lower temperature data, no consistent trend can be established.

At the opposite end of the flaw growth rate curve (i.e., the low ΔK range), elevated temperatures have an opposite effect on the threshold value, ΔK_o; that is, higher test temperatures appear to decrease ΔK_o relative to the room temperature

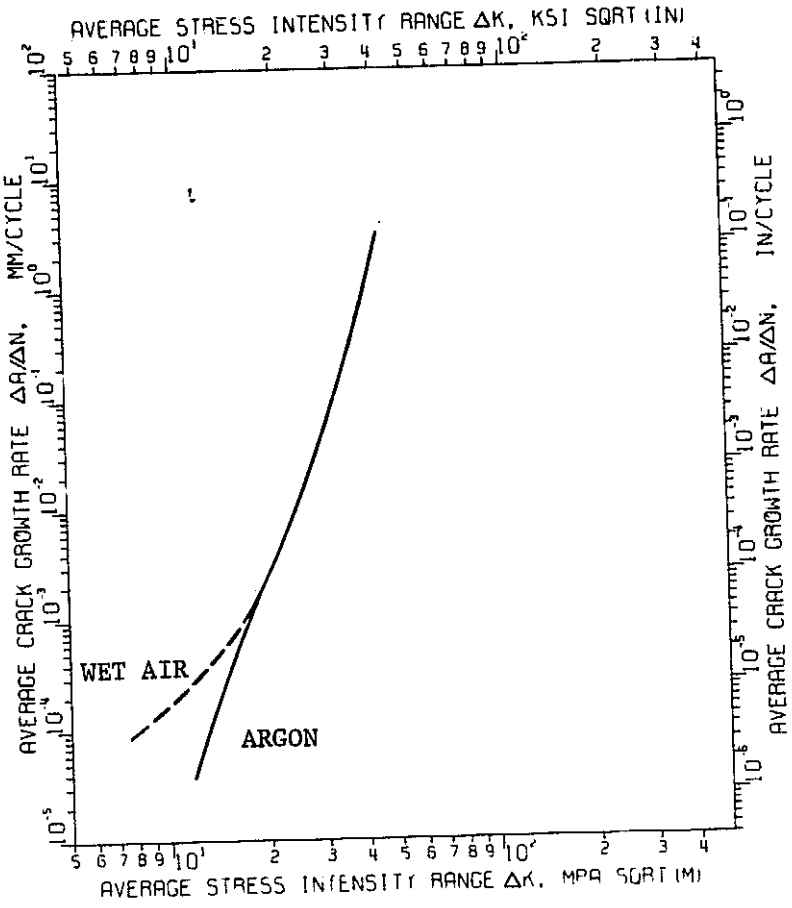


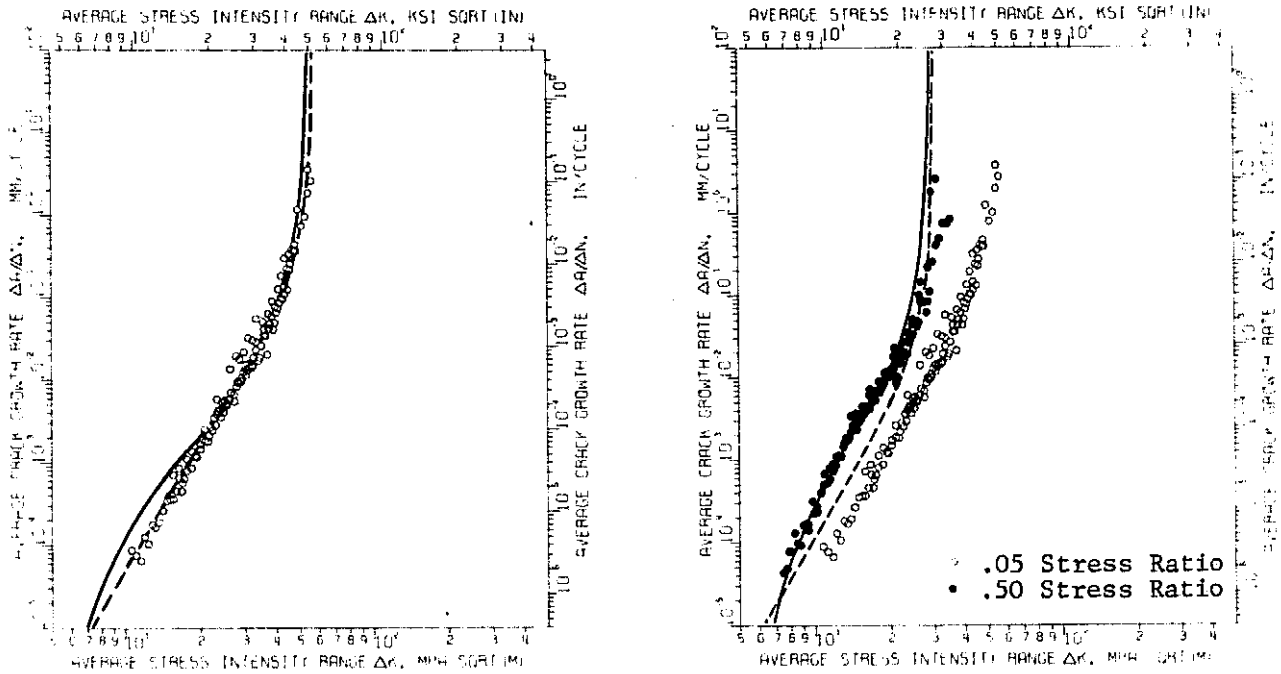
FIGURE 4-7

EFFECT OF RELATIVE HUMIDITY ON THE ROOM TEMPERATURE FLAW GROWTH RATE OF 2024-T861
(curves are hand-faired from Appendix D, Figure D3-2a)

value. The curves shown in Figure 4-6 appear to indicate that cryogenic temperatures have little affect on the threshold value; however, no firm conclusion can be drawn in this regard because of the lack of cryogenic data in this region of the curve.

The value of ΔK_o was also found to be affected by the relative humidity at room temperature. As shown in Figure 4-7 the wet air environment (RH $\geq$ 100%) causes the value of ΔK_o to decrease relative to the dry argon environment (RH = 0.03%).

Effect of Applied Stress Level. Examination of the flaw growth rate curves in Appendix D shows that flaw growth rate is unaffected by differences in the magnitude



———— Forman Model (Equation 4-3)
– – —— Colliepriest Model (Equation 4-4)

(a) Comparison of Test Data for R = .05 with Least Squares Fit of Various Rate Models

(b) Comparison of Test Data for R = .50 with Predicted Behavior from (a)

FIGURE 4-8

EFFECT OF STRESS RATIO ON THE ROOM TEMPERATURE FLAW GROWTH RATE OF 2024-T861 (curves are hand-faired from Appendix D, Figure D2-4a and D2-5a)

of the maximum applied cyclic stress. Such results indicate that the stress intensity parameter adequately accounts for differences in stress level.

Effect of Cyclic Frequency. Cyclic test frequency was observed to have no effect on fatigue flaw growth rate. For corresponding tests, the 20 and 200 cpm cyclic data was found to be indistinguishable for all test conditions evaluated.

Effect of Stress Ratio. The effect of stress ratio (minimum to maximum cyclic stress) on flaw growth rate is shown in Figure 4-8. Because both the Forman and

Table 4-4

PARAMETERS USED TO OBTAIN CURVES IN FIGURE 4-8

MODEL/PARAMETER	SI UNITS	ENGLISH UNITS
Forman (Equation 4-2)		
° K_c +	60.1 MPa $\sqrt{m}$	54.7 ksi $\sqrt{in}$
° C **	.6174 E-10*	.1734 E-8
° n	4.582	4.582
Colliepriest (Equation 4-4)		
° ΔK_o ++	5.7 MPa $\sqrt{m}$	5.2 ksi $\sqrt{in}$
° K_c	60.1 MPa $\sqrt{m}$	54.7 ksi $\sqrt{in}$
° C_1	.1264 E-5 m/cycle	.4974 E-8 inch/cycle
° C_2	4.394	4.394
° C(P)***	.2360 E-10	.1321 E-8
° n(P)	3.731	3.731

* E-10 = 10^{-10}, E-8 = 10^{-8}, etc.

** SI Units: $\frac{m/cycle}{(MPa\ \sqrt{m})^{n-1}}$; English Units: $\frac{in/cycle}{(ksi\ \sqrt{in})^{n-1}}$

*** SI Units: $\frac{m/cycle}{(ksi\ \sqrt{in})^{n}}$; English Units: $\frac{in/cycle}{(ksi\ \sqrt{in})^{n}}$

\+ From Appendix C, Table C3-1

++ From Appendix E, Table E2-2

Colliepriest rate models (equations 4-3 and 4-4, respectively) attempt to account for the effect of stress ratio, an attempt was made to predict the behavior at one stress ratio from an analysis of the data at the other stress ratio. The linearized form of each model (i.e., equations 4-9 and 4-10) was fit to the 0.05 stress ratio data shown in Figure 4-8(a) in a least squares manner. The K_c and ΔK_o values used in this analysis were obtained from fracture toughness testing and from regression/convergence analysis, respectively. The rate parameters obtained from this analysis are listed in Table 4-4; they were used to generate the curves shown in Figure 4-8(b). As can be seen, slightly better agreement is obtained between

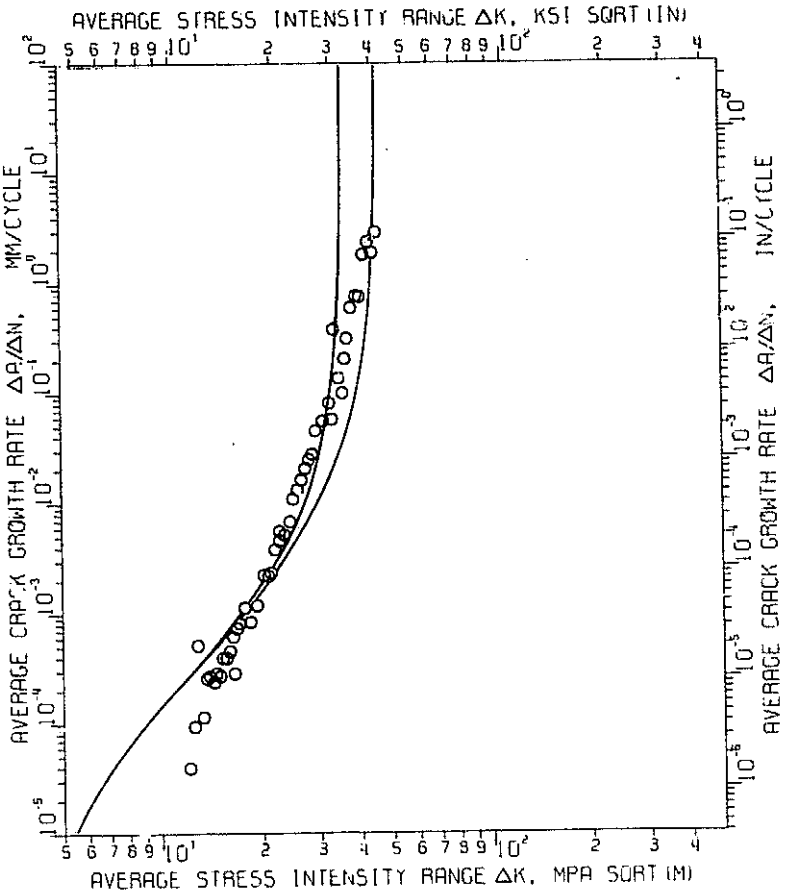


FIGURE 4-9

COMPARISON OF 2024-T861 DATA WITH REFERENCE 4-7 DATA
(Data from Appendix D, Figure D5-2a)

the test data and the curve predicted by the Colliepriest model.

4.3.2 Comparison of Cyclic Data Bases

The cyclic test data generated under this program was compared with that obtained by other investigators for these alloys. The growth rate curves obtained from room temperature tests of 2024-T861 and 2124-T851 compact tension specimens having respective thicknesses 6.38 mm (.250 inch) and 12.7 mm (.500 inch) are shown in Figures 4-9 and 4-10. These curves were generated using the flaw growth rate

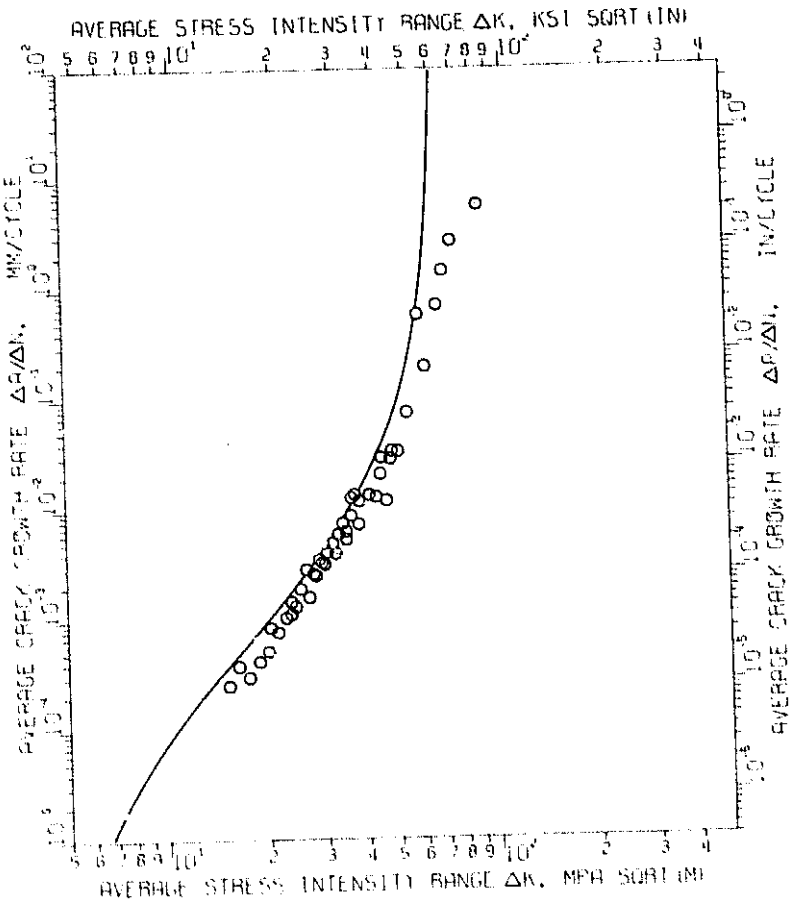


FIGURE 4-10

COMPARISON OF 2124-T851 DATA WITH REFERENCE 4-7 DATA
(Data from Appendix D, Figure D7-2a)

parameters specified in Reference 4-7 and a stress ratio of 0.05. Also shown in these figures is the room temperature cyclic data obtained under this program. The agreement between the two data bases appears to be excellent.

4.3.3 Comparison of Rate Models with Test Data

As discussed in Section 4.2.2, regression/convergence techniques were used to fit the Forman and Colliepriest fatigue flaw growth rate models (Equations 4-3 and

4-4) to the cyclic test data generated under this program; the results of these analyses are collected in Appendix E. These techniques permitted the value of K_C to be optimized for each data set examined; as shown in Tables 4-5 and 4-6, a consistent discrepancy exists between these optimized K_C values obtained by curve fitting and those derived from static tensile testing. As shown in Figure 4-11, these "curve fit" K_C values are consistently higher than the corresponding "static" values. These results also indicate that, for any given test condition, the optimized K_C value obtained using the Colliepriest rate model is in most cases always higher than that obtained using the Forman rate model.

The differences between the two optimized K_C values are most likely related to the nature of the mathematical model used to fit the data. However, the differences between these and the static values are related to the nature of the curve fitting process and not to any difference in the response of the material to the manner in which load is applied. That the K_C value is unique is confirmed by the maximum stress intensity values shown in Tables 4-5 and 4-6. This data, also plotted in Figure 4-11, was obtained from those tests for which crack length was measured on the cycle before failure and represents the stress intensity at maximum load. These values confirm that the critical stress intensity parameter, K_C, is essentially independent of loading profile.

The discrepancy between the static and the curve fit K_C values must be related to the nature of the curve fitting process because an unusually large variation in standard deviation (.012 to .469) is associated with the optimized values. Such a wide variation in standard deviation could be related to the fairly large scatter bands associated with some data sets or the fact that the rate models fit some data sets better than others. More significantly, however, is the fact that the amount of data at the high ΔK levels (i.e., immediately preceding instability) is limited and varies from one data set to another. The accuracy with which the curve

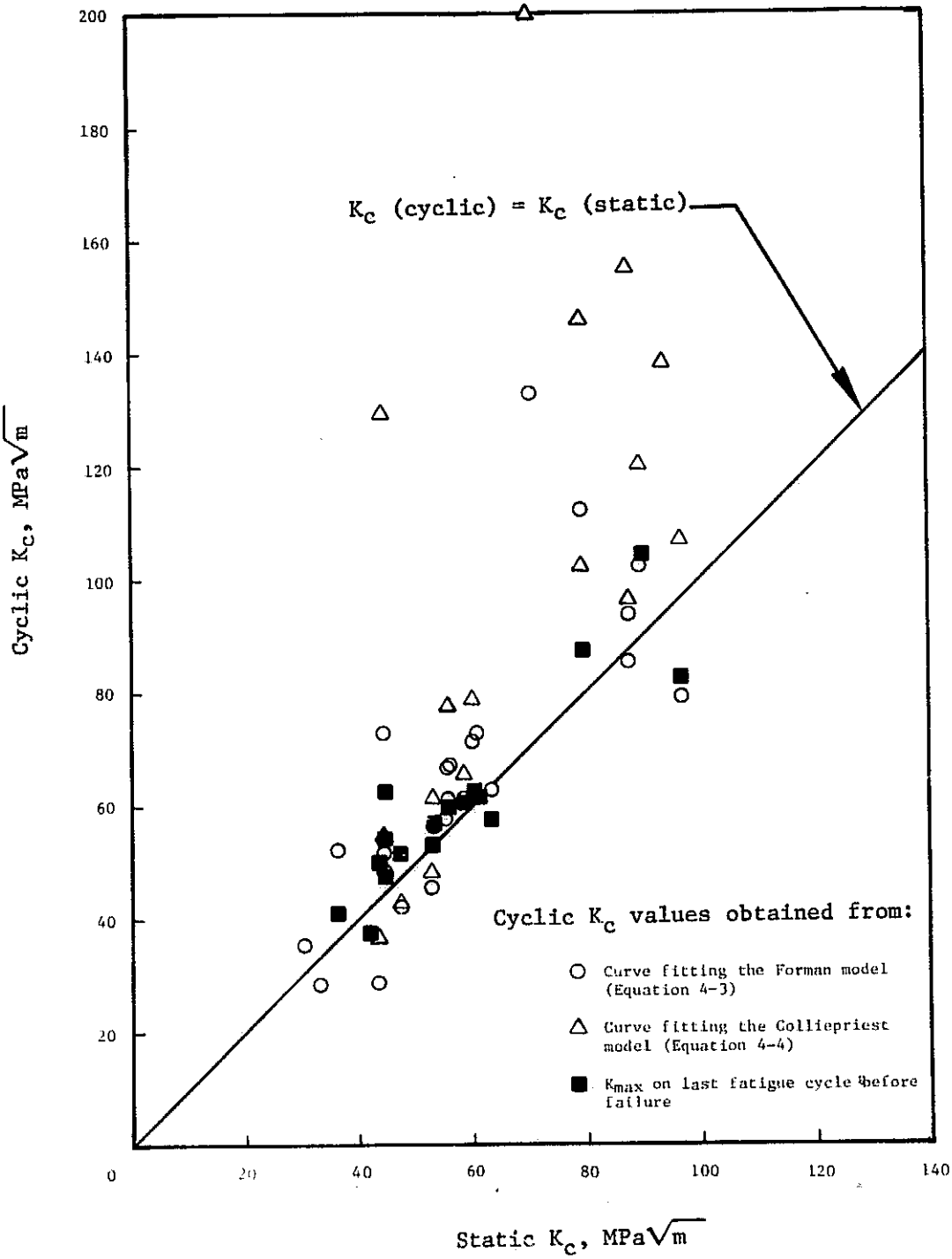


FIGURE 4-11

STATIC VS CYCLIC K_c VALUES FOR 2024-T861 AND 2124-T851

Table 4-5

STATIC AND CYCLIC FRACTURE TOUGHNESS (K_c) FOR 2024-T861

NOMINAL THICKNESS mm	NOMINAL THICKNESS in	CONSTRAINT**	TEMPERATURE (°K)	TEST DIRECTION	AVERAGE K_c (STATIC)* MPa$\sqrt{m}$	AVERAGE K_c (STATIC)* ksi$\sqrt{in}$	AVERAGE K_{max} @ N-1** MPa$\sqrt{m}$	AVERAGE K_{max} @ N-1** ksi$\sqrt{in}$	K_c (CURVE FIT)*** FORMAN MPa$\sqrt{m}$	FORMAN ksi$\sqrt{in}$	COLLIPRIEST MPa$\sqrt{m}$	COLLIPRIEST ksi$\sqrt{in}$
1.60	.063	STIFFENED	144	L	58.4	53.2	60.8	55.3	61.2	55.7	65.6	59.7
				T	47.2	43.0	51.6	47.0	42.9	39.9	42.8	38.9
			294	L	60.9	55.4	61.4	56.3	72.8 (A)	66.3 (A)	79.2 (A)	72.1 (A)
				T	52.8	48.0	53.0	48.3	45.4 (A)	41.3 (A)	48.0 (A)	43.7 (A)
			450	L	NSY		--	--	107.7	98.0	110.1	100.2
				T	NSY		--	--	74.8	68.0	76.5	69.6
1.60	.063	UNSTIFFENED	144	L	60.6	55.2	--	--	FC		FC	
				T	--	--	--	--	55.1	50.1	FC	
			294	L	66.7	60.7	--	--	76.7 (A)	69.8 (A)	85.3 (A)	77.6 (A)
									67.5 (W)	61.4 (W)	FC (W)	
				T	51.1	46.5	--	--	53.0 (A)	48.2 (A)	59.3 (A)	54.0 (A)
									50.1 (W)	45.6 (W)	FC (W)	
			450	L	97.9	89.1	--	--	80.1	72.8	81.8	74.5
				T	--	--	--	--	71.5	65.0	73.1	66.5
3.18	.125	STIFFENED	144	L	53.0	48.2	56.7	51.6	56.4	51.3	61.2	55.7
				T	37.3	34.0	42.1	38.4	FC		FC	
			294	L	60.1	54.7	62.2	56.7	71.7 (A)	65.3 (A)	78.9 (A)	71.8 (A)
				T	44.6	40.7	47.4	43.1	48.3 (A)	44.0 (A)	54.5 (A)	49.6 (A)
			450	L	NSY		--	--	129.1	117.5	FC	
				T	NSY		--	--	102.0	9.28	FC	
3.18	.125	UNSTIFFENED	144	L	61.2	56.0	--	--	58.4	53.2	70.9	64.5
				T	--	--	--	--	FC		39.6	36.0
			294	L	73.0	66.4	--	--	FC (A)		78.9 (A)	71.8 (A)
									66.0 (W)	60.0 (W)	82.9 (W)	75.4 (W)
				T	47.4	43.1	--	--	52.1 (A)	47.4 (A)	FC (A)	
									37.4 (W)	34.1 (W)	FC (W)	
			450	L	--	--	--	--	133.0	121.0	138.6	117.0
				T	94.6	88.8	--	--	99.7	90.8	102.0	92.9
6.35	.250	UNSTIFFENED	144	L	36.5	33.2	41.0	37.3	52.2	47.5	FC	
				T	30.4	27.7	--	--	35.3	32.1	FC	
			294	L	43.7	39.8	49.9	45.4	FC (A)		FC (A)	
									28.5 (W)	25.9 (W)	36.9 (W)	33.6 (W)
				T	33.7	30.7	--	--	FC (A,20)		FC (A,20)	
									28.1 (A)	25.6 (A)	FC (A)	
									25.3 (W,20)	23.0 (W,20)	25.3 (W,20)	23.0 (W,20)
									FC (W)		36.9 (W)	33.6 (W)
			450	L	93.8	85.3	--	--	FC		138.2	125.8
				T	70.6	64.0	--	--	132.8 (20)	120.8 (20)	201.6 (20)	183.5 (20)
									FC (200)		FC (200)	

* All dynamic K_c values are for 200 CPM tests unless noted by (20), indicating 20 CPM tests. Other abbreviations are:
A = Argon Environment
W = Wet Air Environment
NSY = Net Section Yielding
FC = Failure to Converge

** Stiffened: Buckling restrained
Unstiffened: Buckling unrestrained

* Static: K_c determined from fracture toughness testing (Appendix C).

** K_{max} @ N-1: Average K_{max} values on last fatigue cycle before failure (from Appendix D).

*** Curve Fit: As determined from curve fitting rate models to data representing both 0.05 and 0.50 stress ratios, using regression/convergence techniques (Appendix E); "Forman" K_c values represent those obtained using the Forman rate model (Equation 4-8), "Collipriest" K_c values represent those obtained using the Collipriest rate model (Equation 4-4).

Table 4-6

STATIC AND CYCLIC FRACTURE TOUGHNESS (K_C) FOR 2124-T851

NOMINAL THICKNESS mm	in	TEMPERATURE °K	TEST DIRECTION	AVERAGE K_C (STATIC)* MPa$\sqrt{m}$	ksi$\sqrt{in}$	AVERAGE K_{max} @ N-1** MPa$\sqrt{m}$	ksi$\sqrt{in}$	K_C (CURVE FIT) FORMAN MPa$\sqrt{m}$	ksi$\sqrt{in}$	COLLIEPRIEST MPa$\sqrt{m}$	ksi$\sqrt{in}$
6.35	.250	144	L	89.3	81.3	104.3	94.9	102.2	93.0	120.1	109.3
			T	63.1	58.0	57.5	52.3	62.9	57.2	FC	
		294	L	87.3	79.5	--	--	93.7 (A)	85.3 (A)	155.2 (A)	141.2 (A)
								85.2 (W)	77.5 (W)	96.1 (W)	87.4 (W)
			T	55.5	50.5	59.7	54.3	57.5 (A,20)	52.3 (A,20)	FC (A,20)	
								66.8 (A,200)	60.8 (A,200)	77.7 (A,200)	70.7 (A,200)
								61.0 (W,20)	55.5 (W,20)	FC (A,W)	
								67.0 (W,200)	60.9 (W,200)	FC (W,200)	
		450	L	NSY		--	--	125.6	114.3	100.6	9.15
			T	NSY		--	--	99.3 (20)	90.3 (20)	201.6 (20)	183.5 (20)
								141.7	129.0	114.9	104.5
11.45	.450	144	L	96.5	87.8	82.6	75.2	78.9	71.8	107.4	97.8
				44.5	40.5	62.5	56.9	51.3	46.7	FC	
		294	L	79.1	72.0	87.4	79.6	112.2 (A)	102.1 (A)	145.9 (A)	132.8 (A)
								FC (W)		102.2 (W)	93.0 (W)
			T	44.5	40.5	54.2	49.4	72.8 (A)	66.3 (A)	129.5 (W)	117.9 (W)
		450	L	NSY		--	--	102.7	93.5	109.2	99.4
			T	NSY		--	--	98.5	89.3	FC	

+ All dynamic K_C values are for 200 CPM tests unless noted by (20), indicating 20 CPM tests. Other abbreviations are:

A = Argon Environment
W = Wet Air Environment
NSY = Net Section Yielding
FC = Failure to Converge

* Static: As determined from fracture toughness testing (Appendix C).

** K_{max} @ N-1: Average K_{max} values on last fatigue cycle before failure (from Appendix D).

*** Curve Fit: As determined from curve fitting rate models to data representing both 0.05 and 0.50 stress ratios, using regression/convergence techniques (Appendix E); "Forman" K_C values represent those obtained using the Forman rate model (Equation 4-8); "Colliepriest" K_C values represent those obtained using the Colliepriest rate model (Equation 4-4).

fitting process selects a value for K_C, then, can only be as good as the amount of cyclic data in the immediate vicinity of instability.

The results of the regression/convergence analyses also indicate that, even when the difference between the static and optimized K_C values are small, no one rate model is superior in its agreement with the experimental data above flaw growth rates of 10^{-4} mm/cycle (3.9×10^{-6} inch/cycle). For crack growth rates less than this value, the behavior predicted by the two models differs significantly;

unfortunately, the test data generated in this range was limited. However, visual examination of the results of the curve fitting process showed that a slightly better fit was obtained for the sigmodal curves associated with the Colliepriest model.

4.4 REFERENCES

4-1 R. G. Forman, V. E. Kearney, R. M. Engle; "Numerical Analysis of Crack Propagation in Cyclic-Loaded Structures," Journal of Basic Engineering, Vol. 89, 1967, pp. 459-464.

4-2 J. E. Colliepriest, Jr., R. M. Ehret, "A Generalized Relationship of Fatigue Crack Growth Rates", Space Division, Rockwell International Corporation, SD 74-CE-0001, March, 1974.

4-3 P. C. Paris, "The Growth of Cracks Due to Variations in Loads", PhD Thesis, Lehigh University, 1962.

4-4 J. E. Colliepriest, Jr., and R. M. Ehret, "Computer Modeling of Part-Through-Crack Growth", Space Division, Rockwell International Corporation, SD 72-CE-0015, 1972.

4-5 A. Ralston, A First Course in Numerical Analysis, pp. 323-328.

4-6 F. B. Hildebrand, Introduction to Numerical Analysis, pp. 443-445.

5.0 CONCLUSIONS

5.1 FRACTURE TOUGHNESS PROPERTIES

The following conclusions can be drawn from the fracture toughness data generated during this study:

1) for equivalent section thicknesses, the K_c values for the 2124-T851 alloy are almost twice those of the 2024-T861 alloy;
2) for section thicknesses as thin as 1.60 mm (.063 inch), buckling has little effect on the fracture behavior of 2024-T861;
3) for all test conditions, the fracture toughness (K_c) in the transverse test direction is approximately 15-20 percent lower than the corresponding longitudinal value;
4) for both alloys, fracture toughness decreases with increasing section thickness, particularly in the thinner gages of the 2024-T861 alloy;
5) for both alloys, increasing temperature causes an increase in fracture toughness; for the 2024-T861 alloy with a thickness of 6.35 mm (.250 inch), toughness increases 250 percent over the temperature range 144°K to 450°K (-200°F to 350°F);
6) no systematic variation of fracture toughness with initial flaw size was observed for any test condition investigated.

5.2 FATIGUE CRACK GROWTH PROPERTIES

The conclusions drawn from the fatigue crack growth data are:

1) for equivalent section thicknesses and stress intensity conditions, the crack growth rate for the 2024-T861 alloy is faster than that for the 2124-T851 alloy;

2) for section thicknesses in the range 1.60 - 3.18 mm (.063 - .125 inch), buckling accelerates the crack growth process only at elevated temperature (450°K or 350°F);

3) for equivalent stress intensity conditions, the crack growth rate is higher for the transverse test direction than for the longitudinal test direction;

4) for equivalent stress intensity conditions, the crack growth rate of both alloys increases with increasing section thickness;

5) for equivalent test conditions, increasing test temperature causes an increase in flaw growth rate at low ΔK levels and a decrease in flaw growth rate at high ΔK levels.

6) for the test conditions investigated, differences in applied stress level and cyclic frequency have no effect on flaw growth rate;

7) for equivalent test conditions, crack growth rate increases with decreasing stress ratio, and the effect is adequately predicted by the Forman and Colliepriest empirical rate models;

8) differences in K_c between that derived from toughness testing and that obtained from cyclic testing using least squares/convergence techniques are due primarily to the lack of sufficient cyclic data near the point of instability and not to any fundamental difference in the response of the material to the way in which load is applied;

9) based on limited flaw growth rate data below 10^{-4} mm/cycle, it appears that slightly better fit between predicted behavior and actual data was obtained for the Colliepriest rate model.

6.0. RECOMMENDATIONS

As a result of the work conducted under this program, one area has been observed that requires further investigation. It has been realized that a critical need exists for a statistically significant technique for the reduction and analysis of fatigue flaw growth data. Such a study should include at least the following:

- o an examination of the possibility of using spline functions with a least squares procedure to establish the relation between crack length and number of applied fatigue cycles;
- o developing a practical method for solving the integrated form of the various rate models in order that the fatigue flaw growth parameters may be evaluated directly from the measured crack length/cycle data;
- o determining if a statistically significant difference exists in the cyclic life predicted by the various rate models;
- o determining the best numerical algorithm for computing the constants associated with each flaw growth rate model.

Appendix A
TENSILE TEST DATA

The following data tables incorporate the mechanical property values obtained from tensile tests of 2024-T861 sheet and 2124-T851 plate specimens. Table A-1 summarizes the design mechanical properties for these alloys, based on the data presented in Reference 4-7. Tables A-2 through A-4 include the data obtained from 2024-T861 sheet specimens, while Tables A-5 through A-7 include the data obtained from the 2124-T851 plate specimens. The elastic modulus values reported represent those obtained from the slope of the stress-strain curve, generated using a Class B-1 extensometer.

TABLE A-1

ROOM TEMPERATURE DESIGN MECHANICAL PROPERTIES FOR BARE 2024-T861 AND 2124-T851 ALUMINUM*

		2024-T861**		2124-T851***	
		L ORIENTATION	T ORIENTATION	L ORIENTATION	T ORIENTATION
F_{tu}	MPa	496.4	489.5	448	448
	ksi	72	71	65	65
F_{ty}	MPa	462.0	455	393	393
	ksi	67	66	57	57
E	10^3MPa	72.40	72.40	71.71	71.71
	10^6psi	10.7	10.7	10.4	10.4
ELONGATION, PER CENT		4	4	6	4

*FROM: MATERIALS PROPERTIES MANUAL, VOLUME I, DESIGN DATA; SPACE DIVISION, ROCKWELL INTERNATIONAL; JUNE, 1974.

**VALUES FOR SHEET 1.60 - 6.32 mm (.063-.249 inch) THICK.

***VALUES FOR PLATE 50.8 - 76.2 mm (2.001-3.000 inch) THICK.

TABLE A-2. MECHANICAL PROPERTIES OF AS-RECEIVED 2024-T861 ALUMINUM ALLOY SHEET AT 144°K (-200°F)

SHEET THICKNESS mm	SHEET THICKNESS in	SHEET NO.	SPECIMEN NO.	TEST DIRECTION	F_{ty} MPa	F_{ty} ksi	F_{tu} MPa	F_{tu} ksi	Modulus 10^3MPa	Modulus 10^6psi	Elongation, % (5.08cm gage length)
1.60	.063	4	63-4LS-1	L	551.6	80.0	582.6	84.5	88.74	12.9	6
1.60	.063	5	63-5LS-1	L	548.2	79.5	582.6	84.5	73.91	10.7	6
1.60	.063	6	63-6LS-1	L	548.2	79.5	579.2	84.0	81.98	11.9	6
				AVG:	549.3	79.7	581.5	84.3	81.54	11.8	6
1.60	.063	1	63-1TS-2	T	548.2	79.5	586.1	85.0	76.26	11.1	6
1.60	.063	1	63-1TS-3	T	*	*	582.6	84.5	*	*	6
1.60	.063	4	63-4TS-1	T	537.8	78.0	579.2	84.0	78.19	11.3	6
				AVG:	543.0	78.8	582.6	84.5	77.22	11.2	6
3.18	.125	1	125-1LS-1	L	548.2	79.5	589.5	85.5	75.43	10.9	7
3.18	.125	4	125-4LS-1	L	561.9	81.5	599.9	87.0	77.64	11.3	7
3.18	.125	5	125-5LS-1	L	572.3	83.0	603.3	87.5	82.53	12.0	7
				AVG:	560.8	81.3	597.6	86.7	78.53	11.4	7
3.18	.125	1	125-1TS-3	T	561.9	81.5	596.4	86.5	74.26	10.8	6
3.18	.125	2	125-2TS-2	T	572.3	83.0	596.4	86.5	74.19	10.8	6
3.18	.125	4	125-4TS-1	T	555.0	80.5	596.4	86.5	76.47	11.1	6
				AVG:	563.1	81.7	596.4	86.5	74.97	10.9	6
6.35	.250	2	250-2LS-1	L	*	*	575.7	83.5	*	*	7
6.35	.250	3	250-3LS-1	L	*	*	589.5	85.5	*	*	7
6.35	.250	3	250-3LS-2	L	579.2	84.0	593.0	86.0	83.29	12.1	6
				AVG:	579.2	84.0	586.1	85.0	83.29	12.1	7
6.35	.250	2	250-2TS-1	T	*	*	568.8	82.5	*	*	6
6.35	.250	2	250-2TS-2	T	534.4	77.5	568.8	82.5	76.95	11.2	6
6.35	.250	3	250-3TS-1	T	558.5	81.0	586.1	85.0	80.81	11.7	6
				AVG:	546.5	79.3	574.6	83.3	78.88	11.4	6

* Extensometer slipped off specimen.

TABLE A-3. ROOM TEMPERATURE MECHANICAL PROPERTIES OF AS-RECEIVED 2024-T861 ALUMINUM ALLOY SHEET

SHEET THICKNESS mm	SHEET THICKNESS in	SHEET NO.	SPECIMEN NO.	TEST DIRECTION		F_{ty} MPa	F_{ty} ksi	F_{tu} MPa	F_{tu} ksi	MODULUS 10^3MPa	MODULUS 10^6psi	ELONGATION, % (5.08 cm GAGE LENGTH)
1.60	.063	1	63-ILS-1	L		499.9	72.5	520.6	75.5	70.33	10.2	6.5
1.60	.063	1	63-ILS-2	L		496.4	72.0	517.1	75.0	71.02	10.3	6.5
1.60	.063	1	63-ILS-3	L		496.4	72.0	517.1	75.0	69.64	10.1	6.0
					AVG:	497.8	72.2	518.5	75.2	70.33	10.2	6.3
1.60	.063	1	63-ITS-1	T		493.0	71.5	520.6	75.5	69.64	10.1	5.5
1.60	.063	1	63-ITS-2	T		493.0	71.5	524.0	76.0	72.40	10.5	6.5
1.60	.063	6	63-6TS-1	T		496.4	72.0	524.0	76.0	73.09	10.6	7.0
					AVG:	484.4	71.7	522.6	75.8	71.71	10.4	6.3
3.18	.125	1	125-ILS-2	L		496.4	72.0	520.6	75.5	71.02	10.3	7.5
3.18	.125	1	125-ILS-3	L		496.4	72.0	524.0	76.0	71.71	10.4	8.0
3.18	.125	2	125-2LS-1	L		499.9	72.5	524.0	76.0	71.02	10.3	8.0
					AVG:	496.4	72.0	522.6	75.8	71.02	10.3	7.8
3.18	.125	1	125-ITS-2	T		496.4	72.0	524.0	76.0	67.57	9.8	7.0
3.18	.125	1	125-ITS-4	T		496.4	72.0	527.5	76.5	70.33	10.2	8.0
3.18	.125	6	125-6TS-1	T		503.3	73.0	534.4	77.5	71.71	10.4	7.5
					AVG:	498.5	72.3	528.8	76.7	69.64	10.1	7.5
6.35	.250	1	250-ILS-1	L		510.2	74.0	517.1	75.0	68.26	9.9	6.5
6.35	.250	1	250-ILS-2	L		510.2	74.0	517.1	75.0	71.02	10.3	6.5
6.35	.250	1	250-ILS-3	L		510.2	74.0	517.1	75.0	70.33	10.2	7.0
					AVG:	510.2	74.0	517.1	75.0	69.64	10.1	6.8
6.35	.250	1	250-ITS-1	T		496.4	72.0	510.2	74.0	71.71	10.4	6.0
6.35	.250	1	250-ITS-2	T		496.4	72.0	513.7	74.5	74.47	10.8	6.0
6.35	.250	3	250-3TS-3	T		506.8	73.5	527.5	76.5	71.02	10.3	7.0
					AVG:	497.8	72.2	517.1	75.0	72.40	10.5	6.3

TABLE A-4. MECHANICAL PROPERTIES OF AS-RECEIVED 2024-T861 ALUMINUM ALLOY SHEET AT 450°K (350°F)

SHEET THICKNESS mm	SHEET THICKNESS in	SHEET NO.	SPECIMEN NO.	TEST DIRECTION		F_{ty} MPa	F_{ty} ksi	F_{tu} MPa	F_{tu} ksi	MODULUS 10^3MPa	MODULUS 10^6psi	ELONGATION, % (5.08 cm GAGE LENGTH)
1.60	.063	2	63-2LS-2	L		386.1	56.0	396.5	57.5	60.74	8.81	13
1.60	.063	3	63-3LS-1	L		386.1	56.0	389.6	56.5	56.81	8.24	12
1.60	.063	5	63-5LS-2	L		382.7	55.5	389.6	56.5	59.92	8.69	10
					AVG:	385.0	55.8	391.9	56.8	59.16	8.58	12
1.60	.063	2	63-2TS-1	T		396.5	57.5	403.4	58.5	62.74	9.10	13
1.60	.063	2	63-2TS-2	T		389.6	56.5	399.9	58.0	64.88	9.41	12
1.60	.063	3	63-3TS-1	T		393.0	57.0	403.4	58.5	66.19	9.60	12
					AVG:	393.0	57.0	402.2	58.3	64.61	9.37	12
3.18	.125	2	125-2LS-2	L		386.1	56.0	396.5	57.5	57.37	8.32	13
3.18	.125	2	125-2LS-1	L		*	*	393.0	57.0	59.84	8.68	12
3.18	.125	5	125-5LS-2	L		396.5	57.5	403.4	58.5	58.33	8.46	*
					AVG:	391.3	56.8	397.6	57.7	58.54	8.49	12
3.18	.125	1	125-1TS-1	T		396.5	57.5	403.4	58.5	57.23	8.30	12
3.18	.125	2	125-2TS-1	T		399.9	58.0	406.8	59.0	60.12	8.72	13
3.18	.125	3	125-3TS-1	T		393.0	57.0	399.9	58.0	60.95	8.84	12
					AVG:	396.5	57.5	403.4	58.5	59.43	8.62	12
6.35	.250	2	250-2LS-2	L		393.0	57.0	403.4	58.5	60.47	8.77	12
6.35	.250	4	250-4LS-1	L		382.7	55.5	393.0	57.0	60.40	8.76	12
6.35	.250	4	250-4LS-2	L		382.7	55.5	393.0	57.0	58.68	8.51	12
					AVG:	386.1	56.0	396.5	57.5	59.85	8.68	12
6.35	.250	1	250-1TS-3	T		396.5	57.5	406.8	59.0	57.78	8.38	12
6.35	.250	3	250-3TS-2	T		393.0	57.0	410.3	59.5	64.61	9.37	12
6.35	.250	3	250-3TS-3	T		403.4	58.5	410.3	59.5	59.78	8.67	11
					AVG:	397.8	57.7	409.1	59.3	60.74	8.81	12

*EXTENSOMETER SLIPPED OFF SPECIMEN.

TABLE A-5. MECHANICAL PROPERTIES OF AS-RECEIVED 2124-T851 ALUMINUM ALLOY PLATE AT 144°K (-200°F)

PLATE NO.	LOCATION*	SPECIMEN NO.	TEST DIRECTION	F_{ty} MPa	F_{ty} ksi	F_{tu} MPa	F_{tu} ksi	Modulus 10^3MPa	Modulus 10^6psi	Elongation, % (5.08cm gage length)
2	Top	2L-1	L	534.4	77.5	565.4	82.0	81.64	11.8	8
2	Middle	2L-2	L	527.5	76.5	572.3	83.0	83.29	12.1	8
3	Top	3L-1	L	541.3	78.5	575.7	83.5	81.84	11.9	8
			AVG:	534.4	77.5	571.1	82.8	82.26	11.9	8
1	Bottom	1TR-3	T	**	**	558.5	81.0	**	**	8
4	Top	4TR-1	T	506.8	73.5	555.0	80.5	81.98	11.9	7
5	Top	5TR-1	T	506.8	73.5	555.0	80.5	79.43	11.5	8
			AVG:	506.8	73.5	556.2	80.7	80.71	11.7	8

* Location in a 5.08 cm (2.0 inch) thick plate.

** Extensometer slipped off specimen.

TABLE A-6. ROOM TEMPERATURE MECHANICAL PROPERTIES OF AS-RECEIVED 2124-T851 ALUMINUM ALLOY PLATE

PLATE NO.	LOCATION*	SPECIMEN NO.	TEST DIRECTION	F_{ty} MPa	F_{ty} ksi	F_{tu} MPa	F_{tu} ksi	Modulus 10^3MPa	Modulus 10^6psi	Elongation, % (5.08 cm gage length)
1	Top	IL-1	L	486.1	70.5	510.2	74.0	72.40	10.5	10.0
1	Middle	IL-2	L	468.9	68.0	503.3	73.0	73.78	10.7	9.0
1	Bottom	IL-3	L	482.7	70.0	506.8	73.5	71.71	10.4	9.0
			AVG:	479.2	69.5	506.8	73.5	72.40	10.5	9.3
1	Top	IT-1	T	465.4	67.5	499.9	72.5	72.40	10.5	9.5
1	Middle	IT-2	T	461.9	67.0	493.0	71.5	73.09	10.6	9.5
5	Bottom	5T-3	T	468.9	68.0	499.9	72.5	71.02	10.3	9.5
			AVG:	465.4	67.5	497.8	72.2	72.40	10.5	9.5

*Location in a 5.08 cm (2.0 inch) thick plate

TABLE A-7. MECHANICAL PROPERTIES OF AS-RECEIVED 2124-T851 ALUMINUM ALLOY PLATE AT 450°K (350°F)

PLATE NO.	LOCATION*	SPECIMEN NO.	TEST DIRECTION	T_{ty} MPa	T_{ty} ksi	F_{tu} MPa	F_{tu} ksi	Modulus 10^3 MPa	Modulus 10^6 psi	Elongation, % (5.08cm gage length)
2	Bottom	2L-3	L	365.4	53.0	375.8	54.5	61.16	8.87	16
3	Middle	3L-2	L	351.6	51.0	372.3	54.0	62.40	9.05	17
3	Bottom	3L-3	L	368.9	53.5	382.6	55.5	59.99	8.70	15
			AVG:	361.98	52.5	377.2	54.7	61.16	8.87	16
5	Middle	5T-2	T	358.5	52.0	362.0	52.5	61.09	8.86	14
4	Middle	4T-2	T	**	**	368.9	53.5	**	**	14
4	Bottom	4T-3	T	365.4	53.0	376.5	54.5	63.57	9.22	15
			AVG:	362.0	52.5	368.9	53.5	62.33	9.04	14

* Location in a 5.08 cm (2.0 inch) thick plate

** Extensometer slipped off specimen

Appendix B
RESULTS OF ELASTIC COMPLIANCE CALIBRATION

The following data tables incorporate the compliance/crack length data obtained from calibrations of the center cracked tension specimen used in this program. Details concerning the test equipment and procedure used can be found in Section 3.1.

TABLE B-1

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 63-2L4 AT 298°K (70°F), BUCKLING RESTRAINED

(thickness: 1.60 mm or .063 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2a/w															
		.043	.085	.128	.171	.213	.256	.299	.341	.384	.427	.469	.512	.555	.597	.640	.683
MAX. APPLIED LOAD, P	MN	0.071	0.053	0.044	0.036	0.031	0.027	0.027	0.022	0.022	0.022	0.018	0.018	0.018	0.013	0.013	0.013
	Kips	16.0	12.0	10.0	8.0	7.0	6.0	6.0	5.0	5.0	5.0	4.0	4.0	4.0	3.0	3.0	3.0
DISPLACEMENTS AT:																	
0.5P	10^{-3} mm	0.0245	0.0376	0.0486	0.0511	0.0543	0.0553	0.0656	0.0628	0.0717	0.0813	0.0720	0.0880	0.0993	0.0823	0.0940	0.1078
	10^{-3} in	.964	1.481	1.914	2.012	2.137	2.179	2.584	2.472	2.822	3.199	2.836	3.464	3.911	3.241	3.702	4.246
0.6P	10^{-3} mm	0.0302	0.0465	0.0596	0.0625	0.0671	0.0685	0.0809	0.0777	0.0887	0.1004	0.0898	0.1075	0.1220	0.1008	0.1150	0.1313
	10^{-3} in	1.187	1.830	2.347	2.460	2.640	2.696	3.185	3.059	3.492	3.953	3.534	4.232	4.805	3.967	4.526	5.168
0.7P	10^{-3} mm	0.0355	0.0550	0.0706	0.0749	0.0802	0.08161	0.0965	0.0919	0.1050	0.1188	0.1065	0.1270	0.1444	0.1192	0.1359	0.1550
	10^{-3} in	1.397	2.165	2.780	2.947	3.157	3.213	3.799	3.618	4.135	4.679	4.191	5.001	5.685	4.693	5.350	6.104
0.8P	10^{-3} mm	0.0415	0.0639	0.0816	0.0866	0.0926	0.09474	0.1118	0.1068	0.1217	0.1377	0.1231	0.1465	0.1660	0.1387	0.1568	0.1785
	10^{-3} in	1.634	2.514	3.213	3.408	3.646	3.730	4.400	4.205	4.791	5.420	4.847	5.769	6.537	5.462	6.174	7.026
0.9P	10^{-3} mm	0.0475	0.0727	0.0933	0.0983	0.1054	0.1082	0.1270	0.1217	0.1384	0.1558	0.1398	0.1650	0.1884	0.1575	0.1785	0.2026
	10^{-3} in	1.872	2.864	3.674	3.869	4.149	4.260	5.001	4.791	5.448	6.132	5.504	6.495	7.417	6.202	7.026	7.976
P	10^{-3} mm	0.0532	0.0820	0.1047	0.1103	0.1185	0.1213	0.1426	0.1362	0.1547	0.1739	0.1561	0.1845	0.2107	0.1767	0.1994	0.2267
	10^{-3} in	2.095	3.227	4.121	4.344	4.666	4.777	5.615	5.364	6.090	6.845	6.146	7.264	8.297	6.956	7.850	8.926
COMPLIANCE, C	mm/MN	0.810	1.656	2.520	3.334	4.116	4.948	5.766	6.605	7.460	8.323	9.428	10.832	12.488	14.166	15.806	17.808
	10^{-6} in/lb	0.142	0.290	0.441	0.584	0.721	0.867	1.010	1.157	1.307	1.458	1.651	1.897	2.187	2.481	2.768	3.119

TABLE B-2

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 63-2L4 AT

298°K (70°F), BUCKLING UNRESTRAINED

(thickness: 1.60 mm or .063 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2a/w										
		.043	.085	.128	.171	.213	.256	.299	.341	.384	.427	.469
MAX APPLIED, LOAD, P	MN	0.071	0.053	0.044	0.036	0.031	0.027	0.027	0.022	0.022	0.022	0.018
	Kips	16.0	12.0	10.0	8.0	7.0	6.0	6.0	5.0	5.0	5.0	4.0
DISPACEMENTS AT:												
.5P	10^{-3} mm	0.0252	0.0398	0.0500	0.0521	0.0568	0.0578	0.0692	0.0663	0.0781	0.0919	0.0839
	10^{-3} in	0.992	1.565	1.928	2.053	2.235	2.277	2.724	2.612	3.073	3.618	3.283
.6P	10^{-3} mm	0.0309	0.0486	0.0600	0.0639	0.0692	0.0710	0.0845	0.0816	0.0958	0.1118	0.1029
	10^{-3} in	1.215	1.914	2.361	2.514	2.724	2.794	3.325	3.213	3.772	4.400	4.051
.7P	10^{-3} mm	0.0366	0.0571	0.0710	0.0756	0.0823	0.0837	0.0997	0.0958	0.1121	0.1313	0.1224
	10^{-3} in	1.439	2.249	2.794	2.975	3.241	3.297	3.925	3.772	4.414	5.168	4.819
.8P	10^{-3} mm	0.0426	0.0660	0.0816	0.0873	0.0947	0.0965	0.1150	0.1110	0.1292	0.1508	0.1416
	10^{-3} in	1.676	2.598	3.213	3.436	3.730	3.799	4.526	4.372	5.085	5.937	5.573
.9P	10^{-3} mm	0.0483	0.0749	0.0930	0.0990	0.1075	0.1100	0.1299	0.1260	0.1458	0.1703	0.1611
	10^{-3} in	1.900	2.947	3.660	3.897	4.232	4.330	5.113	4.959	5.741	6.705	6.342
P	10^{-3} mm	0.0543	0.0837	0.1043	0.1107	0.1203	0.1231	0.1451	0.1402	0.1622	0.1902	0.1820
	10^{-3} in	2.137	3.297	4.107	4.358	4.735	4.847	5.713	5.518	6.384	7.487	7.166
COMPLIANCE, C	mm/MN	0.817	1.646	2.482	3.290	4.082	4.883	5.686	6.646	7.548	8.819	11.029
	10^{-6} in/lb	0.143	0.288	0.435	0.576	0.715	0.855	0.996	1.164	1.322	1.545	1.932

TABLE B-3

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 125-2L4 AT

298°K (70°F), BUCKLING RESTRAINED

(thickness: 3.18 mm or 0.125 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2a/w															
		.043	.085	.128	.170	.213	.255	.298	.340	.383	.426	.468	.511	.553	.596	.638	.681
MAX. APPLIED LOAD, P	MN	0.133	0.089	0.089	0.067	0.067	0.044	0.044	0.044	0.044	0.044	0.036	0.036	0.031	0.031	0.027	0.027
	Kips	30.0	20.0	20.0	15.0	15.0	10.0	10.0	10.0	10.0	10.0	8.0	8.0	7.0	7.0	6.0	6.0
DISPLACEMENTS AT:																	
.5P	10^{-3} mm	0.0238	0.0330	0.0497	0.0479	0.0600	0.0461	0.0564	0.0653	0.0763	0.0851	0.0766	0.873	0.0855	0.0990	0.0947	0.1082
	10^{-3} in	0.936	1.299	1.956	1.886	2.361	1.816	2.221	2.570	3.003	3.352	3.017	3.436	3.366	3.897	3.730	4.260
.6P	10^{-3} mm	0.0287	0.0401	0.0603	0.0582	0.0735	0.0568	0.0692	0.0802	0.0937	0.1047	0.0937	0.1068	0.1047	0.1199	0.1153	0.1302
	10^{-3} in	1.131	1.578	2.375	2.291	2.892	2.235	2.724	3.157	3.688	4.121	3.688	4.205	4.121	4.721	4.540	5.126
.7P	10^{-3} mm	0.0341	0.0472	0.0710	0.0685	0.0866	0.0678	0.0820	0.0951	0.1107	0.1238	0.1110	0.1260	0.1242	0.1416	0.1359	0.1529
	10^{-3} in	1.341	1.858	2.794	2.696	3.408	2.670	3.227	3.744	4.358	4.875	4.372	4.959	4.889	5.573	5.350	6.020
.8P	10^{-3} mm	0.0394	0.0546	0.0823	0.0791	0.1001	0.0788	0.0951	0.1100	0.1277	0.1433	0.1281	0.1458	0.1433	0.1632	0.1561	0.1760
	10^{-3} in	1.551	2.151	3.241	3.115	3.939	3.101	3.744	4.330	5.029	5.643	5.043	5.741	5.643	6.425	6.146	6.928
.9P	10^{-3} mm	0.0443	0.0617	0.0930	0.0905	0.1135	0.0901	0.1078	0.1252	0.1455	0.1625	0.1458	0.1650	0.1622	0.1845	0.1767	0.1990
	10^{-3} in	1.746	2.431	3.660	3.562	4.470	3.548	4.246	4.931	5.727	6.398	5.741	6.495	6.384	7.264	6.956	7.836
P	10^{-3} mm	0.0500	0.0688	0.1043	0.1008	0.1270	0.1011	0.1210	0.1405	0.1622	0.1824	0.1632	0.1845	0.1813	0.2054	0.1973	0.2221
	10^{-3} in	1.970	2.710	4.107	3.967	5.001	3.981	4.763	5.532	6.384	7.180	6.426	7.264	7.138	8.088	7.767	8.744
COMPLIANCE, C	mm/MN	0.393	0.808	1.228	1.592	2.008	2.479	2.903	3.380	3.865	4.362	4.869	5.464	6.154	6.861	7.676	8.554
	10^{-6} in/lb	0.069	0.142	0.215	0.279	0.352	0.434	0.508	0.592	0.677	0.764	0.853	0.957	1.078	1.201	1.344	1.498

TABLE B-4

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 125-2L4 AT 298°K (70°F), BUCKLING UNRESTRAINED

(thickness: 3.18 mm or 0.125 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2a/w														
		.043	.085	.128	.170	.213	.255	.298	.340	.383	.426	.468	.511	.553	.596	.638	.681
MAX APPLIED, LOAD, P	MN	0.133	0.089	0.089	0.067	0.067	0.044	0.044	0.044	0.044	0.044	0.036	0.036	0.031	0.031	0.027	0.027
	Kips	30.0	20.0	20.0	15.0	15.0	10.0	10.0	10.0	10.0	10.0	8.0	8.0	7.0	7.0	6.0	6.0
DISPLACEMENTS AT:																	
.5P	10^{-3} mm	0.0245	0.0330	0.0514	0.0490	0.0617	0.0497	0.0585	0.0699	0.0805	0.0933	0.0841	0.0958	0.0937	0.1086	0.1061	0.1206
	in	0.964	1.299	2.025	1.928	2.431	1.956	2.305	2.752	3.171	3.674	3.311	3.772	3.688	4.274	4.177	4.749
.6P	10^{-3} mm	0.0294	0.0398	0.0621	0.0593	0.0752	0.0607	0.0717	0.0848	0.0979	0.1135	0.1022	0.1164	0.1135	0.1313	0.1274	0.1451
	in	1.159	1.565	2.445	2.333	2.961	2.389	2.822	3.339	3.855	4.470	4.023	4.582	4.470	5.168	5.015	5.713
.7P	10^{-3} mm	0.0348	0.0472	0.0731	0.0699	0.0887	0.0717	0.0848	0.1004	0.1157	0.1338	0.1206	0.1366	0.1345	0.1540	0.1494	0.1700
	in	1.369	1.858	2.878	2.752	3.492	2.822	3.339	3.953	4.554	5.266	4.749	5.378	5.294	6.062	5.881	6.691
.8P	10^{-3} mm	0.0398	0.0543	0.0837	0.0805	0.1022	0.0827	0.0983	0.1157	0.1334	0.1533	0.1384	0.1572	0.1543	0.1770	0.1717	0.1951
	in	1.565	2.137	3.297	3.171	4.023	3.255	3.869	4.554	5.252	6.034	5.448	6.188	6.076	6.970	6.761	7.683
.9P	10^{-3} mm	0.0451	0.0614	0.0947	0.0915	0.1157	0.0940	0.1114	0.1309	0.1508	0.1739	0.1568	0.1777	0.1746	0.2001	0.1941	0.2207
	in	1.774	2.417	3.730	3.604	4.554	3.702	4.386	5.154	5.937	6.845	6.174	6.998	6.873	7.878	7.641	8.688
P	10^{-3} mm	0.0507	0.0685	0.1057	0.1022	0.1292	0.1054	0.1245	0.1465	0.1685	0.1937	0.1753	0.1987	0.1951	0.2232	0.2164	0.2462
	in	1.998	2.696	4.163	4.023	5.085	4.149	4.903	5.769	6.635	7.627	6.900	7.822	7.683	8.786	8.521	9.694
COMPLIANCE, C	mm/MN	0.392	0.801	1.221	1.600	2.021	2.502	2.971	3.447	3.959	4.512	5.118	5.773	6.518	7.364	8.287	9.419
	10^{-6} in/lb	0.069	0.140	0.214	0.280	0.354	0.438	0.520	0.604	0.693	0.790	0.896	1.011	1.141	1.290	1.451	1.650

TABLE B-5

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 250-4T4 AT 144°K (-200°F)

(thickness: 6.30 mm or .248 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2a/w							
		0.085	.170	.256	.341	.426	.511	.596	.681
MAX. APPLIED LOAD, P	MN Kips	0.200 45.0	0.133 30.0	0.111 25.0	0.089 20.0	0.080 18.0	0.067 15.0	0.058 13.0	0.044 10.0
DISPLACEMENT AT:									
0.5P	10^{-3} mm in	0.0309 1.215	0.0415 1.634	0.0507 1.998	0.0539 2.123	0.0710 2.794	0.0805 3.171	0.0788 3.101	0.0855 3.366
0.6P	10^{-3} mm in	0.0369 1.453	0.0511 2.012	0.0617 2.431	0.0660 2.598	0.0851 3.352	0.0965 3.799	0.0951 3.744	0.1015 3.995
0.7P	10^{-3} mm in	0.429 1.690	0.0600 2.361	0.0731 2.878	0.0781 3.073	0.0993 3.911	0.1121 4.414	0.1114 4.386	0.1175 4.624
0.8P	10^{-3} mm in	0.0497 1.956	0.0685 2.696	0.0851 3.352	0.0905 3.562	0.1139 4.484	0.1277 5.029	0.1270 5.000	0.1338 5.266
0.9P	10^{-3} mm in	0.0553 2.179	0.0777 3.059	0.0955 3.758	0.1029 4.051	0.1284 5.057	0.1437 5.657	0.1433 5.643	0.1497 5.895
P	10^{-3} mm in	0.0617 2.431	0.0866 3.408	0.1078 4.246	0.1150 4.526	0.1426 5.615	0.1597 6.286	0.1597 6.286	0.1664 6.551
COMPLIANCE, C	mm/MN 10^{-6} in/lb	0.309 0.054	0.671 0.118	1.024 0.179	1.376 0.241	1.794 0.314	2.367 0.415	2.791 0.489	3.633 .636

TABLE B-6

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 250-4T4 AT 298°K (70°F)

(thickness: 6.30 mm or .248 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2c/w															
		0.043	0.085	.128	.170	.213	.256	.298	.341	.383	.426	.469	.511	.554	.596	.639	.681
MAX. APPLIED LOAD, P	MN	0.267	0.200	0.156	0.133	0.111	0.111	0.089	0.089	0.089	0.080	0.076	0.067	0.062	0.058	0.053	0.044
	Kips	60.0	45.0	35.0	30.0	25.0	25.0	20.0	20.0	20.0	18.0	17.0	15.0	14.0	13.0	12.0	10.0
DISPLACEMENTS AT:																	
0.5P	10^{-3} mm	0.0248	0.0394	0.0444	0.0497	0.0518	0.0631	0.0600	0.0692	0.0788	0.0813	0.0859	0.0851	0.0873	0.0905	0.0958	0.0919
	10^{-3} in	.978	1.551	1.746	1.956	2.039	2.486	2.361	2.724	3.101	3.199	3.380	3.352	3.436	3.562	3.772	3.618
0.6P	10^{-3} mm	0.0302	0.0472	0.0539	0.0600	0.0624	0.0759	0.0723	0.0834	0.0944	0.0983	0.1040	0.1025	0.1065	0.1100	0.1160	0.1114
	10^{-3} in	1.187	1.858	2.123	2.361	2.458	2.989	2.850	3.283	3.716	3.869	4.093	4.037	4.191	4.330	4.568	4.386
0.7P	10^{-3} mm	0.0355	0.0553	0.0628	0.0699	0.0731	0.0894	0.0848	0.0983	0.1118	0.1157	0.1224	0.1213	0.1249	0.1288	0.1359	0.1309
	10^{-3} in	1.397	2.179	2.472	2.752	2.878	3.520	3.339	3.870	4.400	4.554	4.819	4.777	4.917	5.071	5.350	5.154
0.8P	10^{-3} mm	0.0408	0.0635	0.0720	0.0805	0.0837	0.1029	0.0976	0.1128	0.1281	0.1323	0.1405	0.1394	0.1433	0.1490	0.1568	0.1501
	10^{-3} in	1.606	2.500	2.836	3.171	3.297	4.051	3.841	4.442	5.043	5.210	5.532	5.490	5.643	5.867	6.174	5.909
0.9P	10^{-3} mm	0.0461	0.0720	0.0809	0.0912	0.0944	0.1160	0.1096	0.1274	0.1441	0.1494	0.1586	0.1575	0.1625	0.1689	0.1763	0.1700
	10^{-3} in	1.816	2.836	3.185	3.590	3.716	4.568	4.316	5.015	5.685	5.881	6.244	6.202	6.398	6.649	6.942	6.691
P	10^{-3} mm	0.0514	0.0802	0.0905	0.1018	0.1050	0.1288	0.1228	0.1416	0.1618	0.1660	0.1770	0.1756	0.1810	0.1891	0.1973	0.1895
	10^{-3} in	2.025	3.157	3.562	4.009	4.135	5.071	4.833	5.573	6.370	6.537	6.970	6.914	7.124	7.445	7.767	7.459
COMPLIANCE, C	mm/MN	0.199	0.409	0.588	0.782	0.959	1.188	1.410	1.633	1.867	2.118	2.410	2.724	3.004	3.409	3.797	4.385
	10^{-6} in/lb	0.0349	0.0717	0.103	0.137	0.168	0.208	0.247	0.286	0.327	0.371	0.422	0.477	0.526	0.597	0.665	0.768

TABLE B-7

LOAD/DISPLACEMENT DATA FOR 2024-T861 SPECIMEN 250-4T4 AT 450°K (350°F)

(thickness: 6.30 mm or .248 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2c/w							
		0.085	0.170	0.256	0.341	0.426	0.511	0.596	0.681
MAX. APPLIED LOAD, P	MN Kips	0.200 45.0	0.133 30.0	0.111 25.0	0.089 20.0	0.080 18.0	0.067 15.0	0.058 13.0	0.044 10.0
DISPLACEMENTS AT:									
0.5P	10^{-3} mm in	0.0429 1.690	0.0543 2.137	0.0575 2.263	0.0635 2.500	0.0741 2.919	0.0851 3.352	0.1040 4.093	0.1022 4.023
0.6P	10^{-3} mm in	0.0518 2.039	0.0656 2.584	0.0717 2.822	0.0791 3.115	0.0927 3.650	0.1047 4.121	0.1260 4.959	0.1235 4.861
0.7P	10^{-3} mm in	0.0607 2.389	0.0766 3.017	0.0859 3.380	0.0951 3.744	0.1114 4.386	0.1245 4.903	0.1480 5.825	0.1444 5.685
0.8P	10^{-3} mm in	0.0699 2.752	0.0876 3.450	0.1001 3.939	0.1110 4.372	0.1302 5.126	0.1448 5.699	0.1700 6.691	0.1660 6.537
0.9P	10^{-3} mm in	0.0791 3.115	0.0993 3.911	0.1146 4.512	0.1267 4.987	0.1497 5.895	0.1639 6.453	0.1923 7.571	0.1884 7.417
P	10^{-3} mm in	0.0887 3.492	0.1107 4.358	0.1292 5.085	0.1423 5.601	0.1678 6.607	0.1842 7.250	0.2136 8.409	0.2093 8.241
COMPLIANCE, C	mm/MN 10^{-6} in/lb	0.458 0.0802	0.845 0.148	1.290 0.226	1.776 0.311	2.393 0.419	2.969 0.520	3.803 0.666	4.831 0.846

TABLE B-8

LOAD/DISPLACEMENT DATA FOR 2124-T851 SPECIMEN 1T7-453-1 AT 298°K (70°F)

(thickness: 11.43 mm or .450 inch)

		RATIO OF CRACK LENGTH TO SPECIMEN WIDTH, 2c/w														
		0.043	0.085	0.128	0.171	0.213	0.256	0.299	0.341	0.384	0.426	0.469	0.512	0.554	0.597	0.640	0.682
MAX. APPLIED LOAD	MN	0.578	0.400	0.311	0.267	0.222	0.222	0.177	0.179	0.177	0.133	0.133	0.133	0.133	0.111	0.111	0.111
	Kips	130	90.0	70.0	60.0	50.0	50.0	40.0	40.0	40.0	30.0	30.0	30.0	30.0	25.0	25.0	25.0
DISPLACEMENTS AT:																	
0.5P	10^{-3} mm	0.0366	0.0482	0.0554	0.0638	0.0661	0.0789	0.0761	0.0884	0.1002	0.0879	0.0985	0.1097	0.1232	0.1159	0.1293	0.1433
	in	1.441	1.896	2.182	2.513	2.601	3.108	2.998	3.482	3.945	3.460	3.879	4.320	4.849	4.563	5.092	5.643
0.6P	10^{-3} mm	0.0425	0.0577	0.0661	0.0756	0.0789	0.0935	0.0896	0.1041	0.1181	0.1030	0.1159	0.1293	0.1445	0.1360	0.1523	0.1685
	in	1.675	2.270	2.601	2.976	3.108	3.681	3.527	4.100	4.651	4.056	4.563	5.092	5.687	5.356	5.995	6.634
0.7P	10^{-3} mm	0.0498	0.0666	0.0767	0.0879	0.0907	0.1086	0.1036	0.1198	0.1366	0.1181	0.1332	0.1489	0.1663	0.1568	0.1752	0.1943
	in	1.962	2.623	3.020	3.460	3.571	4.276	4.078	4.717	5.378	4.651	5.246	5.863	6.546	6.172	6.899	7.648
0.8P	10^{-3} mm	0.0571	0.0761	0.0879	0.1002	0.1030	0.1237	0.1176	0.1360	0.1551	0.1332	0.1506	0.1691	0.1892	0.1775	0.1988	0.2206
	in	2.248	2.998	3.460	3.945	4.056	4.871	4.629	5.356	6.105	5.246	5.929	6.656	7.450	6.987	7.825	8.684
0.9P	10^{-3} mm	0.0638	0.0856	0.0985	0.1120	0.1159	0.1383	0.1310	0.1523	0.1730	0.1495	0.1679	0.1892	0.2111	0.1982	0.2211	0.2458
	in	2.513	3.372	3.879	4.408	4.563	5.444	5.158	5.995	6.811	5.885	6.612	7.450	8.310	7.803	8.706	9.676
P	10^{-3} mm	0.0711	0.0952	0.1092	0.1243	0.1276	0.1539	0.1456	0.1685	0.1920	0.1652	0.1864	0.2088	0.2335	0.2183	0.2441	0.2721
	in	2.799	3.747	4.298	4.893	5.025	6.061	5.731	6.634	7.560	6.502	7.340	8.221	9.191	8.596	9.610	10.712
COMPLIANCE, C	mm/MN	0.120	0.234	0.348	0.451	0.554	0.674	0.777	0.902	1.034	1.159	1.313	1.490	1.656	1.850	2.067	2.318
	10^{-6} in/lb	0.021	0.041	0.061	0.079	0.097	0.118	0.136	0.158	0.181	0.203	0.230	0.261	0.290	0.324	0.362	0.406

APPENDIX C

FRACTURE TOUGHNESS TEST DATA

This appendix contains all the fracture toughness test data generated under the program. Because of the great quantity of data, it is divided into sections according to alloy, specimen thickness, and buckling constraint, as follows:

Section	Alloy	Nominal Specimen Thickness		Constraint
		mm	in	
C1	2024-T861	1.60	.063	Stiffened
C2	2024-T861	1.60	.063	Unstiffened
C3	2024-T861	3.18	.125	Stiffened
C4	2024-T861	3.18	.125	Unstiffened
C5	2024-T861	6.35	.250	Unstiffened
C6	2124-T851	6.35	.250	Unstiffened
C7	2124-T851	11.43	.450	Unstiffened

The data in each section is presented in both graphical and tabular format. At the beginning of each section, a summary table is provided which includes pertinent specimen test data, critical stress intensity (K_c) values, and information as to the location of the tabular and graphical fracture resistance data for each specimen. The critical stress intensity values listed in these summary tables were obtained from the fracture resistance curve for each specimen, as described in Section 3.4. For some specimens, no K_c values are reported because net section yielding occurred prior to fracture; such instances are denoted by (*).

SECTION C1. FRACTURE TOUGHNESS TEST DATA FOR 1.60 mm (.063 INCH) THICK 2024-T861, BUCKLING RESTRAINED.

PRECEDING PAGE BLANK NOT FILMED

TABLE C1-1.

Fracture Toughness Test Data for 2024-T861 Specimens

(1.60 mm (.063 inch) Thick, Buckling Restrained)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load kN	Precrack Load kip	Failure Load kN	Failure Load kip	Full Section Failure Stress MPa	Full Section Failure Stress ksi	Critical Stress Intensity, Kc $MPa\sqrt{m}$	Critical Stress Intensity, Kc $ksi\sqrt{in}$	Data Table No.	Figure No.
															*		*	*
63-1L10	144	L	1.65	.0648	29.787	11.727	82.73	3.26	26.7	6.0	62.6	14.1	127.8	18.5			C1-2	C1-1
63-1L14	144	L	1.65	.0649	29.799	11.732	88.09	3.47	26.7	6.0	70.6	15.9	143.7	20.8	61.4	55.9	C1-3	C1-1
63-2L3	144	L	1.64	.0647	29.756	11.715	25.35	1.00	53.4	12.0	122.1	27.5	249.7	36.2	55.4	50.4	C1-4	C1-1
63-4L4	144	L	1.63	.0640	29.794	11.730	12.75	.50	84.5	19.0	167.3	37.6	345.4	50.1	58.4	53.2		
														AVG:	58.4	53.2		
63-6L7	294	L	1.64	.0647	29.812	11.737	81.76	3.22	31.1	7.0	68.3	15.4	139.4	20.2	61.0	55.5	C1-5	C1-3
63-1L16	294	L	1.64	.0644	29.807	11.735	48.62	1.91	44.5	10.0	93.6	21.0	192.1	27.9	56.7	51.6	C1-6	C1-3
63-6L6	294	L	1.65	.0648	29.784	11.726	12.17	.48	89.0	20.0	169.5	38.1	345.6	50.1	65.0	59.2	C1-7	C1-3
														AVG:	60.9	55.4		
63-6L5	450	L	1.65	.0648	29.782	11.725	98.42	3.88	48.9	11.0	111.2	25.0	226.9	32.9		NSY **	C1-8	C1-5
63-2L14	450	L	1.64	.0644	29.789	11.728	80.62	3.17	35.6	8.0	115.2	25.9	236.5	34.3		NSY	C1-9	C1-5
63-2L8	450	L	1.64	.0644	29.779	11.724	63.09	2.48	62.3	14.0	136.8	30.7	280.8	40.7		NSY	C1-10	C1-5
63-6T2	144	T	1.65	.0650	29.799	11.732	88.54	3.49	22.2	5.0	53.0	11.9	107.7	15.6	44.1	40.2	C1-11	C1-2
63-5T12	144	T	1.66	.0652	29.794	11.730	25.17	.99	48.9	11.0	99.2	22.3	201.1	29.2	50.3	45.8	C1-12	C1-2
63-3T8	144	T	1.63	.0643	29.774	11.722		+		+		+		+		+	+	+
														AVG:	47.2	43.0		
63-3T4	294	T	1.63	.0640	29.782	11.725	81.79	3.22	26.7	6.0	66.9	15.1	138.3	20.1	56.1	51.1	C1-13	C1-4
63-6T1	294	T	1.64	.0647	29.782	11.725	43.36	1.71	44.5	10.0	85.9	19.3	175.4	25.4	52.6	47.8	C1-14	C1-4
63-3T9	294	T	1.63	.0640	29.794	11.730	12.40	.49	80.1	18.0	139.0	31.3	287.0	41.6	49.7	45.2	C1-15	C1-4
														AVG:	52.8	48.0		
63-5T11	450	T	1.67	.0658	29.789	11.728	98.42	3.88	44.5	10.0	97.4	21.9	195.7	28.4		NSY	C1-16	C1-6
63-6T5	450	T	1.64	.0647	29.771	11.721	63.63	2.50	57.8	13.0	105.9	23.8	216.4	31.4		NSY	C1-17	C1-6
63-7T2	450	T	1.66	.0652	29.771	11.721	81.61	3.21	35.6	8.0	109.2	24.5	221.5	32.1		NSY	C1-18	C1-6

* Compliance gage slipped on knife edges.

** Recorder malfunction prior to failure.

\+ Specimen failed in the grips.

NSY Net section stress greater than 0.2 percent offset yield strength prior to failure.

TABLE C1-2

SPECIMEN NUMBER: 63-1L14
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.64 MM (.064 IN)
K(MAX) DURING PRECRACKING: 21.54 MPA SQRT(M) (19.63 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.14	1.734	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
66.7	15.0	376.68	14.83	44.22	1.741	.18	.007	53.98	49.13	136.90	19.85	194.69	28.23
68.9	15.5	396.24	15.60	44.80	1.764	.76	.030	56.23	51.17	141.47	20.52	202.29	29.34
70.1	15.8	422.86	16.64	46.31	1.831	2.47	.097	58.53	53.27	143.84	20.86	209.12	30.33
70.6	15.9	444.75	17.51	48.14	1.895	4.09	.161	60.24	54.82	144.84	21.00	213.97	31.03
74.3	15.8	477.77	18.81	51.14	2.010	7.00	.276	62.31	56.70	144.21	20.91	219.35	31.81

TABLE C1-3

SPECIMEN NUMBER: 63-2L3
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.64 MM (.065 IN)
K(MAX) DURING PRECRACKING: 21.88 MPA SQRT(M) (19.91 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.67	.499	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
33.4	7.5	44.38	1.75	12.83	.505	.16	.006	13.81	12.57	68.47	9.93	74.93	10.87
55.7	12.5	80.47	3.17	12.69	.500	.41	.001	22.85	20.79	113.95	16.53	124.58	18.07
65.5	14.7	96.25	3.79	12.82	.505	.15	.006	27.81	24.54	133.94	19.42	146.58	21.26
81.1	18.2	120.08	4.75	12.81	.504	.13	.005	33.43	30.43	165.93	24.36	181.56	26.33
88.5	19.9	134.42	5.29	13.06	.514	.39	.015	36.62	33.32	179.91	26.09	197.22	28.60
97.2	21.9	152.22	5.99	13.24	.521	.57	.022	40.76	37.10	198.89	28.84	218.32	31.66
102.6	23.1	166.44	6.51	13.55	.533	.87	.034	43.51	39.60	209.87	30.43	230.89	33.48
108.3	24.3	178.14	7.01	13.75	.542	1.08	.043	46.15	42.00	221.85	32.13	243.35	35.29
113.6	25.5	184.84	7.47	13.79	.543	1.12	.044	48.72	44.34	232.83	33.76	256.63	37.22
118.7	26.7	204.57	8.05	14.15	.557	1.47	.058	51.46	46.84	242.80	35.21	268.31	38.91
122.1	27.5	221.32	8.71	14.78	.582	2.11	.083	54.15	49.28	249.76	36.22	277.32	40.22
123.3	27.7	229.44	9.03	15.14	.596	2.46	.097	55.35	50.37	252.24	36.58	280.81	40.72

TABLE C1-4

SPECIMEN NUMBER: 63-4L4
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
K(MAX) DURING PRECRACKING: 24.72 MPA SQRT(M) (22.50 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.38	.251	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
21.8	4.9	17.53	.69	7.13	.281	.76	.030	6.76	6.15	46.08	6.54	47.35	6.87
85.6	19.2	69.62	2.76	6.85	.270	.47	.019	25.96	23.62	176.79	25.64	185.30	26.88
103.9	23.3	86.35	3.39	6.94	.273	.57	.022	31.68	28.83	214.29	31.08	224.77	32.60
118.5	26.6	101.73	4.06	7.03	.277	.65	.026	36.40	33.13	244.71	35.49	256.83	37.24
122.3	27.6	108.48	4.27	7.17	.282	.80	.031	38.16	34.72	253.85	36.81	266.59	38.68
135.7	30.5	123.62	4.84	7.20	.284	.83	.033	42.21	38.41	280.22	40.64	294.46	42.70
146.3	32.9	141.59	5.57	7.53	.296	1.15	.045	46.52	42.34	302.07	43.81	318.15	46.14
155.4	34.9	161.93	6.38	7.94	.313	1.56	.062	50.76	46.19	321.90	46.54	338.96	49.16
159.1	35.8	171.73	6.76	8.15	.321	1.77	.070	52.65	47.91	328.55	47.64	347.55	50.40
161.8	36.4	178.63	7.17	8.43	.332	2.06	.081	54.48	49.53	334.17	48.46	354.22	51.37
163.8	36.8	185.80	7.75	8.51	.335	2.13	.084	55.39	50.41	336.25	49.05	356.72	52.02
163.8	36.8	188.62	7.42	9.03	.356	2.66	.105	57.11	51.98	338.32	49.06	360.16	52.23
166.3	37.4	205.93	8.11	9.16	.361	2.79	.110	58.48	53.15	343.42	49.80	365.94	53.07

TABLE C1-5

SPECIMEN NUMBER: 63-6L7
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 1.64 MM (.065 IN)
K(MAX) DURING PRECRACKING: 23.89 MPA SQRT(M) (21.75 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	40.88	1.609	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
27.6	6.1	145.19	5.72	41.41	1.630	.53	.021	23.85	18.98	55.05	7.98	76.22	11.05
46.5	10.4	255.68	10.07	41.81	1.646	.93	.037	36.15	32.90	94.88	13.76	131.87	19.12
56.5	12.7	321.78	12.67	42.76	1.684	1.88	.074	44.55	40.55	115.35	16.73	161.75	23.46
62.2	14.0	369.99	14.57	44.15	1.738	3.27	.129	49.99	45.50	126.91	18.40	180.33	26.15
65.7	14.8	411.43	16.18	45.84	1.805	4.96	.195	54.08	49.21	134.12	19.45	193.68	28.08
67.8	15.2	438.37	17.25	47.47	1.853	6.19	.244	56.74	51.63	138.39	20.07	202.25	29.33
67.5	15.2	455.31	17.91	48.39	1.905	7.51	.296	57.72	52.53	138.32	20.06	204.81	29.70
67.5	15.2	457.46	18.31	48.76	1.920	7.88	.310	57.77	52.57	137.77	19.98	204.74	29.69
67.4	15.2	461.91	18.19	49.18	1.936	8.30	.327	58.01	52.79	137.57	19.95	205.31	29.77
68.2	15.3	474.33	18.67	49.73	1.958	8.85	.348	59.10	53.78	139.15	20.18	208.81	30.28
68.2	15.3	493.64	19.56	51.11	2.012	10.23	.403	60.17	54.76	139.14	20.18	211.74	30.71
68.1	15.3	506.20	19.92	52.24	2.057	11.35	.447	61.04	55.55	139.12	20.18	214.18	31.06
67.9	15.3	516.43	20.33	53.22	2.095	12.33	.486	61.54	56.00	138.52	20.09	215.43	31.24

TABLE C1-6

SPECIMEN NUMBER: 63-1L16
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 1.64 MM (.064 IN)
K(MAX) DURING PRECRACKING: 25.63 MPA SQRT(M) (23.33 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	24.31	.957	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
84.8	19.1	266.94	10.51	24.51	.965	.21	.008	49.10	44.68	173.98	25.25	208.23	30.20
88.9	20.0	287.45	11.32	25.01	.985	.70	.028	52.02	47.35	182.41	26.45	219.18	31.79
90.9	20.4	297.34	11.71	25.23	.993	.92	.036	53.41	48.61	186.37	27.03	224.35	32.54
92.8	20.9	307.22	12.10	25.44	1.002	1.13	.045	54.79	49.86	190.33	27.60	229.51	33.28
93.2	21.0	317.80	12.51	26.12	1.028	1.81	.071	55.84	50.82	191.27	27.74	231.91	33.63
93.5	21.0	327.63	12.90	26.80	1.055	2.49	.098	56.76	51.65	191.71	27.80	233.75	33.90

TABLE C1-7

SPECIMEN NUMBER: 63-6L6
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 1.65 MM (.065 IN)
K(MAX) DURING PRECRACKING: 25.11 MPA SQRT(M) (22.85 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.08	.239	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
7.5	1.7	5.66	.22	6.45	.254	.36	.014	2.17	1.97	15.21	2.21	15.90	2.31
34.5	7.8	26.19	1.03	6.41	.252	.32	.013	10.00	9.10	70.41	10.21	73.57	10.67
64.1	14.4	51.15	2.01	6.60	.260	.52	.020	18.85	17.16	130.76	18.96	136.83	19.84
67.6	15.2	54.77	2.16	6.68	.263	.60	.024	20.80	18.20	137.89	20.00	144.36	20.93
68.9	15.5	58.43	2.30	6.98	.275	.90	.035	20.84	18.96	140.51	20.38	147.43	21.38
87.1	19.6	75.39	2.99	7.03	.277	.95	.037	26.44	24.06	177.62	25.76	186.42	27.03
101.5	22.8	91.51	3.60	7.11	.280	1.03	.040	31.00	28.21	207.15	30.04	217.54	31.55
110.5	24.9	102.65	4.04	7.21	.284	1.13	.045	34.00	30.94	225.54	32.71	237.02	34.37
119.4	26.8	116.19	4.57	7.43	.293	1.35	.053	37.26	33.91	243.51	35.31	256.39	37.17
127.9	28.8	128.66	5.07	7.54	.297	1.46	.057	40.22	36.50	260.94	37.94	274.86	39.86
137.7	31.0	144.80	5.70	7.70	.303	1.61	.064	43.76	39.82	281.00	40.75	296.32	42.97
143.6	32.3	156.02	6.14	7.83	.308	1.75	.069	46.02	41.88	292.89	42.47	309.16	44.83
146.4	32.9	161.50	6.36	7.89	.311	1.81	.071	47.09	42.85	299.59	43.33	315.29	45.72
146.4	32.9	167.03	6.58	8.15	.321	2.07	.081	47.89	43.59	298.78	43.33	316.00	45.84
153.3	34.5	180.85	7.12	8.26	.325	2.18	.086	50.47	45.93	312.77	45.36	331.13	48.02
157.5	35.4	194.48	7.66	8.53	.336	2.45	.096	52.69	47.95	321.24	46.59	340.77	49.42
161.2	36.2	206.53	8.13	8.75	.344	2.66	.105	54.59	49.68	329.67	47.66	349.17	50.64
165.2	37.1	219.52	8.65	8.93	.352	2.85	.112	56.59	51.50	337.13	48.89	358.64	52.01
166.6	37.5	228.58	9.00	9.17	.361	3.09	.122	57.82	52.62	339.94	49.30	362.25	52.53
168.3	37.8	237.74	9.36	9.39	.370	3.30	.130	59.08	53.77	343.27	49.78	366.36	53.11
167.9	37.7	237.96	9.37	9.43	.371	3.35	.132	59.08	53.77	342.49	49.67	365.64	53.02
168.4	37.9	244.53	9.63	9.63	.379	3.55	.140	59.92	54.53	343.68	49.83	367.36	53.27
168.7	37.9	253.42	9.98	9.95	.392	3.87	.152	61.03	55.54	344.25	49.92	368.90	53.50
168.6	37.9	262.70	10.34	10.33	.407	4.24	.167	62.12	56.53	343.90	49.87	369.53	53.59
169.1	38.0	272.36	10.72	10.65	.419	4.56	.180	63.29	57.62	345.07	50.04	371.63	53.89
169.2	38.0	282.48	11.12	10.95	.431	4.87	.192	64.23	58.45	345.20	50.06	372.90	54.07
169.3	38.1	288.60	11.36	11.25	.443	5.17	.204	65.16	59.30	345.34	50.08	373.58	54.17
168.8	38.0	294.80	11.61	11.54	.454	5.46	.215	65.83	59.90	344.45	49.95	373.39	54.15

TABLE C1-8

SPECIMEN NUMBER: 63-6L5
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.65 MM (.065 IN)
K(MAX) DURING PRECRACKING: 42.12 MPA SQRT(M) (38.33 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	49.21	1.937	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
47.4	10.7	337.44	13.29	49.73	1.957	.49	.019	41.09	37.40	96.77	14.03	145.25	21.06
56.4	12.7	413.14	16.27	50.36	1.983	1.15	.045	49.33	44.89	115.16	16.70	174.32	25.24
64.5	14.5	493.77	19.44	51.64	2.033	2.43	.096	57.30	52.15	131.59	19.38	201.45	29.21
71.3	16.0	572.49	22.54	53.04	2.088	3.83	.151	64.51	58.71	145.51	21.10	226.02	32.78
75.9	17.1	649.37	25.57	55.21	2.173	5.99	.236	70.59	64.24	154.93	22.47	246.20	35.71
78.8	17.7	725.83	27.79	56.84	2.238	7.63	.300	74.35	68.02	160.74	23.31	259.98	37.70
80.6	18.1	761.35	29.97	58.80	2.315	9.59	.378	78.39	71.34	164.55	23.86	271.94	39.44
83.3	18.7	821.73	32.35	60.39	2.378	11.18	.440	82.52	75.10	169.88	24.64	285.78	41.44
83.8	18.8	846.10	33.31	61.27	2.412	12.06	.475	83.96	76.41	171.92	24.80	290.57	42.14
84.4	19.0	862.66	33.96	61.76	2.431	12.54	.494	85.00	77.35	172.11	24.96	294.06	42.64
84.6	19.0	873.38	34.38	62.11	2.445	12.89	.508	85.64	77.93	172.67	25.04	296.21	42.96
84.7	19.0	891.62	35.10	62.92	2.477	13.71	.540	86.55	78.77	172.81	25.06	299.26	43.40

TABLE C1-9

SPECIMEN NUMBER: 63-2L14
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.064 IN)
K(MAX) DURING PRECRACKING: 27.23 MPA SQRT(M) (24.78 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	40.31	1.587	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
88.5	19.9	573.35	22.57	43.39	1.708	3.08	.121	74.80	64.43	181.65	26.34	256.32	37.17
93.2	21.0	665.97	26.22	46.49	1.830	6.18	.243	77.85	70.85	191.36	27.75	278.19	40.34
94.3	21.2	692.90	27.28	47.41	1.867	7.10	.280	79.76	72.59	193.63	28.08	284.05	41.19
96.5	21.7	753.97	29.68	48.54	1.911	8.23	.324	84.52	76.92	202.12	29.31	299.83	43.48
103.0	23.1	834.91	32.87	50.19	1.976	9.88	.389	90.36	82.23	211.43	30.66	318.89	46.24
105.9	23.8	900.75	35.68	51.38	2.046	11.65	.459	95.01	86.47	217.31	31.51	333.73	48.40
108.3	24.4	956.75	37.67	52.85	2.081	12.54	.494	98.35	89.50	222.38	32.25	344.69	49.99
108.9	24.5	994.14	39.14	54.08	2.129	13.77	.542	100.42	91.39	225.55	32.42	350.99	50.90
109.6	24.6	1015.19	39.97	54.99	2.165	14.28	.562	*		224.87	32.61	354.97	51.48
110.9	24.9	1060.24	41.74	55.55	2.191	15.34	.604	*		227.64	33.01	363.42	52.70
112.6	25.3	1170.55	46.07	58.79	2.314	18.48	.727	*		231.06	33.51	381.72	55.36
113.8	25.6	1275.19	50.20	61.71	2.430	21.40	.843	*		233.47	33.86	398.65	57.81
114.5	25.7	1311.40	51.63	62.30	2.454	22.19	.874	*		234.95	34.07	404.83	58.71
114.7	25.8	1373.31	54.07	64.30	2.532	23.99	.945	*		235.39	34.14	414.22	60.07

TABLE C1-10

SPECIMEN NUMBER: 63-2L8
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.064 IN)
K(MAX) DURING PRECRACKING: 41.40 MPA SQRT(M) (37.68 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	31.55	1.242	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
43.8	9.8	185.34	7.30	32.15	1.266	.60	.024	29.40	26.75	89.83	13.03	114.57	16.61
66.1	14.9	299.90	11.81	33.26	1.310	1.72	.068	45.29	41.21	135.78	19.69	174.84	25.35
79.4	17.9	376.60	14.83	33.85	1.333	2.30	.091	54.93	49.99	163.05	23.65	211.03	30.60
92.2	20.7	466.92	19.38	34.93	1.375	3.38	.133	64.93	59.09	189.34	27.46	247.36	35.87
101.5	22.8	543.66	21.40	35.93	1.415	4.38	.173	72.51	65.99	208.05	30.17	274.22	39.77
108.5	24.4	625.28	24.62	37.48	1.476	5.93	.234	79.55	72.40	222.75	32.30	297.67	43.17
114.9	25.8	711.77	28.02	39.08	1.539	7.53	.297	86.36	78.59	235.94	34.21	319.90	46.39
119.6	26.9	804.11	31.66	41.22	1.623	9.67	.381	92.79	84.45	245.61	35.62	339.63	49.25
122.1	27.5	859.54	33.80	42.42	1.670	10.87	.428	96.37	87.71	250.70	36.36	350.58	50.84
122.6	27.6	879.93	34.64	43.06	1.695	11.52	.453	*	*	251.74	36.51	354.17	51.36
122.8	27.6	885.33	34.84	43.20	1.701	11.65	.459	*	*	252.05	36.55	355.06	51.49
123.8	27.8	937.69	36.92	44.78	1.763	13.24	.521	*	*	254.26	36.87	363.63	52.73
125.1	28.1	982.95	38.68	45.89	1.807	14.34	.565	*	*	256.94	37.26	371.42	53.86
126.0	28.3	1628.33	40.49	47.19	1.858	15.65	.616	*	*	258.63	37.51	378.64	54.91
126.3	28.4	1068.41	42.06	48.47	1.908	16.92	.666	*	*	259.29	37.60	384.44	55.75
127.4	28.6	1093.61	43.29	49.18	1.936	17.64	.694	*	*	260.92	37.84	389.62	56.50
127.4	28.6	1147.41	45.17	50.65	1.994	19.10	.752	*	*	261.61	37.94	396.48	57.50
128.0	28.3	1192.29	46.94	51.86	2.042	20.31	.800	*	*	262.79	38.11	403.22	58.47

TABLE C1-11

SPECIMEN NUMBER: 63-6T2
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.5 K
SPECIMEN THICKNESS: 1.65 MM (.065 IN)
K(MAX) DURING PRECRACKING: 17.84 MPA SQRT(M) (16.24 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.27	1.743	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
51.5	11.6	288.26	11.35	44.60	1.756	.33	.013	41.55	37.77	114.78	15.18	149.42	21.67
52.9	11.9	297.59	11.72	44.72	1.761	.45	.018	42.73	38.89	107.63	15.61	153.79	22.30
52.8	11.9	320.46	12.62	47.54	1.872	3.27	.129	44.28	40.30	107.32	15.56	157.61	22.86

TABLE C1-12

SPECIMEN NUMBER: 63-5T12
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.66 MM (.065 IN)
K(MAX) DURING PRECRACKING: 19.81 MPA SQRT(M) (18.02 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.59	.495	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
29.4	6.6	42.30	1.67	12.91	.508	.33	.013	12.56	11.97	59.58	8.64	65.23	9.46
63.9	14.4	97.65	3.69	12.90	.508	.32	.013	26.21	23.65	129.59	18.79	141.86	20.57
74.0	16.6	112.79	4.44	13.31	.524	.73	.029	30.81	28.04	149.94	21.74	164.66	23.87
78.7	17.7	122.86	4.84	13.58	.535	.99	.039	33.68	30.11	159.38	23.11	175.36	25.43
86.7	19.5	138.97	5.47	13.81	.544	1.23	.048	36.80	33.49	175.76	25.49	193.52	28.07
87.4	19.7	141.48	5.57	13.83	.545	1.25	.049	37.14	33.81	177.25	25.71	195.18	28.31
89.4	20.1	144.71	5.67	13.84	.545	1.26	.049	37.99	34.57	181.22	26.28	199.56	28.94
91.9	20.6	153.55	6.03	14.04	.553	1.46	.057	39.31	35.78	186.19	27.00	205.41	29.79
91.9	20.6	156.60	6.17	14.39	.566	2.01	.079	40.10	36.49	186.19	27.00	206.41	29.94
96.0	21.6	172.71	6.80	14.59	.575	2.72	.107	42.95	39.09	194.63	28.22	216.91	31.46
97.5	21.9	184.79	7.28	15.30	.603	3.54	.139	44.68	40.66	197.11	28.58	221.03	32.05
98.5	22.1	196.98	7.75	16.12	.635	4.33	.170	46.37	42.20	199.59	28.94	225.15	32.65
99.7	22.4	217.02	8.54	16.91	.666	5.05	.199	48.95	44.55	202.08	29.30	230.24	33.39
99.7	22.4	231.62	9.12	18.33	.722	5.76	.226	50.57	46.02	202.08	29.30	232.32	33.69
99.2	22.3	236.66	9.32	19.52	.768	6.93	.273	51.00	46.41	201.08	29.16	232.32	33.69
				20.03	.789	7.44	.293						

TABLE C1-13

SPECIMEN NUMBER: 63-3T4
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
K(MAX) DURING PRECRACKING: 20.73 MPA SQRT(M) (18.87 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	40.89	1.610	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
54.9	12.4	297.61	11.72	41.27	1.625	.37	.015	42.14	38.35	111.47	16.17	154.21	22.36
55.9	12.6	310.81	12.24	41.49	1.633	.59	.023	43.80	39.86	115.49	16.75	160.18	23.23
56.2	12.6	315.36	12.42	41.80	1.646	.91	.036	44.23	40.25	116.09	16.83	161.39	23.40
60.1	13.5	345.31	13.59	42.22	1.662	1.32	.052	47.96	43.65	125.13	18.15	174.64	25.32
60.2	13.5	350.88	13.81	42.42	1.670	1.53	.060	48.56	44.20	126.33	18.32	176.66	25.62
61.2	13.7	369.62	14.55	43.09	1.697	2.20	.087	50.58	46.03	130.33	18.90	183.40	26.60
63.1	14.2	384.78	15.15	43.89	1.728	3.00	.118	52.81	47.33	132.50	19.21	187.89	27.25
64.1	14.4	393.39	15.49	44.17	1.739	3.28	.129	52.92	48.16	134.30	19.48	190.94	27.69
65.4	14.6	398.45	15.69	44.50	1.752	3.60	.142	53.47	48.66	135.09	19.59	192.66	27.94
65.4	14.7	417.68	16.44	45.04	1.773	4.15	.163	55.39	50.41	138.88	20.14	199.10	28.87
67.2	15.1	428.27	16.86	45.85	1.805	4.96	.195	56.16	51.11	139.24	20.19	201.19	29.18
67.4	15.2												

TABLE C1-14

SPECIMEN NUMBER: 63-6T1
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 1.64 MM (.065 IN)
K(MAX) DURING PRECRACKING: 24.03 MPA SQRT(M) (21.87 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	21.69	.853	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
15.6	3.4	30.50	1.56	21.79	.858	.11	.004	8.14	7.46	30.69	4.45	35.95	5.21
80.1	18.4	223.30	8.79	22.15	.868	.37	.015	43.68	39.75	163.74	23.74	192.20	27.87
80.1	18.4	235.46	9.27	23.20	.913	1.52	.060	44.84	40.80	163.62	23.73	193.82	28.11
81.3	18.4	241.27	9.50	23.23	.915	1.55	.061	45.82	41.70	167.08	24.23	197.96	28.71
82.7	18.6	253.39	13.05	24.22	.954	2.54	.100	47.37	43.11	168.95	24.50	201.76	29.26
83.8	18.8	275.89	10.86	25.67	1.011	3.99	.157	49.54	45.08	171.26	24.83	206.93	30.01
86.0	19.3	287.48	11.32	25.98	1.023	4.30	.169	51.14	46.54	175.66	25.47	212.78	30.86
86.4	19.4	306.69	12.07	27.45	1.081	5.77	.227	52.93	48.17	176.48	25.59	216.96	31.38

TABLE C1-15

SPECIMEN NUMBER: 63-3T9
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
K(MAX) DURING PRECRACKING: 23.09 MPA SQRT(M) (21.01 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.20	.244	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
16.9	3.8	13.67	.54	6.79	.267	.59	.023	5.13	4.64	39.89	5.05	36.56	5.32
37.5	8.3	31.12	1.22	6.98	.275	.79	.031	11.32	10.30	76.36	11.07	80.12	11.62
47.8	10.7	41.64	1.64	7.19	.283	.99	.039	14.84	13.51	99.61	14.30	103.61	15.03
85.5	19.2	77.62	3.06	7.24	.285	1.05	.041	26.66	24.26	176.50	25.60	185.52	26.90
92.5	20.8	85.97	3.38	7.32	.288	1.12	.044	29.02	26.41	191.17	27.72	201.04	29.15
102.1	23.0	98.59	3.88	7.49	.295	1.29	.051	32.39	29.47	210.90	30.58	222.06	32.20
111.6	24.9	112.44	4.39	7.67	.302	1.47	.058	35.62	32.41	229.12	33.23	241.55	35.03
119.3	26.8	126.21	4.97	7.94	.313	1.74	.069	38.96	35.46	246.33	35.72	260.19	37.73
123.5	27.8	132.26	5.21	7.96	.314	1.77	.070	40.39	36.75	254.93	36.97	259.32	39.06
127.9	28.7	140.69	5.54	8.09	.319	1.91	.075	42.17	38.38	264.04	38.29	279.21	40.49
128.8	28.9	144.11	5.67	8.23	.324	2.03	.080	42.77	38.92	265.56	38.51	281.09	40.76
131.1	29.5	143.44	5.86	8.29	.326	2.09	.082	43.75	39.81	270.63	39.25	286.57	41.56
133.3	29.9	156.73	6.17	8.55	.337	2.36	.093	45.12	41.06	274.68	39.83	291.42	42.26
135.6	30.3	161.73	6.37	8.65	.341	2.46	.097	46.05	41.91	278.74	40.42	295.43	42.91
135.6	30.5	171.42	6.71	9.17	.357	2.87	.113	47.33	43.07	279.77	40.57	297.91	43.28
139.2	31.3	183.55	7.21	9.39	.370	3.19	.126	49.47	45.02	287.37	41.67	306.70	44.48
139.4	31.3	184.37	7.26	9.43	.371	3.23	.127	49.67	45.20	287.88	41.75	307.34	44.57

TABLE C1-16

SPECIMEN NUMBER: 63-5T11
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.67 MM (.066 IN)
K(MAX) DURING PRECRACKING: 37.70 MPA SQRT(M) (34.31 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	49.21	1.937	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
45.6	11.0	317.31	12.52	49.81	1.961	.60	.024	38.77	35.29	91.19	13.22	137.00	19.87
55.6	12.5	403.27	15.88	50.71	1.995	1.49	.059	48.04	43.72	111.67	16.19	169.31	24.55
63.6	14.3	479.33	18.89	51.82	2.040	2.61	.103	55.73	50.72	127.70	18.52	195.92	28.40
69.1	15.5	542.56	21.36	52.99	2.086	3.78	.149	61.47	55.94	138.75	20.12	215.34	31.23
73.1	16.4	615.37	24.25	55.21	2.174	6.00	.236	67.38	61.32	147.89	21.45	235.80	34.08
77.0	17.3	691.71	27.23	57.41	2.260	8.20	.323	73.37	66.50	156.05	22.63	253.92	36.82
80.2	18.0	765.69	30.14	59.71	2.351	10.50	.413	78.15	71.12	162.23	23.53	270.79	39.27
84.2	18.9	881.36	34.70	63.52	2.501	14.31	.563	85.29	77.62	169.07	24.52	294.79	42.75
84.4	19.0	893.63	35.17	63.72	2.509	14.51	.571	85.91	78.18	169.88	24.64	296.90	43.06
86.7	19.5	947.74	37.31	65.46	2.577	16.26	.640	89.24	81.21	172.82	25.06	308.3[illegible]	44.71
87.7	19.7	1019.30	40.13	67.52	2.658	18.30	.721	93.29	84.89	176.26	25.56	322.40	46.75
88.7	19.9	1085.92	42.76	69.61	2.741	20.40	.803	96.72	88.02	178.22	25.85	334.61	48.52
90.3	20.3	1151.77	45.35	71.10	2.799	21.89	.862	100.35	91.32	181.66	26.34	347.59	50.41
90.9	20.4	1203.12	47.36	72.65	2.860	23.44	.923	*	*	182.64	26.49	356.57	51.71
91.7	20.6	1242.67	48.92	73.60	2.898	24.38	.960			184.12	26.70	363.95	52.78

TABLE C1-17

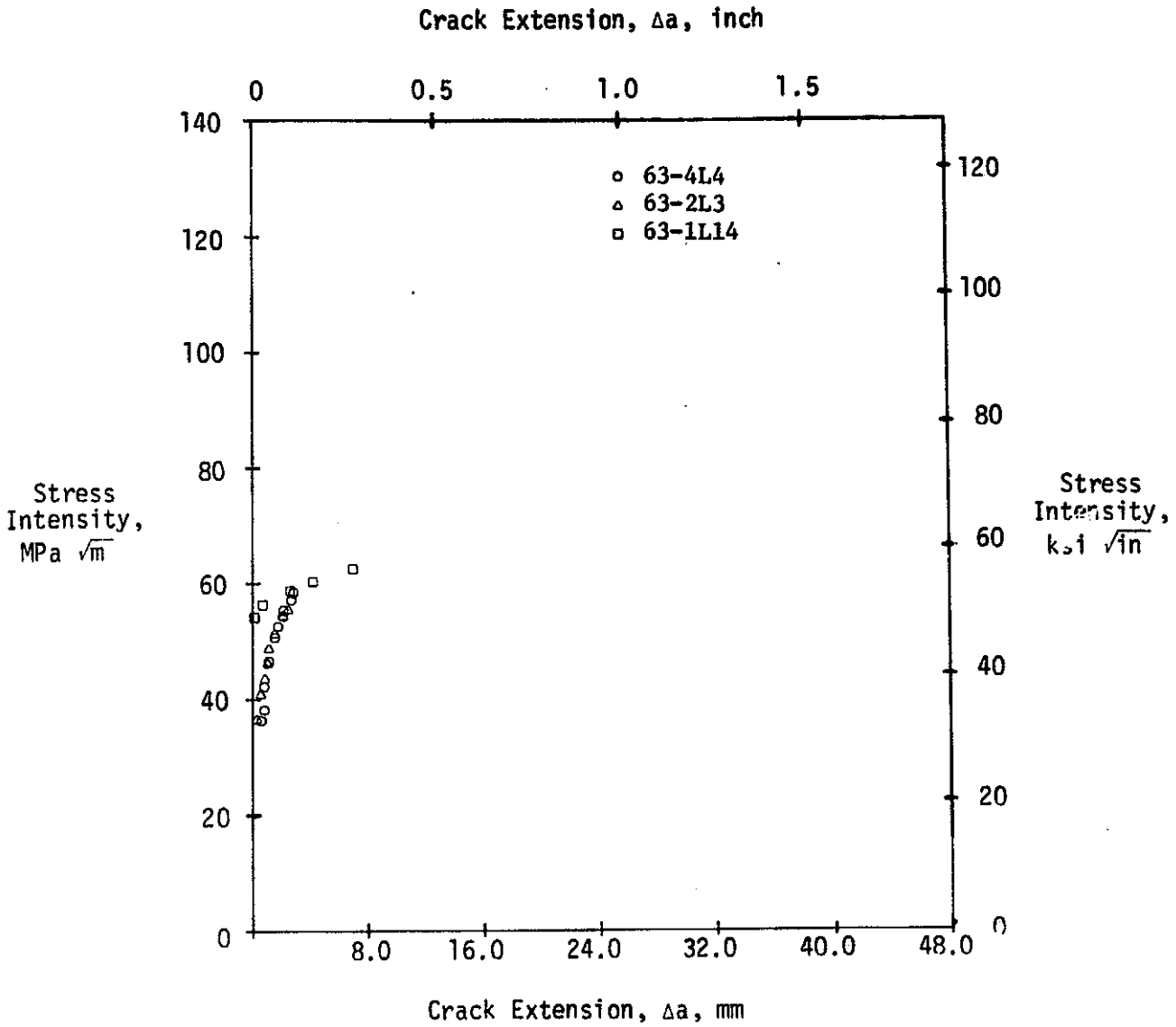
SPECIMEN NUMBER: 63-6T5
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.065 IN)
K(MAX) DURING PRECRACKING: 39.45 MPA SQRT(M) (35.88 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	31.41	1.237	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
75.1	16.9	335.[illegible]	[illegible]	32.07	1.278	.66	.026	51.56	46.92	153.67	22.[illegible]	196.54	28.52
82.2	18.5	381.[illegible]	[illegible]	33.11	1.314	1.70	.067	55.96	50.93	164.22	23.81	210.03	30.47
88.1	19.8	424.[illegible]	[illegible]	33.83	1.334	2.82	.111	60.69	55.23	173.04	25.11	223.31	32.40
93.5	21.0	467.[illegible]	[illegible]	34.53	1.364	3.92	.154	65.17	59.30	180.96	26.26	234.48	34.02
95.[illegible]	21.[illegible]	491.[illegible]	[illegible]	35.26	1.393	4.64	.183	67.40	61.34	185.50	26.91	240.26	34.86
98.[illegible]	22.[illegible]	[illegible]	[illegible]	36.37	1.432	5.75	.226	69.41	63.16	190.36	27.62	246.56	35.77
102.[illegible]	23.[illegible]	1014.[illegible]	[illegible]	38.39	2.299	26.58	1.047	99.68	90.62	211.36	30.66	345.64	50.15
105.[illegible]	23.[illegible]	1242.[illegible]	48.90	95.41	2.575	33.50	1.323	*	*	214.[illegible]	31.[illegible]	382.80	55.51
105.9	23.8	1443.19	56.78	71.12	2.803	39.31	1.548			218.42	31.68	414.43	60.10

TABLE C1-18

SPECIMEN NUMBER: 63-7T2
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.3 K
SPECIMEN THICKNESS: 1.66 MM (.065 IN)
K(MAX) DURING PRECRACKING: 27.11 MPA SQRT(M) (24.67 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	40.91	1.606	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
53.4	12.0	299.67	11.80	41.14	1.620	.34	.013	40.79	37.12	108.08	15.67	149.37	21.66
63.4	14.2	368.87	14.52	41.85	1.648	1.15	.041	49.00	44.59	128.51	18.64	178.77	25.93
69.5	15.6	421.95	16.61	42.97	1.692	2.16	.085	54.62	49.71	140.97	20.44	196.17	28.74
75.8	17.1	484.29	19.07	44.32	1.745	3.52	.139	60.79	55.32	153.93	22.32	219.20	31.79
80.8	18.2	544.34	21.43	45.93	1.808	5.12	.202	66.18	60.23	163.91	23.77	237.05	34.38
84.5	19.0	611.36	24.07	48.28	1.901	7.48	.294	71.44	65.01	171.40	24.86	253.69	36.79
87.6	19.7	669.35	26.34	50.41	1.985	9.60	.378	75.61	68.81	176.41	25.58	266.73	38.68
89.2	20.1	754.71	29.71	53.91	2.122	13.10	.516	81.10	73.81	180.92	26.24	283.64	41.13
91.9	20.7	898.10	35.36	59.42	2.340	18.62	.733	89.52	81.46	186.46	27.04	310.36	45.01
94.9	21.3	1060.60	41.73	64.63	2.545	23.83	.938	98.44	89.58	192.52	27.92	358.23	49.34
98.4	22.1	1251.96	49.29	69.69	2.744	28.88	1.137			199.56	28.94	375.23	54.41
101.9	22.9	1490.19	58.67	75.09	2.956	34.29	1.350			206.64	29.97	417.00	60.47
105.3	23.7	1679.44	66.14	78.23	3.080	37.43	1.474			213.70	30.99	450.43	65.32
107.8	24.2	1839.43	72.42	80.68	3.176	39.88	1.570			218.75	31.72	477.61	69.26
108.6	24.4	1964.35	77.34	82.37	3.266	42.16	1.660			220.30	31.95	497.69	72.17
109.1	24.5	2026.31	79.80	83.98	3.306	43.17	1.700			221.32	32.10	507.79	73.63
109.6	24.6	2066.14	81.34	84.30	3.327	43.69	1.720			222.35	32.24	514.25	74.57
109.6	24.6	2098.53	82.62	85.12	3.351	44.31	1.745			222.35	32.24	519.26	75.30
109.7	24.7	2108.95	83.03	85.29	3.358	44.48	1.751			222.47	32.26	520.95	75.55
109.7	24.7	2179.39	85.76	86.27	3.408	45.76	1.802			222.58	32.27	531.75	77.11
109.7	24.7	2243.38	88.29	87.67	3.452	46.87	1.845			222.56	32.27	541.48	78.52



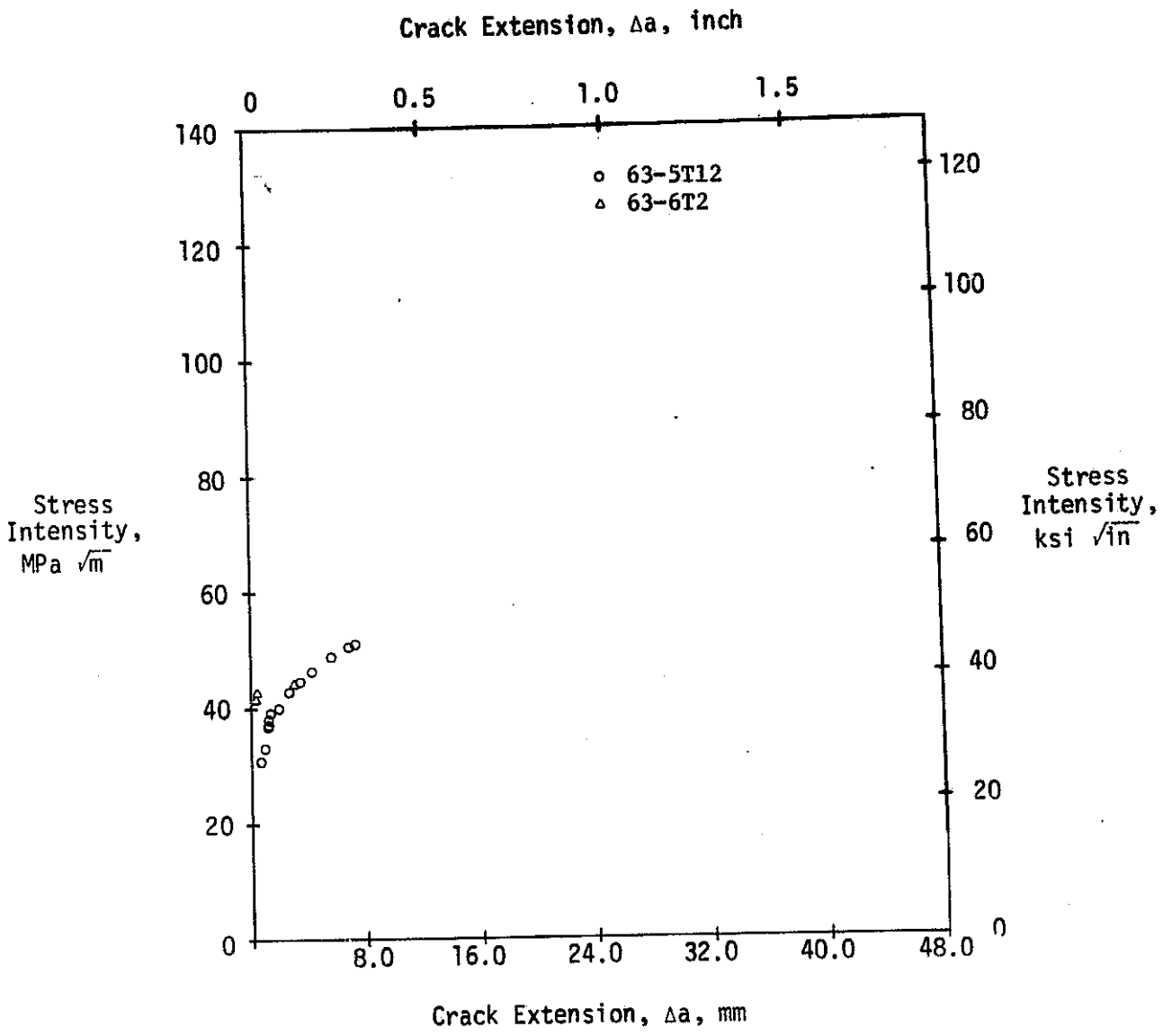
Thickness: 1.60 mm (.063 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C1-1



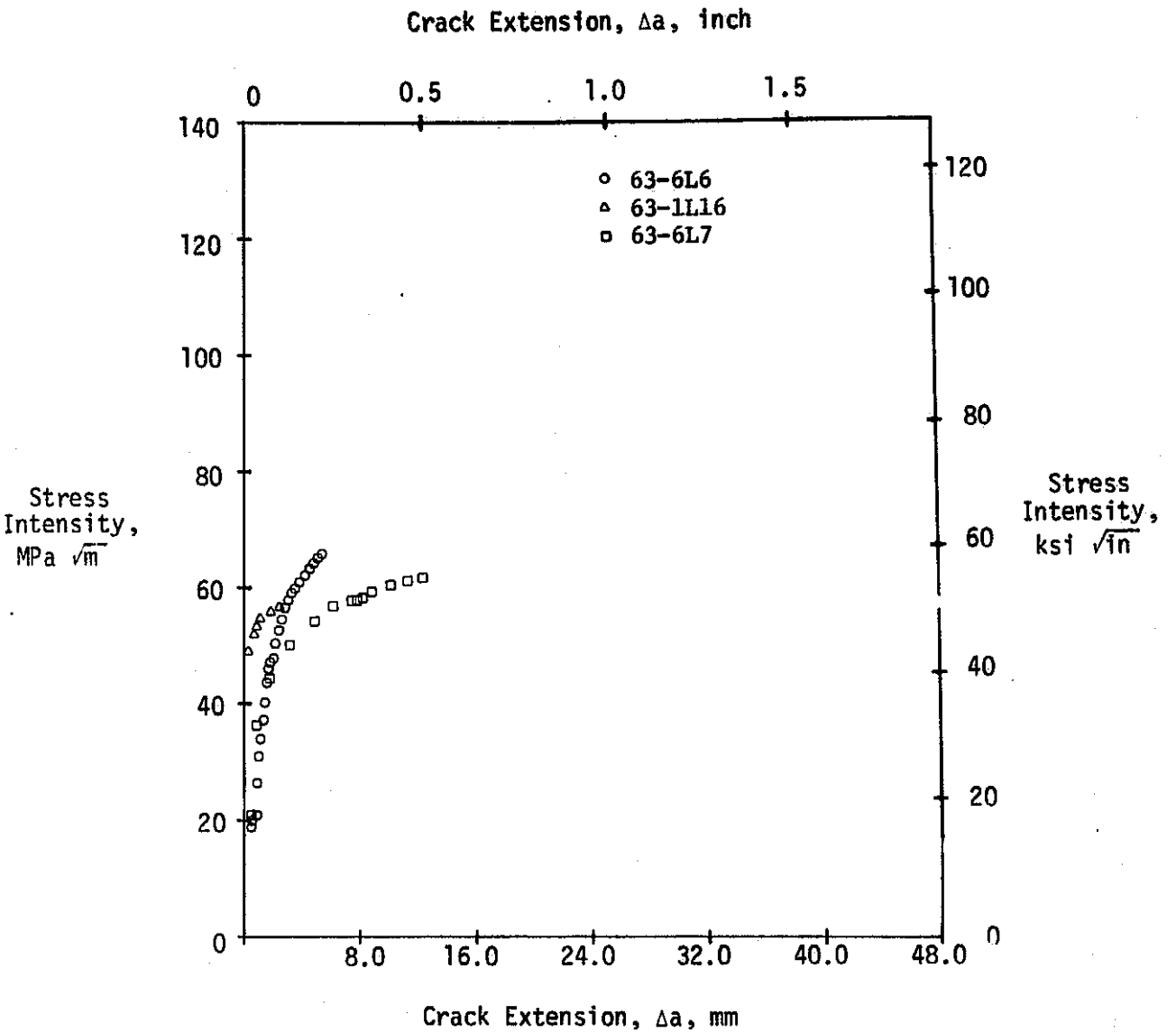
Thickness: 1.60 mm (.063 inch)

Crientation: Transverse

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C1-2

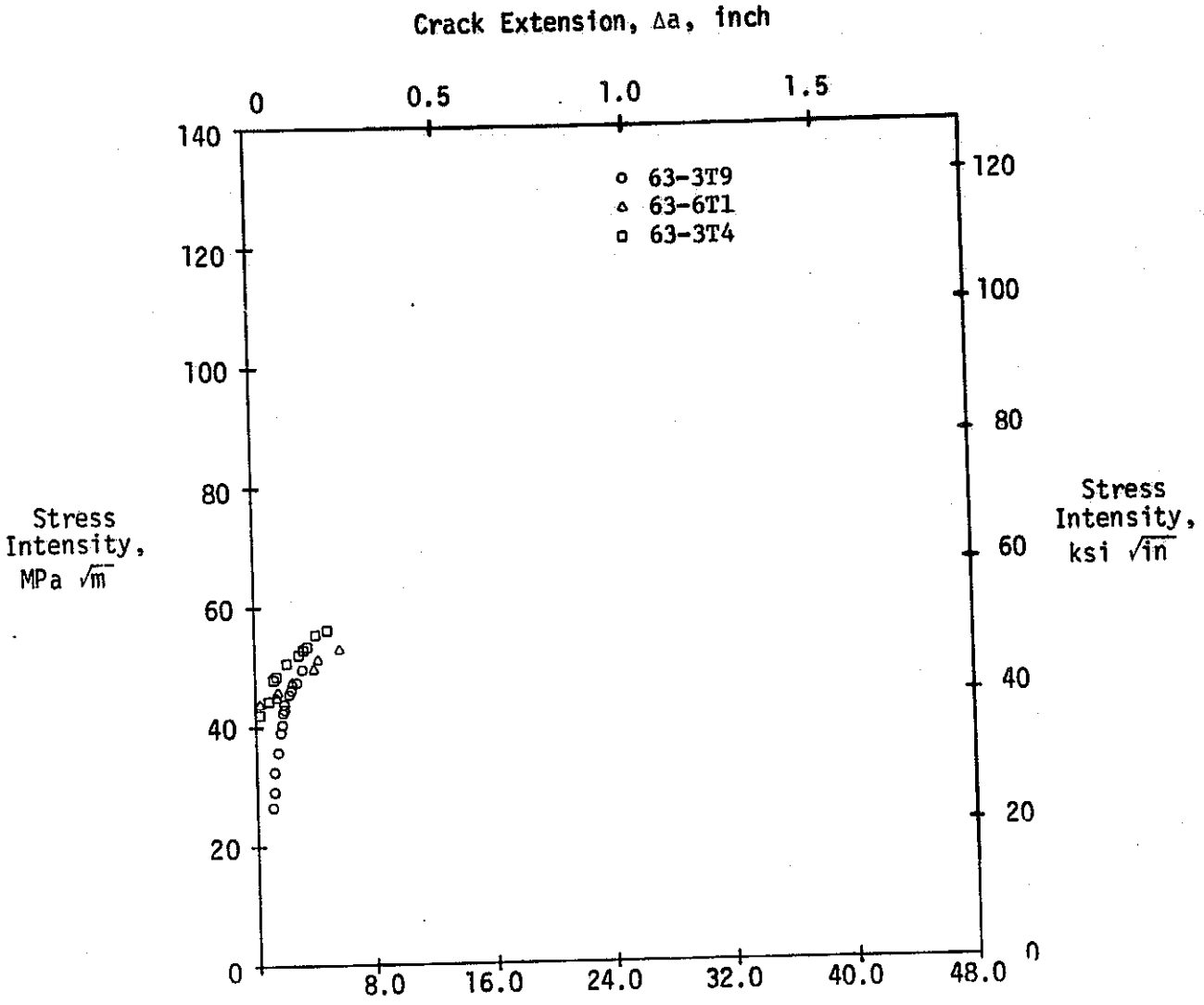


Thickness: 1.60 mm (.063 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861



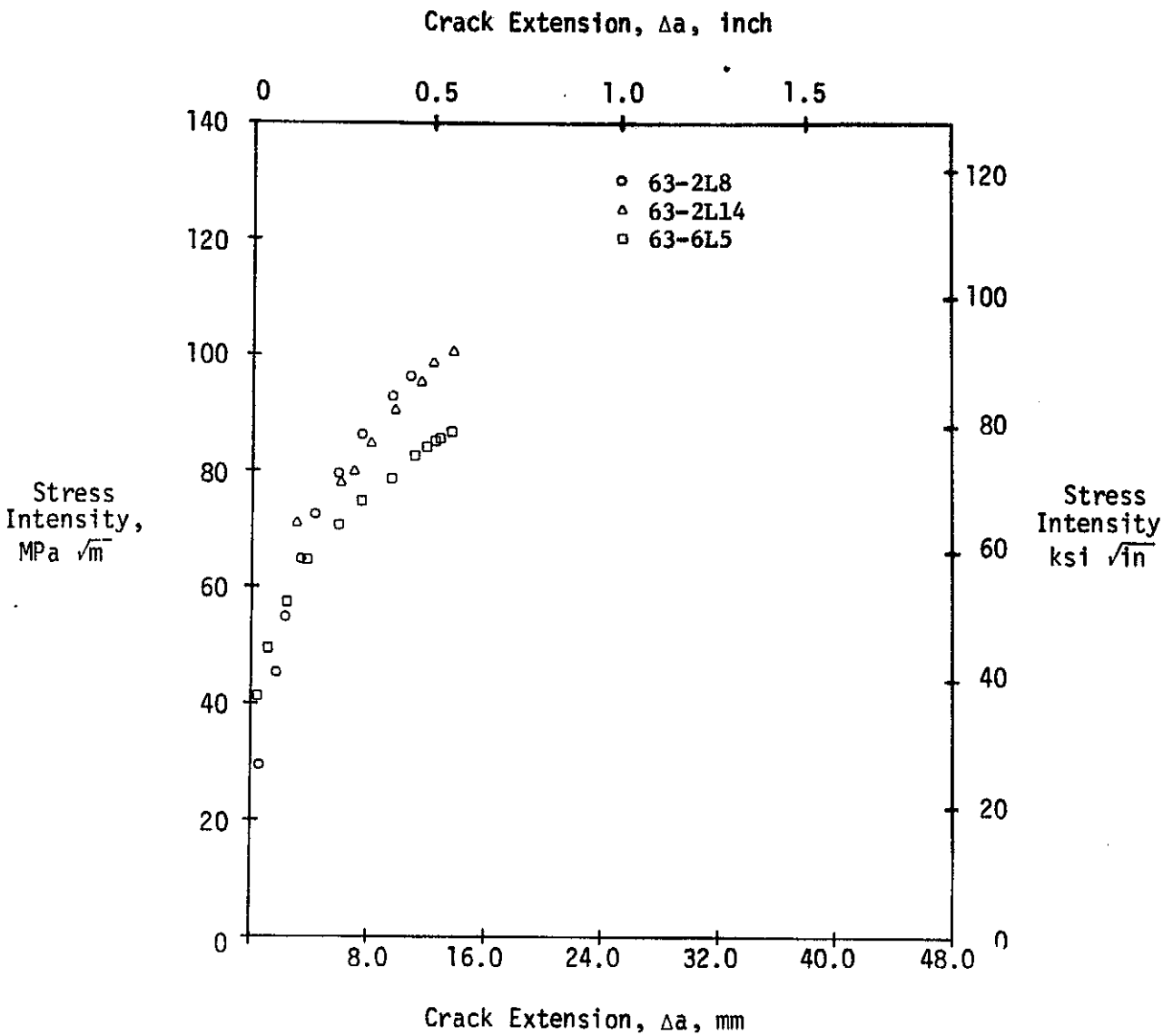
Thickness: 1.60 mm (.063 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C1-4

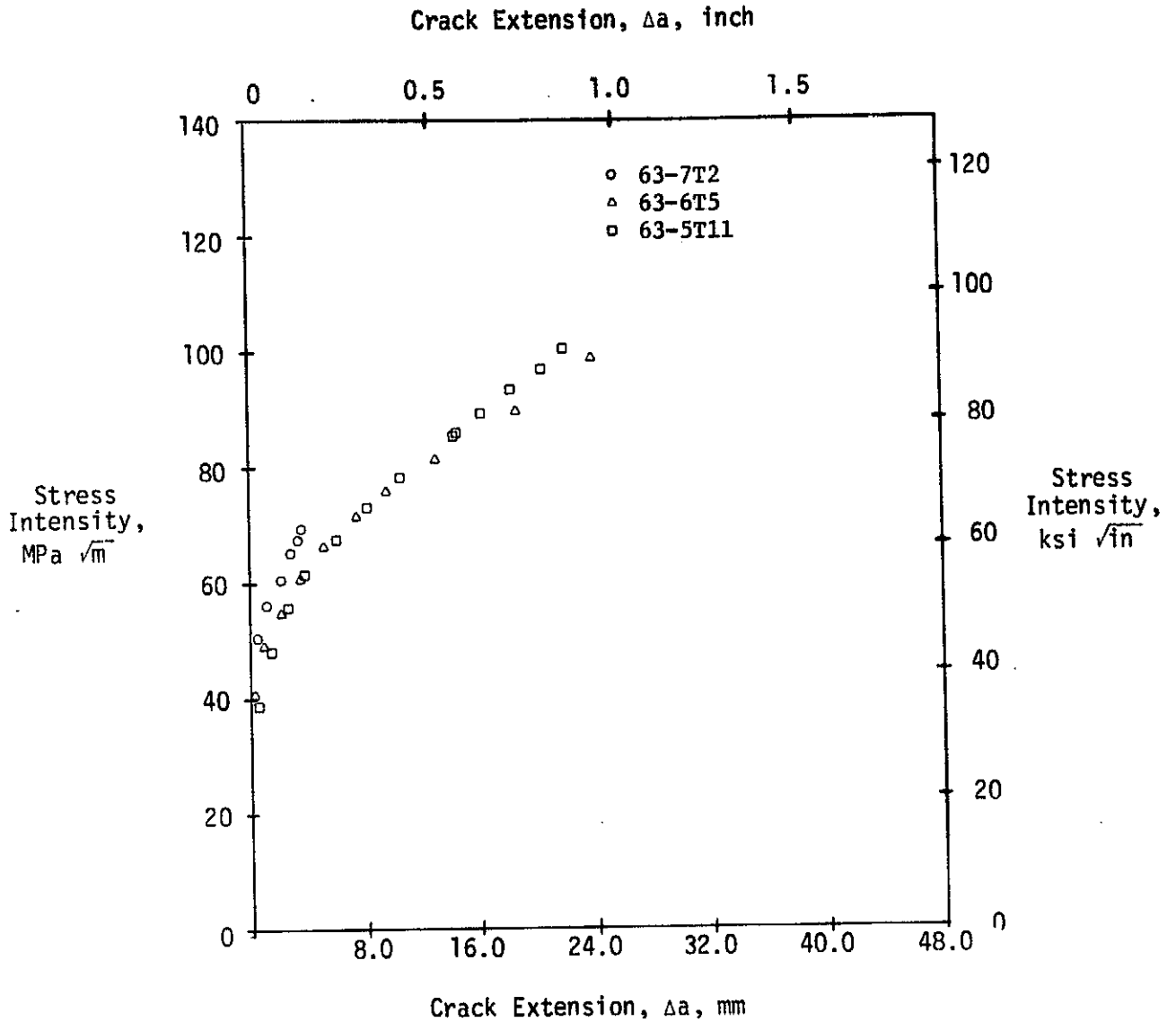


Thickness: 1.60 mm (.063 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861



Thickness: 1.60 mm (.063 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C1-6

SECTION C2. FRACTURE TOUGHNESS TEST DATA FOR 1.60 mm (.063 INCH) THICK 2024-T861, BUCKLING UNRESTRAINED

PRECEDING PAGE BLANK NOT FILMED

TABLE C2-1.

Fracture Toughness Test Data for 2024-T861 Specimens

(1.60 mm (.063 inch) Thick, Buckling Unrestrained)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load kN	Precrack Load kip	Failure Load kN	Failure Load kip	Full Section Failure Stress MPa	Full Section Failure Stress ksi	Critical Stress Intensity, K_c MPa$\sqrt{m}$	Critical Stress Intensity, K_c ksi$\sqrt{in}$	Data Table No.	Figure No.
U63-1L3	144	L	1.65	.0563	29.789	11.728	24.71	.97	53.4	12.0	120.8	27.1	244.5	35.5	62.6	57.0	C2-2	C2-1
U63-2L11	144	L	1.63	.0643	29.797	11.731	12.19	.48	75.6	17.0	161.2	36.3	331.4	46.1	58.6	53.3	C2-3	C2-1
														AVG:	60.6	55.2		
U63-5L2	294	L	1.66	.0653	29.794	11.730	82.75	3.26	26.7	6.0	69.7	15.7	141.2	20.5	*		C2-4	C2-2
U63-1L2	294	L	1.63	.0641	29.812	11.737	43.89	1.73	40.0	9.0	112.5	25.3	231.9	33.6	66.7	60.7	C2-5	C2-2
U63-7L4	294	L	1.64	.0646	29.799	11.732	12.42	.49	75.6	17.0	166.4	37.4	340.3	49.3	**		**	**
														AVG:	66.7	60.7		
U63-6L2	450	L	1.64	.0644	29.784	11.726	98.88	3.89	44.5	10.0	91.4	20.5	187.7	27.2	97.9	89.1	C2-6	C2-4
U63-1L12	450	L	1.65	.0648	29.789	11.728	81.81	3.22	48.9	11.0	106.5	24.0	217.3	31.5	+		C2-7	C2-4
U63-3L2	450	L	1.64	.0644	29.809	11.736	61.93	2.44	48.9	11.0	121.0	27.2	248.2	36.0	+		C2-8	C2-4
														AVG:	97.9	89.1		
U63-5T1	144	T	1.66	.0653	29.794	11.730	90.35	3.56	22.2	5.0	52.5	11.8	106.2	15.4	**		**	**
U63-2T2	144	T	1.64	.0647	29.799	11.732	25.22	.99	44.5	10.0	99.2	22.3	202.6	29.4	**		**	**
U63-4T10	144	T	1.65	.0650	29.784	11.726	10.13	.40	66.7	15.0	152.8	34.3	310.8	45.1	**		**	**
U63-6T7	294	T	1.64	.0646	29.815	11.738	80.34	3.16	26.7	6.0	62.7	14.1	128.2	18.6	51.1	46.5	C2-9	C2-3
U63-2T1	294	T	1.65	.0648	29.799	11.732	43.21	1.70	35.6	8.0	91.2	20.5	185.9	27.0	**		**	**
U63-1T2	294	T	1.63	.0643	29.761	11.717	++		++		++		++		++		++	++
														AVG:	51.1	46.5		
U63-7T1	450	T	1.65	.0561	29.804	11.734	94.69	3.73	35.6	8.0	86.5	19.5	175.6	25.5	**		**	**
U63-6T9	450	T	1.65	.0650	29.820	11.740	83.24	3.28	48.9	11.0	97.4	21.9	197.9	28.7	+		C2-10	C2-5
U63-4T5	450	T	1.66	.0655	29.799	11.732	60.48	2.38	53.4	12.0	116.1	26.1	234.2	34.0	+		C2-11	C2-5

* Film ran out prior to failure.

** No crack extension measurable due to poor resolution on 16mm film.

\+ Crack resolution near instability lost due to excessive buckling out of the focal plane of the movie camera.

++ Specimen failed in the grips.

TABLE C2-2

SPECIMEN NUMBER: U63-1L3
ALLOY: 2324-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 1.66 MM (.065 IN)
K(MAX) DURING PRECRACKING: 21.38 MPA SQRT(M) (19.45 KSI SQRT(IN))

LOAD KN	LOAD KIPS	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA a MM	DELTA a IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	12.36	.486	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
94.7	21.3	13.76	.542	1.41	.056	40.08	36.48	191.79	27.81	211.31	30.64
112.5	25.3	15.77	.619	4.37	.133	50.54	46.40	227.81	33.04	254.72	36.94
119.7	26.9	19.02	.759	5.65	.223	58.15	52.93	242.21	35.12	275.55	39.96
123.5	27.8	22.35	.883	9.99	.393	65.56	59.65	244.01	35.39	287.09	41.63

TABLE C2-3

SPECIMEN NUMBER: U63-2L11
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
K(MAX) DURING PRECRACKING: 21.53 MPA SQRT(M) (19.59 KSI SQRT(IN))

LOAD KN	LOAD KIPS	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA a MM	DELTA a IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	5.11	.246	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
133.8	29.4	5.37	.211	-.73	-.029	34.94	31.79	268.77	38.98	278.82	40.43
149.5	33.6	6.85	.271	.76	.030	45.12	41.06	307.17	44.54	321.97	46.69
156.6	35.2	7.82	.308	1.73	.068	50.53	45.98	321.79	46.67	339.63	49.25
159.7	35.9	8.20	.323	2.11	.083	52.78	48.03	328.19	47.59	347.32	50.37
161.1	36.2	11.71	.461	5.62	.221	63.37	57.67	329.11	47.73	357.19	51.80

TABLE C2-4

SPECIMEN NUMBER: U63-5L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.[illegible] K
SPECIMEN THICKNESS: 1.66 MM (.065 IN)
K(MAX) DURING PRECRACKING: 20.45 MPA SQRT(M) (18.61 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	41.38	1.629	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
54.7	12.3	41.81	1.646	.44	.017	42.20	38.40	110.73	16.06	153.94	22.32
61.4	13.8	42.92	1.690	1.55	.061	48.10	43.77	124.24	18.02	174.52	25.31

TABLE C2-5

SPECIMEN NUMBER: U63-1L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.[illegible] K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
K(MAX) DURING PRECRACKING: 21.95 MPA SQRT(M) (19.98 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	21.95	.864	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
59.5	13.4	22.13	.871	.18	.007	32.83	29.87	122.82	17.81	144.23	20.92
82.3	18.5	23.38	.920	1.43	.056	46.65	42.46	169.57	24.59	201.10	29.16
93.4	21.0	24.04	.946	2.09	.082	53.75	48.91	192.48	27.91	229.48	33.28
110.8	24.9	25.57	1.007	3.63	.143	65.88	59.96	228.23	33.10	275.49	39.95
111.7	25.1	25.74	1.013	3.85	.152	66.72	60.72	233.06	33.36	278.20	41.34

TABLE C2-6

SPECIMEN NUMBER: U63-6L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.064 IN)
K(MAX) DURING PRECRACKING: 38.64 MPA SQRT(M) (35.17 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	49.44	1.946	[illegible]	[illegible]	[illegible]	0.00	[illegible]	0.00	0.00	0.00
62.3[illegible]	14.[illegible]	51.00	1.958	.56	.022	54.[illegible]	49.69	127.84	18.54	192.45	27.91
81.[illegible]	18.[illegible]47	53.[illegible]47	[illegible].047	.56	.[illegible]1	73.[illegible]	66.89	168.[illegible]2	24.37	258.16	37.44
90.[illegible]	20.[illegible]7	54.[illegible]2	[illegible].316	8.38	.[illegible]56	90.[illegible]7	81.97	189.[illegible]2	27.41	312.44	45.31
9[illegible].[illegible]	2[illegible].[illegible]	55.58	2.582	16.14	.635	95.87	87.24	195.37	26.88	331.25	48.04

TABLE C2-7

SPECIMEN NUMBER: U63-1L12
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.65 MM (.065 IN)
K(MAX) DURING PRECRACKING: 37.54 MPA SQRT(M) (34.16 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	[illegible].91	1.61[illegible]	[illegible]	[illegible]	[illegible].00	0.00	[illegible].00	0.00	0.00	0.00
52.[illegible]	11.[illegible]	41.32	1.627	.42	.[illegible]16	4[illegible].[illegible]	37.18	107.98	15.66	149.44	21.67
68.[illegible]	15.[illegible]	43.46	1.711	2.59	.[illegible]1[illegible]	54.87	49.93	140.64	20.40	198.59	28.80
81.[illegible]	18.[illegible]	45.31	1.784	4.41	.[illegible]17[illegible]	74.83	68.1[illegible]	186.92	27.11	268.65	38.96
98.[illegible]	22.2	47.88	1.885	6.97	.274	87.49	79.[illegible]	221.44	29.21	296.86	43.05
135.[illegible]	23.6	51.97	2.042	10.96	.432	97.52	85.11	214.14	31.05	328.55	47.65

TABLE C2-8

SPECIMEN NUMBER: U63-3L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.064 IN)
K(MAX) DURING PRECRACKING: 32.16 MPA SQRT(M) (29.26 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	30.96	1.219	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
1.1	0.2	31.56	1.243	.61	.024	7.68	6.99	23.72	3.44	30.19	4.38
61.8	13.9	33.71	1.328	2.74	.108	41.17	37.47	126.82	18.39	161.05	23.36
86.4	19.4	33.61	1.323	2.65	.104	54.38	49.04	177.90	25.67	228.05	33.07
105.4	23.7	36.09	1.421	5.12	.202	75.54	68.75	217.23	31.36	285.30	41.37
114.3	25.7	39.68	1.562	8.72	.343	86.60	78.81	234.43	34.00	319.57	46.34

TABLE C2-9

SPECIMEN NUMBER: U63-6T7
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 1.64 MM (.065 IN)
K(MAX) DURING PRECRACKING: 20.30 MPA SQRT(M) (18.47 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	40.17	1.581	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
61.4	13.8	41.51	1.595	.34	.014	46.92	42.70	126.50	18.23	172.33	24.99
61.8	13.9	47.53	1.872	7.33	.289	52.12	47.43	126.41	18.33	185.52	26.90

TABLE C2-10

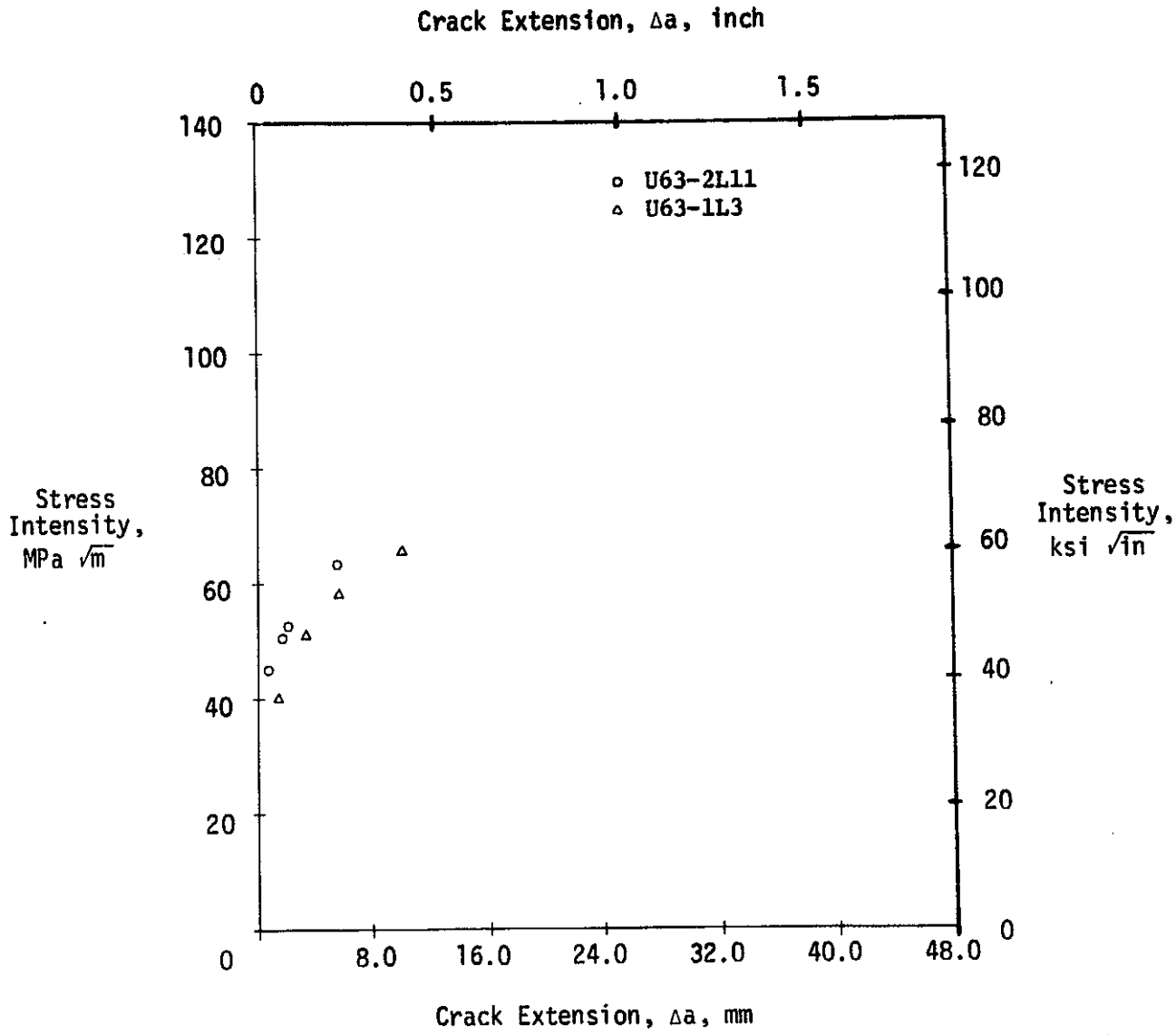
SPECIMEN NUMBER: U63-6T9
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.1 K
SPECIMEN THICKNESS: 1.65 MM (.065 IN)
K(MAX) DURING PRECRACKING: 37.77 MPA SQRT(M) (34.37 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	41.62	1.638	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
68.5	15.4	41.19	1.582	-1.44	-.057	51.77	47.12	139.16	20.18	193.57	27.667
84.5	19.0	42.12	1.654	.47	.019	65.61	59.71	171.69	24.91	239.07	34.667
87.2	19.6	43.66	1.718	2.05	.081	69.27	63.04	177.12	25.68	250.42	36.32
84.1	18.9	45.34	1.785	3.73	.147	68.39	62.24	173.79	24.77	245.42	35.59

TABLE C2-11

SPECIMEN NUMBER: U63-4T5
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.[illegible] K
SPECIMEN THICKNESS: 1.66 MM (.066 IN)
K(MAX) DURING PRECRACKING: 34.15 MPA SQRT(M) (30.99 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	35.24	1.190	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
99.2	22.3	37.[illegible]	1.299	2.75	.111	65.44	59.47	200.11	29.02	257.04	37.279
107.[illegible]	24.1	34.73	1.367	4.51	.177	77.92	67.27	216.26	31.36	282.61	40.969
109.9	24.7	37.61	1.477	7.27	.286	79.21	72.07	221.65	32.14	296.23	42.967
113.9	25.6	40.38	1.578	9.34	.368	85.35	77.67	239.73	33.31	314.27	45.57



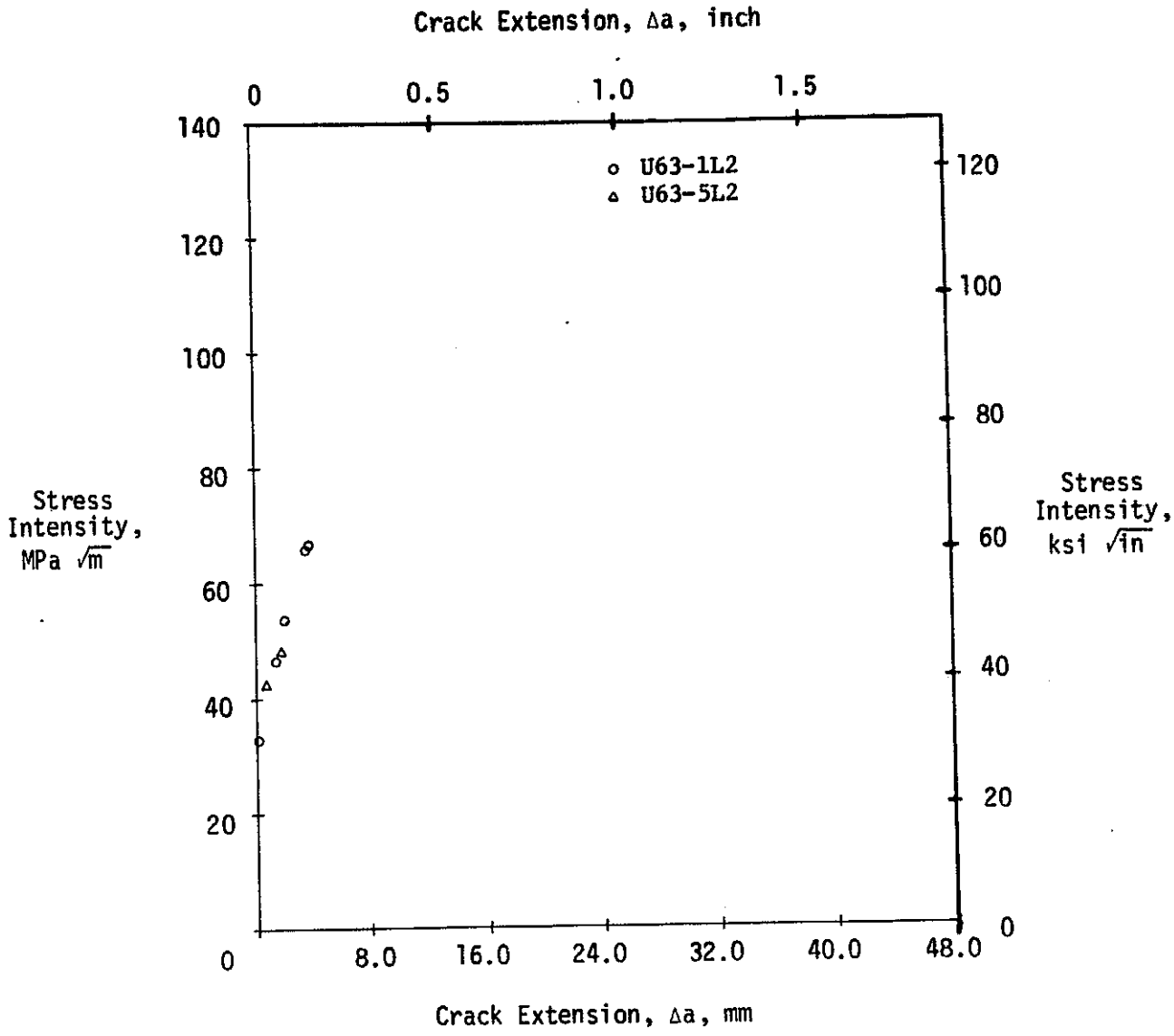
Thickness: 1.60 mm (.063 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C2-1



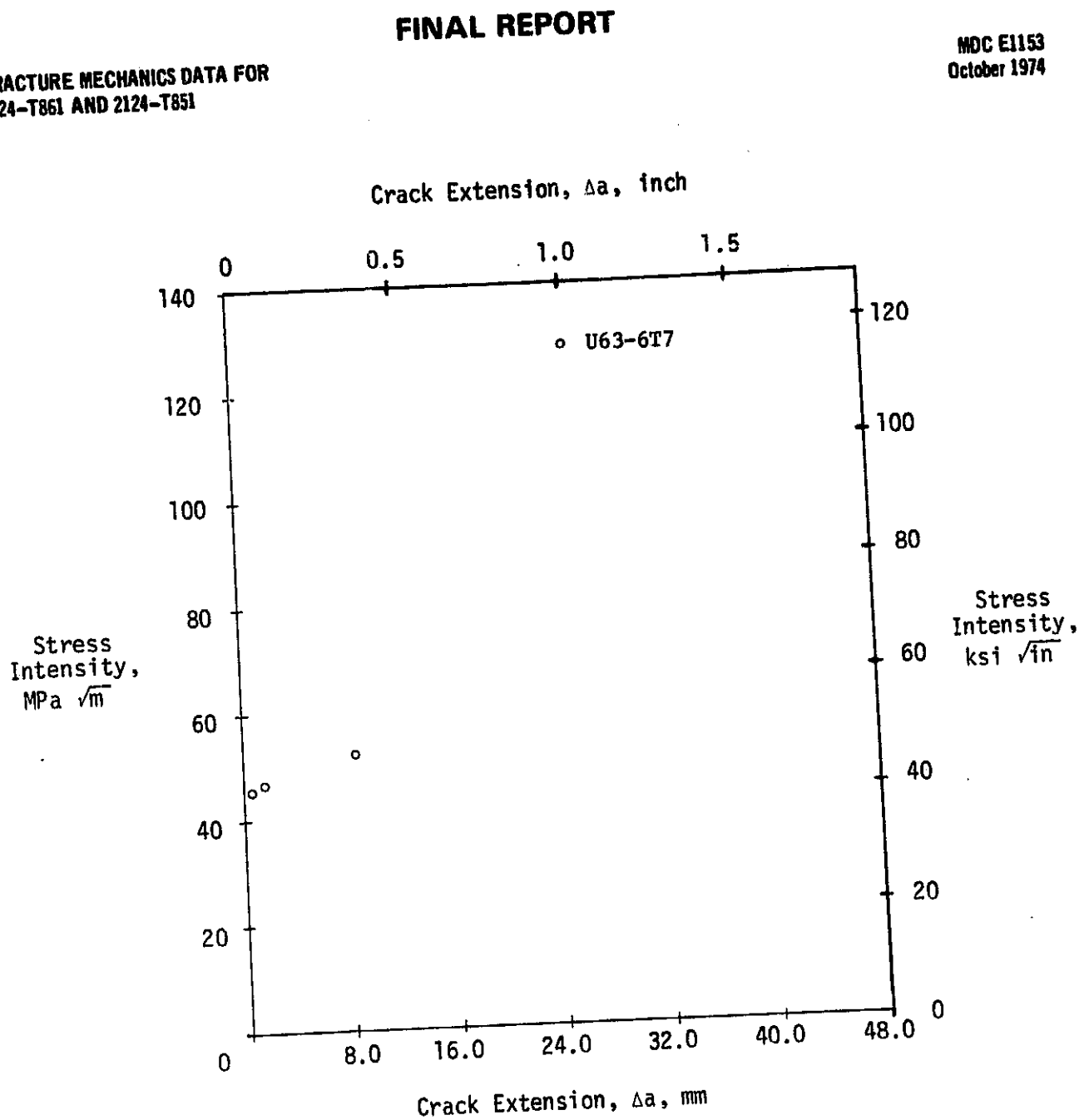
Thickness: 1.60 mm (.063 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C2-2



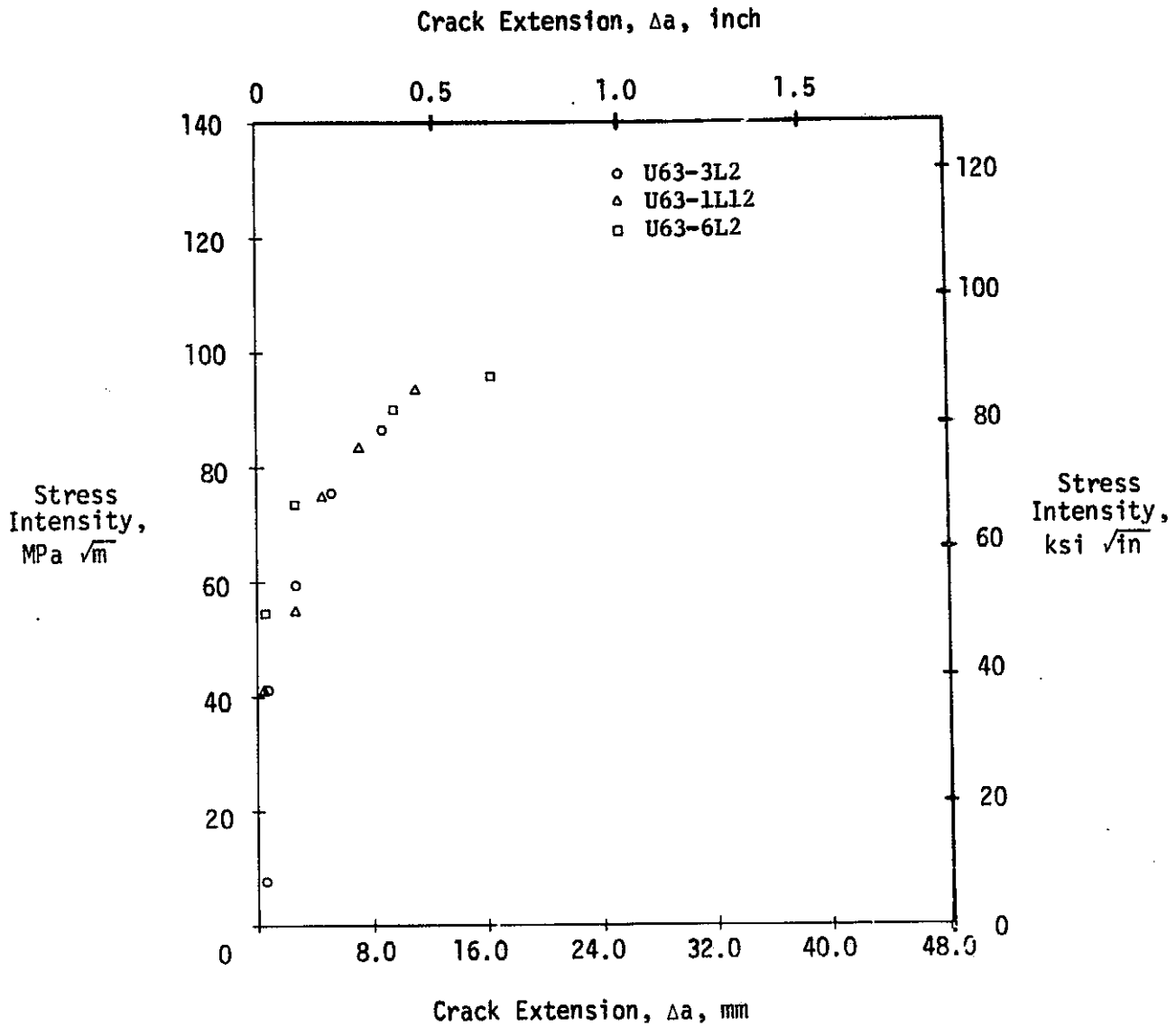
Thickness: 1.60 mm (.063 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C2-3



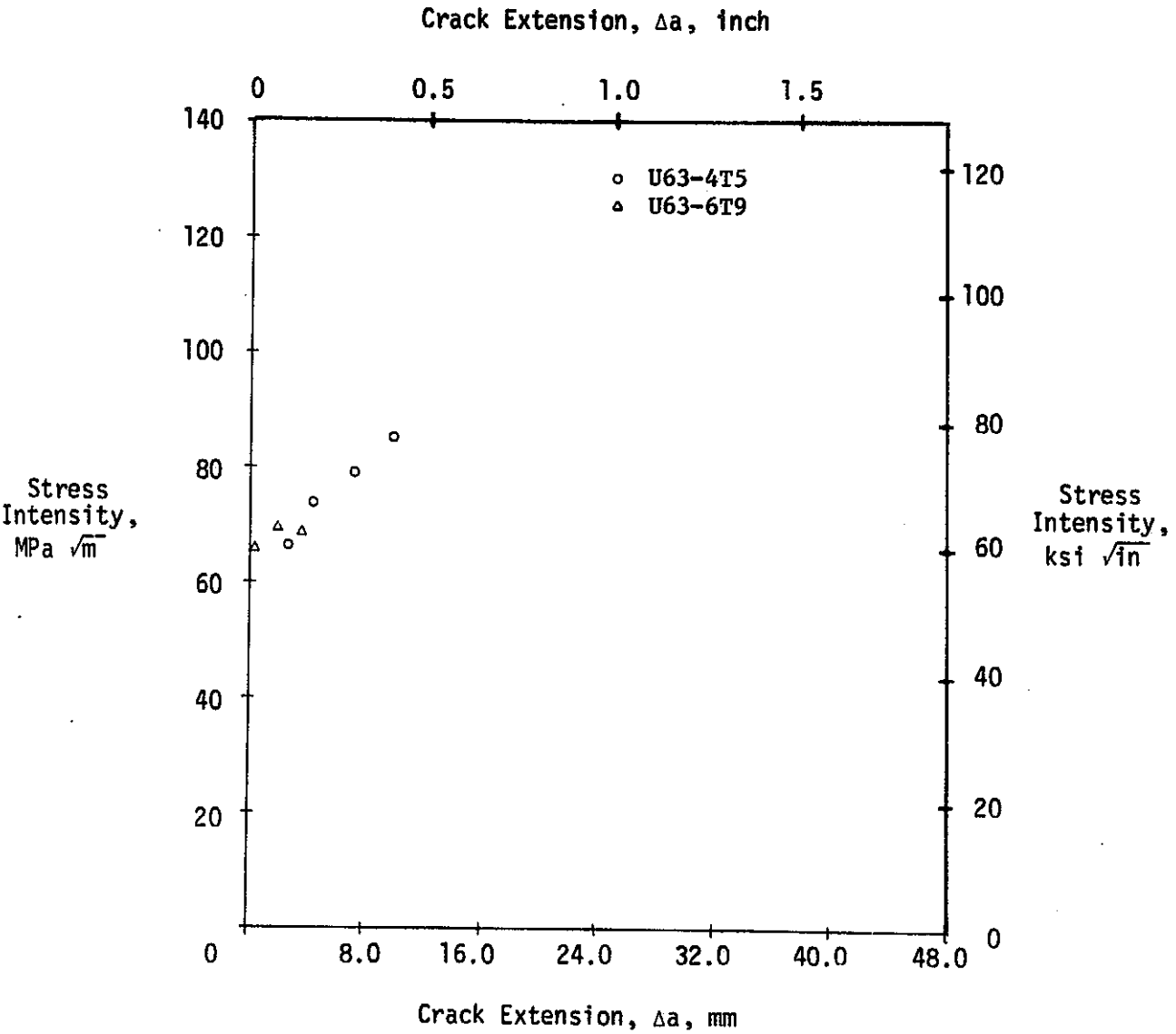
Thickness: 1.60 mm (.063 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C2-4



Thickness: 1.60 mm (.063 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

SECTION C3. FRACTURE TOUGHNESS TEST DATA FOR 3.18 mm (.125 INCH) THICK 2024-T861, BUCKLING RESTRAINED.

TABLE C3-1.

Fracture Toughness Test Data for 2024-T861 Specimens

(3.18 mm (.125 inch) Thick, Buckling Restrained)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load kN	Precrack Load kip	Failure Load kN	Failure Load kip	Full Section Failure Stress MPa	Full Section Failure Stress ksi	Critical Stress Intensity, K_c MPa$\sqrt{m}$	Critical Stress Intensity, K_c ksi$\sqrt{in}$	Data Table No.	Figure No.
125-1L1	144	L	3.19	.1254	29.799	11.732	82.04	3.23	53.4	12.0	116.1	26.1	122.3	17.7	51.9	47.2	C3-2	C3-1
125-2L16	144	L	3.19	.1256	29.832	11.745	25.17	.99	111.2	25.0	210.8	47.4	221.5	32.1	56.1	51.1	C3-3	C3-1
125-2L5	144	L	3.22	.1267	29.789	11.728	9.86	.39	164.6	37.0	296.3	66.6	309.1	44.8	51.0	46.4	C3-4	C3-1
														AVG:	53.0	48.2		
125-3L2	294	L	3.21	.1265	29.809	11.736	125.25	4.93	75.6	17.0	122.3	27.5	127.7	18.5	68.3	62.1	C3-5	C3-3
125-5L4	294	L	3.20	.1261	29.804	11.734	81.74	3.22	62.3	14.0	135.7	30.5	142.1	20.6	58.1	52.9	C3-6	C3-3
125-3L4	294	L	3.20	.1260	29.812	11.737	40.54	1.60	89.0	20.0	192.8	43.3	202.1	29.3	55.5	50.5	C3-7	C3-3
125-5L3	294	L	3.24	.1277	29.807	11.735	12.01	.47	173.5	39.0	302.5	68.0	312 9	45.4	58.6	53.3	C3-8	C3-3
														AVG:	60.1	54.7		
125-2L11	450	L	3.23	.1273	29.799	11.732	66.28	2.57	124.6	28.0	210.0	47.2	217.9	31.6		NSY	C3-9	C3-5
125-6L7	450	L	3.21	.1265	29.794	11.730	98.73	3.89	97.9	22.0	213.1	47.9	222.6	32.3		NSY	C3-10	C3-5
125-7L2	450	L	3.26	.1285	29.794	11.730	82.47	3.25	75.6	17.0	226.4	50.9	232.9	33.8		NSY	C3-11	C3-5
125-4T5	144	T	3.23	.1270	29.863	11.757	88.72	3.49	35.6	8.0	83.3	18.7	86.5	12.5	38.3	34.8	C3-12	C3-2
125-6T1	144	T	3.26	.1282	29.779	11.724	25.88	1.02	57.8	13.0	149.9	33.2	152.5	22.1	36.0	32.8	C3-13	C3-2
125-4T4	144	T	3.24	.1277	29.837	11.747	12.80	.50	115.7	26.0	210.2	47.2	217.2	31.5	37.7	34.3	C3-14	C3-2
														AVG:	37.3	34.0		
125-1T2	294	T	3.20	.1259	29.820	11.740	82.52	3.25	44.5	10.0	108.5	24.4	113.8	16.5	46.4	42.3	C3-15	C3-4
125-1T6	294	T	3.26	.1284	29.815	11.738	39.65	1.56	89.0	20.0	145.0	32.6	149.2	21.6	43.8	39.9	C3-16	C3-4
125-3T5	294	T	3.20	.1258	29.812	11.737	13.26	.52	129.0	29.0	234.9	52.8	246.6	35.8	43.7	39.8	C3-17	C3-4
														AVG:	44.6	40.7		
125-5T8	450	T	3.25	.1280	29.820	11.740	50.47	1.99	75.6	17.0	256.2	57.6	264.3	38.3		NSY	C3-18	C3-6
125-3T9	450	T	3.21	.1265	29.804	11.734	70.08	2.76	102.3	23.0	207.7	46.7	217.0	31.5		NSY	C3-19	C3-6
125-3T4	450	T	3.26	.1282	29.848	11.751	96.34	3.79	84.5	19.0	171.7	38.6	176.7	25.6		NSY	C3-20	C3-6

NSY: Net section stress > 0.2 percent offset yield strength prior to failure

TABLE C3-2

SPECIMEN NUMBER: 125-1L1
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 3.19 MM (.125 IN)
K(MAX) DURING PRECRACKING: 21.19 MPA SQRT(M) (19.28 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	41.02	1.615	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
72.3	16.3	191.95	7.56	41.71	1.642	.69	.027	29.09	26.39	76.22	11.05	105.86	15.35
74.1	16.6	203.74	7.90	42.44	1.671	1.42	.056	30.00	27.31	78.33	11.32	109.11	15.82
89.7	20.2	248.41	9.78	43.04	1.695	2.02	.080	33.68	33.38	94.57	13.71	132.99	19.29
107.4	24.1	306.12	12.05	43.90	1.728	2.88	.113	44.42	40.43	113.17	16.41	160.44	23.27
112.1	25.2	326.19	12.84	44.60	1.756	3.58	.141	46.81	42.62	118.08	17.12	168.53	24.44
114.5	25.7	343.76	13.53	45.08	1.799	4.66	.184	48.55	44.18	120.67	17.50	174.02	25.24
115.5	26.0	360.37	14.18	47.06	1.853	6.04	.238	49.89	45.41	121.70	17.65	177.89	25.80
115.7	26.0	375.12	14.77	48.51	1.910	7.49	.295	50.98	46.39	121.96	17.69	180.64	26.22
115.7	26.0	387.67	15.26	49.76	1.959	8.74	.344	51.82	47.16	121.96	17.69	183.12	26.55

TABLE C3-3

SPECIMEN NUMBER: 125-2L16
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 3.19 MM (.126 IN)
K(MAX) DURING PRECRACKING: 23.35 MPA SQRT(M) (21.25 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.61	.496	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
107.4	24.2	79.92	3.15	12.72	.501	.12	.005	22.67	20.63	112.90	16.37	123.43	17.90
145.2	32.6	110.57	4.35	12.94	.535	.24	.009	30.79	28.01	152.69	22.13	166.97	24.21
164.3	36.9	130.57	5.14	13.27	.523	.68	.027	35.44	32.25	172.70	25.04	188.57	27.49
185.4	41.7	156.79	6.17	13.94	.549	1.34	.053	40.99	37.30	194.85	28.26	214.94	31.17
193.3	43.4	169.33	6.63	14.08	.554	1.48	.058	42.94	39.08	203.10	29.45	224.26	32.52
198.2	44.5	177.38	6.98	14.33	.576	2.03	.080	44.90	40.86	208.25	30.20	230.98	33.48
204.0	45.9	188.93	7.44	15.06	.593	2.46	.097	46.93	42.71	214.42	31.10	238.51	34.59
207.8	46.5	202.49	7.97	15.86	.624	3.26	.128	48.88	44.49	217.50	31.54	243.38	35.29
210.4	47.3	214.55	8.66	16.77	.660	4.17	.164	51.14	46.54	221.16	32.06	249.11	36.12
210.9	47.4	232.60	9.16	17.77	.703	5.17	.204	52.81	48.06	221.60	32.14	251.57	36.48
211.3	47.5	249.16	9.81	18.94	.746	6.34	.250	54.71	49.79	222.10	32.21	254.40	36.89

TABLE C3-4

SPECIMEN NUMBER: 125-2L5
ALLOY: 2324-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 3.22 MM (.127 IN)
K(MAX) DURING PRECRACKING: 21.57 MPA SQRT(M) (19.63 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA a MM	DELTA a IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	5.02	.197	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
216.3	48.6	66.36	2.61	5.05	.200	.07	.003	29.53	26.87	226.66	32.72	233.63	33.88
264.7	59.5	98.99	3.90	5.94	.233	.89	.035	37.66	34.27	276.12	40.04	287.53	41.70
280.5	63.1	116.29	4.58	6.45	.254	1.43	.056	41.69	37.94	292.68	42.44	305.92	44.36
287.1	64.6	137.23	5.40	7.38	.291	2.36	.093	45.67	41.56	299.57	43.44	315.16	45.71
293.3	65.9	150.81	6.73	8.40	.331	3.38	.133	49.80	45.32	305.98	44.37	324.26	47.02
296.9	66.7	174.53	6.87	8.97	.353	3.95	.156	52.69	47.40	309.71	44.91	329.55	47.79
295.9	66.5	178.38	7.02	9.20	.362	4.18	.165	52.60	47.87	308.74	44.77	329.16	47.72
295.9	66.5	178.38	7.02	9.20	.362	4.18	.165	52.60	47.87	308.74	44.77	329.16	47.72

TABLE C3-5

SPECIMEN NUMBER: 125-3L2
ALLOY: 2324-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 3.21 MM (.127 IN)
K(MAX) DURING PRECRACKING: 39.40 MPA SQRT(M) (35.86 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA a MM	DELTA a IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	62.62	2.465	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
110.3	24.8	539.28	21.23	62.87	2.475	.25	.010	57.63	52.45	115.16	16.70	199.18	28.88
115.7	26.0	582.78	22.94	64.03	2.521	1.40	.055	61.28	55.77	123.76	17.51	211.71	30.70
118.8	26.7	615.37	24.23	65.11	2.563	2.48	.098	63.78	58.05	124.67	17.99	220.30	31.95
121.2	27.3	647.45	25.51	66.37	2.613	3.75	.148	66.68	60.14	126.61	18.36	228.24	33.10
122.7	27.6	675.99	26.58	67.55	2.660	4.94	.194	67.83	61.73	128.12	18.58	234.35	33.98
122.4	27.5	688.63	27.11	68.43	2.696	5.86	.231	68.44	62.28	127.85	18.54	236.54	34.30

TABLE C3-6

SPECIMEN NUMBER: 125-5L4
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294. J K
SPECIMEN THICKNESS: 3.20 MM (.126 IN)
K(MAX) DURING PRECRACKING: 24.52 MPA SQRT(M) (22.32 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	40.87	1.609	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
83.0	18.7	227.25	8.96	40.90	1.610	.01	.001	32.69	29.75	86.94	12.61	119.83	17.38
98.2	22.1	271.24	10.68	40.96	1.613	.04	.004	38.72	35.24	102.90	14.92	141.90	20.58
109.6	24.6	306.71	12.08	41.27	1.625	.40	.016	43.40	39.49	114.80	16.65	158.26	23.02
119.4	26.9	344.67	13.57	42.17	1.660	1.30	.051	47.93	43.62	125.15	18.15	174.53	25.31
125.8	28.2	370.47	14.59	42.88	1.688	2.01	.079	50.86	46.28	131.45	19.06	184.35	26.76
129.8	29.2	390.20	15.36	43.44	1.710	2.57	.101	53.03	48.26	135.98	19.72	191.92	27.83
131.7	29.6	404.35	15.94	44.23	1.741	3.33	.131	54.39	49.49	137.97	20.01	196.15	28.45
133.6	30.0	417.48	16.44	44.75	1.762	3.88	.153	55.60	50.60	139.97	20.30	200.34	29.06
134.3	30.2	427.58	16.83	45.42	1.788	4.55	.179	56.40	51.33	141.70	20.40	202.38	29.35
134.2	30.2	440.18	17.33	46.49	1.831	5.63	.222	57.22	52.07	141.65	20.40	204.43	29.65
134.2	30.2	453.79	17.87	47.64	1.876	6.77	.267	58.09	52.86	143.60	20.39	206.66	29.97

TABLE C3-7

SPECIMEN NUMBER: 125-3L4
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294. K
SPECIMEN THICKNESS: 3.20 MM (.126 IN)
K(MAX) DURING PRECRACKING: 23.80 MPA SQRT(M) (21.66 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	20.27	.798	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
109.2	24.6	140.38	5.52	20.39	.803	.12	.005	29.31	26.68	114.48	16.60	132.63	19.23
120.2	27.2	158.23	6.23	20.67	.814	.40	.016	31.66	29.72	126.67	18.37	147.36	21.33
134.2	30.2	179.53	7.07	20.86	.821	.59	.023	36.44	33.15	140.64	20.39	163.52	23.71
149.2	33.5	202.21	9.00	21.17	.833	.90	.035	40.83	37.15	156.37	22.68	182.25	26.43
166.3	37.4	235.30	9.26	21.71	.855	1.45	.057	46.14	41.99	174.36	25.28	204.09	29.60
174.3	39.1	251.84	9.91	22.08	.869	1.81	.071	48.73	44.32	182.45	26.46	214.16	31.06
179.6	40.3	265.32	10.45	22.46	.884	2.19	.086	50.65	46.09	187.99	27.26	221.35	32.10
185.6	41.7	281.50	11.08	22.90	.902	2.63	.104	52.94	48.18	194.55	28.21	229.86	33.34
188.9	42.5	293.97	11.58	23.55	.927	3.28	.129	54.70	49.78	198.03	28.72	235.18	34.11
190.8	42.9	302.33	11.89	23.74	.935	3.47	.137	55.49	50.50	201.04	29.01	237.94	34.50

TABLE C3-8

SPECIMEN NUMBER: 125-5L3
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
K(MAX) DURING PRECRACKING: 24.67 MPA SQRT(M) (22.46 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.01	.236	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
44.7	10.0	16.26	.640	6.09	.240	.09	.003	6.42	5.82	46.21	6.70	48.18	6.99
90.8	20.4	33.58	1.32	6.12	.241	.11	.004	13.03	11.86	93.90	13.62	97.92	14.20
91.2	20.4	34.58	1.36	6.27	.247	.26	.010	13.26	12.07	94.39	13.69	98.53	14.29
135.4	30.4	52.37	2.06	6.28	.247	.28	.011	19.70	17.93	140.05	20.31	146.22	21.20
169.8	38.2	67.27	2.66	6.34	.249	.33	.013	24.80	22.57	175.66	25.47	183.45	26.60
195.5	43.9	82.43	3.17	6.43	.253	.42	.017	28.77	25.18	202.20	29.32	211.32	30.64
215.2	48.4	94.93	3.72	6.75	.266	.74	.029	32.45	29.53	222.66	32.29	233.21	33.82
234.1	52.6	111.41	4.35	7.12	.280	1.11	.044	35.24	32.98	242.06	35.10	254.20	36.86
243.6	54.8	120.39	4.74	7.38	.291	1.37	.054	38.42	34.96	251.98	36.54	265.11	38.44
260.9	58.6	137.53	5.41	7.72	.304	1.71	.067	42.08	38.29	269.85	39.13	284.58	41.27
276.0	60.3	145.21	5.72	7.86	.309	1.85	.073	43.63	39.71	277.28	40.21	292.71	42.45
274.2	61.6	155.93	6.14	8.14	.320	2.17	.086	45.55	41.46	283.64	41.13	300.12	43.52
282.8	63.6	166.15	6.54	8.35	.329	2.34	.092	47.47	43.20	292.54	42.42	309.91	44.94
288.9	65.0	178.15	7.01	8.59	.338	2.68	.106	49.47	45.02	298.88	43.34	317.38	46.03
293.7	66.0	184.82	7.32	8.85	.349	2.89	.112	50.76	46.20	303.79	44.05	322.97	46.88
295.9	66.5	194.23	7.65	9.15	.360	3.14	.124	52.11	47.33	306.15	44.40	326.17	47.30
298.3	67.1	199.38	7.84	9.27	.365	3.26	.128	52.77	48.02	309.58	44.75	329.04	47.72
301.0	67.7	209.78	8.25	9.53	.379	3.62	.143	54.30	49.42	311.40	45.16	332.92	48.28
302.3	68.0	221.50	8.72	10.10	.398	4.09	.161	55.85	50.83	312.69	45.35	335.43	48.64
302.5	68.0	237.56	9.35	10.82	.426	4.81	.189	57.85	52.65	312.88	45.37	337.36	48.92
303.2	68.2	252.05	9.92	11.43	.450	5.42	.213	59.63	54.26	313.60	45.48	339.65	49.25

TABLE C3-9

SPECIMEN NUMBER: 125-2L11
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.23 MM (.127 IN)
K(MAX) DURING PRECRACKING: 42.66 MPA SQRT(M) (38.82 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	1.11	0.04	32.64	1.285	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
135.2	30.4	311.48	12.26	33.29	1.310	.65	.025	46.83	42.62	140.36	20.36	180.74	26.21
155.7	35.0	371.33	14.61	33.72	1.328	1.08	.042	54.32	49.43	161.60	23.44	208.08	30.18
174.8	39.3	435.86	17.16	34.42	1.355	1.78	.070	61.71	56.16	181.46	26.31	233.59	33.88
191.3	43.0	493.27	19.42	34.79	1.370	2.15	.085	67.92	61.81	198.54	28.79	255.59	37.07
204.2	45.9	543.33	21.39	35.45	1.396	2.81	.111	73.29	66.70	211.93	30.73	272.82	39.57
211.7	47.6	586.74	23.10	36.04	1.419	3.42	.134	76.71	69.82	219.78	31.87	282.90	41.04
210.4	47.3	1235.24	50.63	65.88	2.594	33.24	1.309	113.33	103.13	218.39	31.67	391.49	56.77

TABLE C3-10

SPECIMEN NUMBER: 125-6L7
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.21 MM (.127 IN)
K(MAX) DURING PRECRACKING: 43.22 MPA SQRT(M) (39.33 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	49.36	1.943	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
89.4	20.1	324.70	12.78	49.63	1.955	.29	.012	39.64	36.07	93.40	13.54	140.10	20.32
114.3	25.7	423.17	16.66	50.33	1.981	.96	.038	51.12	46.52	119.41	17.32	180.33	26.15
138.7	31.2	557.90	21.96	52.22	2.056	2.86	.112	63.56	57.84	144.88	21.01	223.17	32.35
160.1	36.0	686.12	27.01	53.86	2.120	4.49	.177	74.93	68.19	167.27	24.26	261.99	37.99
177.6	39.9	814.32	32.05	55.73	2.193	6.34	.249	85.07	77.42	185.56	26.91	296.38	42.98
188.8	42.4	921.33	36.29	57.05	2.270	8.29	.326	92.63	84.30	197.22	28.60	321.74	46.66
194.6	43.7	991.31	38.99	58.99	2.323	9.63	.379	97.07	98.34	203.29	29.45	336.58	48.81
199.4	44.8	1059.67	41.68	60.43	2.379	11.06	.436	101.23	92.13	208.34	30.21	353.51	51.83
204.2	45.9	1130.72	44.75	62.36	2.443	12.70	.500	*		213.37	30.94	365.74	53.04
207.6	46.7	1214.61	47.82	63.91	2.516	14.55	.573	*		216.86	31.45	379.81	55.08
210.4	47.3	1311.83	51.65	66.35	2.613	17.00	.669	*		219.82	31.88	396.41	57.49
212.3	47.7	1394.41	54.90	68.41	2.693	19.05	.750	*		221.78	32.16	410.11	59.47
213.2	47.9	1486.57	58.53	71.06	2.798	21.49	.846	*		222.70	32.29	424.70	61.59
213.5	48.0	1574.68	62.15	73.27	2.885	23.90	.941	*		223.10	32.35	439.02	63.66
213.4	48.0	1681.42	66.16	75.90	2.989	26.54	1.045	*		222.98	32.34	454.62	65.93
213.4	48.0	1724.33	67.88	76.98	3.031	27.62	1.087	*		222.93	32.33	461.31	66.93

TABLE C3-11

SPECIMEN NUMBER: 125-7L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 451.0 K
SPECIMEN THICKNESS: 3.26 MM (.128 IN)
K(MAX) DURING PRECRACKING: 29.39 MPA SQRT(M) (26.75 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	41.24	1.623	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
28.4	6.4	79.42	3.13	41.50	1.634	.26	.010	11.08	10.09	29.22	4.24	40.51	5.87
70.5	15.9	203.23	8.00	42.12	1.658	.89	.035	27.77	25.27	72.55	10.52	101.16	14.67
126.4	28.4	385.44	15.17	42.95	1.691	1.72	.068	50.35	45.82	129.99	18.85	182.66	26.49
154.3	34.7	499.91	19.68	44.21	1.741	2.97	.117	62.57	56.94	158.71	23.02	225.69	32.73
180.3	40.5	637.73	25.11	46.33	1.824	5.10	.201	75.27	68.50	185.41	26.89	269.12	39.03
197.4	44.4	754.53	29.71	48.35	1.904	7.11	.280	84.69	77.07	203.05	29.45	300.61	43.59
207.7	46.7	866.66	34.12	51.11	2.012	9.87	.389	92.38	84.07	213.63	30.98	325.19	47.16
216.5	48.7	995.14	39.18	54.33	2.139	13.09	.515	100.35	91.32	222.70	32.29	350.54	50.83
222.9	50.1	1111.94	43.78	57.17	2.251	15.93	.627	*		229.25	33.24	372.02	53.95
225.4	50.7	1221.74	48.10	60.39	2.377	19.14	.754	*		231.77	33.61	389.74	56.52
226.8	51.0	1312.84	51.69	62.97	2.479	21.73	.856	*		233.28	33.83	404.08	58.60
226.8	51.0	1394.60	54.91	65.48	2.578	24.24	.955	*		233.28	33.83	416.24	60.36

TABLE C3-12

SPECIMEN NUMBER: 125-4T5
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.2 K
SPECIMEN THICKNESS: 3.23 MM (.127 IN)
K(MAX) DURING PRECRACKING: 14.59 MPA SQRT(M) (13.28 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.36	1.746	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
71.7	16.1	202.11	7.95	44.39	1.748	.03	.001	29.42	26.78	74.46	10.80	105.96	15.37
76.5	17.2	218.15	8.59	44.79	1.763	.42	.017	31.54	28.70	79.37	11.51	113.38	16.44
78.9	17.7	229.75	9.05	45.49	1.791	1.13	.045	32.87	29.92	81.94	11.88	117.84	17.09
81.2	18.3	241.35	9.50	46.24	1.820	1.87	.074	34.16	31.09	84.30	12.22	122.11	17.71
83.5	18.7	260.23	10.25	48.12	1.895	3.76	.148	35.90	32.67	86.35	12.52	127.42	18.48
83.5	18.8	284.45	11.20	51.38	2.023	7.02	.276	37.60	34.22	86.67	12.57	132.14	19.16
83.5	18.8	301.40	11.87	53.59	2.110	9.23	.364	38.73	35.24	86.78	12.58	135.37	19.63

TABLE C3-13

SPECIMEN NUMBER: 125-6T1
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 3.26 MM (.128 IN)
K(MAX) DURING PRECRACKING: 12.08 MPA SQRT(M) (10.99 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.34	.509	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
93.4	21.0	71.73	2.78	13.27	.522	.33	.013	19.72	17.95	96.13	13.94	105.51	15.30
134.1	30.1	103.82	4.09	13.33	.525	.39	.015	28.48	25.92	138.51	20.09	152.12	22.06
139.2	31.3	109.52	4.32	13.55	.533	.60	.024	29.76	27.08	143.55	20.82	157.31	22.81
143.1	32.2	119.19	4.69	14.29	.563	1.35	.053	31.44	28.61	147.56	21.40	163.22	23.67
144.4	32.4	124.72	4.91	14.83	.584	1.89	.074	32.26	29.36	149.55	21.54	164.99	23.93
146.1	33.0	134.34	5.28	15.58	.614	2.64	.104	33.76	30.72	151.56	21.98	169.27	24.55
146.6	33.0	145.46	5.74	16.84	.663	3.89	.153	35.29	32.12	152.28	22.08	171.69	24.90
147.1	33.1	155.67	6.13	17.87	.704	4.93	.194	36.51	33.23	152.79	22.15	173.59	25.17
148.1	33.3	160.44	6.32	18.30	.720	5.56	.219	36.98	33.66	151.98	22.04	173.53	25.17
147.3	33.1												

TABLE C3-14

SPECIMEN NUMBER: 125-4T4
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 144.2 K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
K(MAX) DURING PRECRACKING: 16.97 MPA SQRT(M) (15.44 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.40	.252	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
79.5	17.9	29.93	1.18	6.64	.262	.24	.014	11.88	10.81	82.11	11.91	85.93	12.46
97.6	21.9	37.72	1.49	6.78	.267	.38	.015	14.74	13.42	101.86	14.63	105.66	15.32
154.5	34.6	61.36	2.38	6.73	.265	.33	.013	23.17	21.09	159.14	23.08	166.67	24.17
169.7	38.1	67.65	2.66	6.79	.268	.39	.016	25.65	23.34	175.36	25.43	183.73	26.64
180.5	40.6	73.69	2.90	6.92	.272	.52	.020	27.53	25.05	186.51	27.05	195.58	28.36
191.8	43.1	81.23	3.20	7.13	.281	.73	.029	29.69	27.02	198.17	28.74	208.11	30.18
200.1	45.0	89.78	3.53	7.51	.296	1.11	.044	31.86	28.94	206.78	29.99	217.74	31.58
203.5	45.8	92.04	3.62	7.35	.237	1.15	.045	32.44	29.52	210.33	30.50	221.54	32.13
205.5	46.2	103.36	4.07	8.38	.330	1.98	.078	34.51	31.41	212.36	30.80	224.99	32.63
208.9	47.0	108.54	4.28	8.64	.340	2.24	.088	35.64	32.43	215.91	31.31	229.18	33.25
209.9	47.2	117.95	4.64	9.32	.367	2.92	.115	37.21	33.86	216.92	31.46	231.38	33.55
209.9	47.2	121.22	4.77	9.58	.377	3.18	.125	37.72	34.33	216.92	31.46	231.80	33.62

TABLE C3-15

SPECIMEN NUMBER: 125-1T2
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 3.26 MM (.126 IN)
K(MAX) DURING PRECRACKING: 17.63 MPA SQRT(M) (16.05 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	41.26	1.624	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
93.2	21.0	260.78	10.27	41.41	1.630	.15	.006	37.54	33.71	97.78	14.18	135.38	19.63
99.2	22.3	281.63	11.09	41.84	1.647	.58	.023	39.67	36.12	134.06	15.39	144.65	20.98
101.5	22.8	295.29	11.62	42.08	1.657	.82	.032	40.71	37.05	106.42	15.41	148.27	21.50
101.7	22.9	293.87	11.57	42.42	1.670	1.15	.045	41.01	37.32	106.70	15.47	149.12	21.62
104.2	23.4	312.01	11.89	42.49	1.673	1.23	.048	42.26	39.28	109.31	15.85	152.88	22.17
104.3	23.4	314.56	11.97	42.73	1.682	1.46	.058	42.23	38.41	109.32	15.85	153.23	22.23
105.2	23.7	317.11	12.09	42.73	1.682	1.47	.058	42.61	38.78	110.37	16.01	154.70	22.43
105.7	23.7	312.75	12.31	43.36	1.707	2.10	.083	43.00	39.13	110.48	16.01	155.67	22.57
109.0	24.5	328.04	12.91	43.75	1.723	2.49	.098	44.79	40.76	114.34	16.58	161.83	23.47
109.2	24.5	354.69	13.96	46.54	1.832	5.27	.208	46.69	42.41	114.48	16.60	166.43	24.13

TABLE C3-16

SPECIMEN NUMBER: 125-1T6
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 3.26 MM (.128 IN)
K(MAX) DURING PRECRACKING: 23.09 MPA SQRT(M) (21.01 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	19.32	.760	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
79.1	17.8	95.92	3.78	19.35	.781	.02	.001	20.55	18.70	91.40	11.80	93.90	13.62
95.0	21.4	115.84	4.56	19.86	.782	.04	.002	24.68	22.46	97.73	14.17	112.76	16.35
105.3	23.7	131.78	5.18	20.29	.799	.46	.018	27.65	25.16	108.27	15.70	125.33	18.17
114.8	25.8	145.53	5.73	20.47	.806	.65	.025	30.29	27.56	118.06	17.12	136.86	19.85
126.2	28.4	164.08	6.46	20.86	.821	1.03	.041	33.64	30.62	129.86	18.83	150.98	21.90
132.1	29.7	174.97	6.88	21.17	.833	1.34	.053	35.48	32.29	135.87	19.70	158.36	22.97
137.9	31.0	187.34	7.38	21.63	.852	1.80	.071	37.47	34.10	141.89	20.58	165.97	24.07
139.9	31.4	192.45	7.56	21.83	.860	2.01	.079	38.18	34.75	143.99	20.87	168.58	24.45
140.8	31.7	201.14	7.92	22.65	.892	2.83	.111	39.20	35.67	144.87	21.01	170.82	24.77
143.0	32.2	210.56	8.29	23.28	.917	3.46	.136	40.39	36.76	147.11	21.33	174.34	25.28
143.7	32.3	220.63	8.69	24.00	.945	4.18	.165	41.59	37.54	147.84	21.44	176.21	25.55
144.2	32.4	228.71	9.00	24.99	.983	5.13	.202	42.26	38.45	148.31	21.51	178.13	25.83
144.9	32.5	244.85	9.64	25.45	1.042	6.64	.261	43.81	39.87	149.01	21.61	181.17	26.27

TABLE C3 17

SPECIMEN NUMBER: 125-3T5
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 3.20 MM (.126 IN)
K(MAX) DURING PRECRACKING: 19.67 MPA SQRT(M) (17.81 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.63	.261	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
140.6	31.6	63.02	2.32	6.99	.263	.06	.002	21.42	19.49	147.61	21.41	154.54	22.41
159.8	35.9	73.78	2.71	6.78	.267	.00	.000	24.51	22.30	167.75	24.33	175.74	25.49
164.0	36.9	78.54	2.92	6.84	.269	.15	.006	25.33	23.02	172.41	25.00	180.70	26.20
170.6	38.4	81.59	3.00	6.94	.273	.21	.008	26.49	24.15	179.14	25.98	187.89	27.25
178.5	40.1	84.59	3.13	7.36	.290	.31	.012	28.54	25.97	187.46	27.18	197.19	28.60
188.9	42.5	91.11	3.35	7.43	.293	.80	.029	30.35	27.62	198.32	28.76	208.73	30.27
194.8	43.8	97.49	3.58	7.70	.303	1.07	.042	31.87	29.00	204.56	29.66	215.25	31.21
200.7	45.1	111.40	3.99	7.70	.303	1.07	.042	32.84	29.88	210.76	30.55	222.25	32.23
207.2	46.6	120.17	4.26	7.93	.312	1.39	.055	34.36	31.27	217.52	31.54	229.37	33.26
207.4	46.6	113.95	4.49	8.02	.316	1.55	.061	35.73	32.52	224.38	32.60	237.55	34.45
214.1	48.1	117.97	4.64	8.18	.322	1.65	.065	36.52	33.24	227.39	32.98	240.60	34.89
216.6	48.7	123.74	4.87	8.28	.326	2.18	.086	37.84	34.43	234.13	33.95	247.91	35.95
223.1	50.1	133.55	5.26	8.81	.347	2.32	.091	39.48	35.93	236.81	34.34	251.69	36.50
225.6	50.7	137.67	5.42	8.99	.352	3.02	.119	40.14	36.53	238.91	34.65	254.16	36.86
227.5	51.2	148.40	5.86	9.65	.380	3.13	.123	41.91	38.14	240.07	34.81	256.69	37.22
228.7	51.4	155.43	6.12	9.79	.384	3.29	.130	43.24	39.35	246.31	35.72	263.56	38.22
234.6	52.7	158.46	6.24	9.92	.391			43.59	39.76	246.85	35.80	264.45	38.35
235.1	52.9												

TABLE C3-18

SPECIMEN NUMBER: 125-5T8
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
K(MAX) DURING PRECRACKING: 22.36 MPA SQRT(M) (20.35 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	25.23	.993	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
108.4	24.4	183.38	7.44	25.47	1.002	1.24	.049	32.93	29.97	111.98	16.24	136.16	19.74
158.4	35.6	290.47	11.75	27.38	1.078	2.15	.085	48.94	44.54	163.40	23.70	200.16	29.03
192.1	43.2	400.13	15.75	28.91	1.138	3.68	.145	61.13	55.63	198.15	28.74	245.82	35.65
208.2	46.8	455.31	17.93	29.57	1.164	4.33	.171	67.58	61.05	214.77	31.14	267.89	38.85
219.9	49.4	509.50	20.06	30.61	1.205	5.37	.212	72.22	65.72	226.83	32.89	285.43	41.39
229.6	51.6	563.68	22.19	31.90	1.256	6.67	.263	76.84	69.93	235.87	34.20	300.38	43.55
234.0	52.6	618.12	24.02	33.23	1.308	8.00	.315	80.46	73.22	241.37	35.00	310.61	45.04
241.7	54.3	694.26	27.33	35.68	1.405	10.44	.411	86.55	78.77	249.36	36.16	327.81	47.54
249.0	56.0	793.41	31.10	38.36	1.510	13.12	.517	92.97	84.60	256.83	37.25	345.79	50.15
252.3	56.7	847.07	33.35	39.97	1.574	14.73	.580	*	*	260.31	37.75	355.65	51.57
254.3	57.2	879.95	34.64	40.85	1.608	15.61	.615	*	*	262.29	38.04	361.27	52.39
254.3	57.1	887.55	34.94	41.20	1.622	15.97	.629	*	*	262.01	38.00	362.07	52.51
255.2	57.4	942.69	37.11	43.02	1.694	17.79	.700	*	*	263.31	38.18	376.10	53.67
256.0	57.5	1008.47	39.70	45.27	1.782	20.04	.789	*	*	264.05	38.29	379.20	54.99
256.2	57.6	1074.23	42.29	47.55	1.872	22.31	.878	*	*	264.29	38.33	388.04	56.27
256.4	57.6	1156.44	45.53	50.30	1.980	25.06	.987	*	*	264.47	38.35	399.10	57.88
256.1	57.6	1216.41	47.89	52.31	2.060	27.08	1.066	*	*	264.23	38.32	407.04	59.03
255.4	57.4	1271.56	50.02	54.23	2.134	28.97	1.140	*	*	263.51	38.21	414.01	60.04

TABLE C3-19

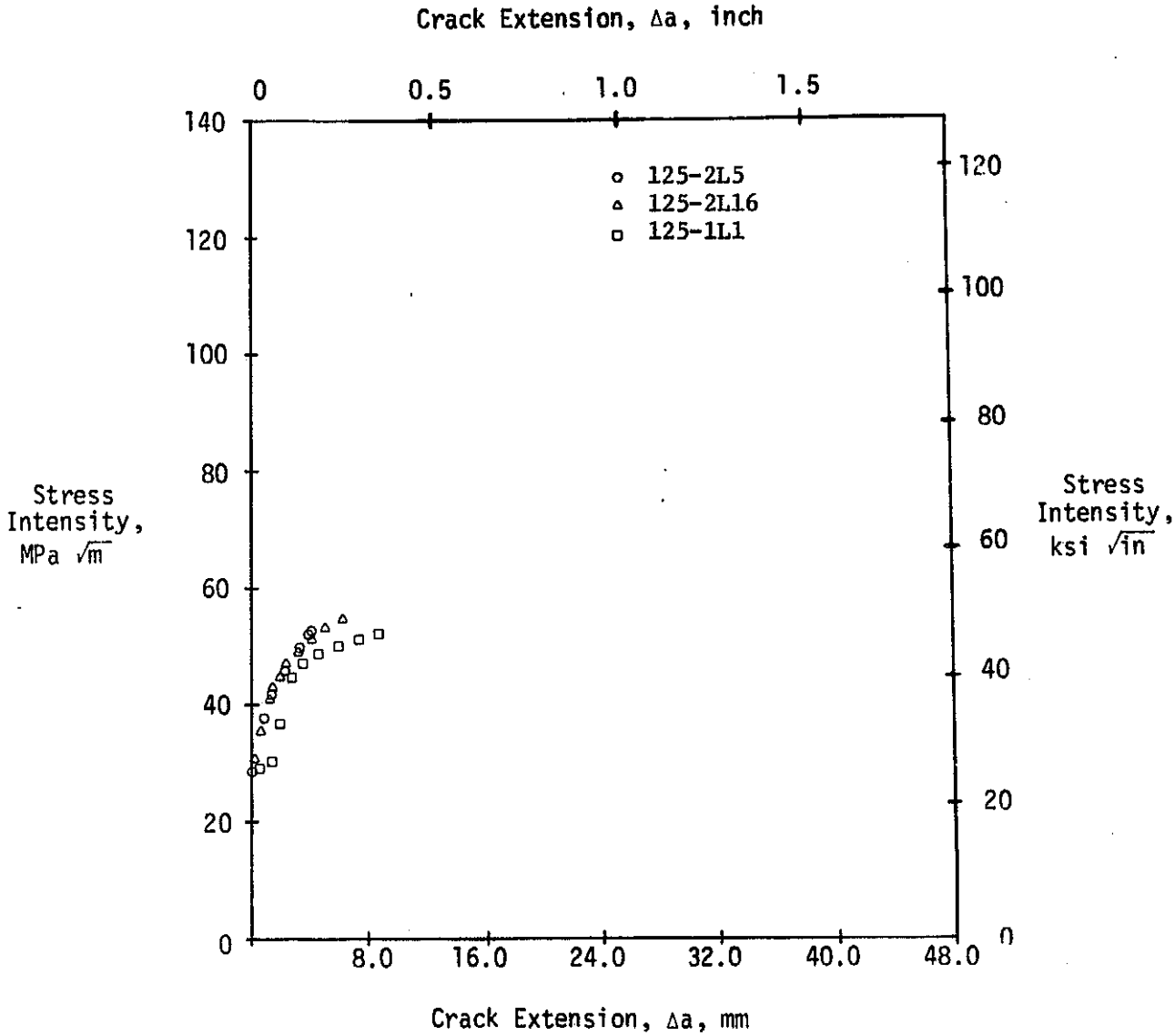
SPECIMEN NUMBER: 125-3T9
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.21 MM (.127 IN)
K(MAX) DURING PRECRACKING: 36.72 MPA SQRT(M) (33.40 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	35.24	1.387	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
25.8	5.8	60.96	2.40	35.51	1.398	.47	.018	8.49	7.72	26.94	3.91	35.37	5.13
78.7	17.7	197.61	7.78	36.88	1.452	1.84	.073	29.39	26.48	82.23	11.92	109.27	15.85
110.3	24.8	289.56	11.40	37.73	1.485	2.69	.106	41.30	37.59	115.21	16.71	154.27	22.37
133.9	30.1	367.79	14.48	38.61	1.520	3.57	.141	50.81	46.24	139.83	21.28	188.73	27.37
153.5	34.5	436.88	17.20	39.17	1.542	4.13	.163	58.73	53.45	160.27	23.24	217.43	31.53
169.0	38.0	505.97	19.92	40.27	1.585	5.23	.206	65.76	59.85	176.53	25.61	241.35	35.00
179.3	40.3	553.72	21.80	40.93	1.610	5.86	.231	73.40	64.07	187.22	27.15	258.04	37.42
182.4	41.0	575.31	22.65	41.43	1.633	6.44	.254	72.23	65.73	191.47	27.62	263.94	38.28
207.7	46.7	704.09	27.72	42.67	1.680	7.64	.301	83.70	76.17	216.95	31.46	304.01	44.09

TABLE C3-20

SPECIMEN NUMBER: 125-3T4
ALLOY: 2124-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.26 MM (.129 IN)
K(MAX) DURING PRECRACKING: 36.18 MPA SQRT(M) (32.93 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	0.00	48.17	1.896	0.00	0.000	[illegible]	[illegible]	[illegible]	[illegible]	0.00	0.00
53.4	12.0	182.89	7.20	48.64	1.915	.47	.018	22.99	21.02	54.93	7.97	81.49	11.82
75.6	17.0	264.41	10.41	49.13	1.933	.92	.036	32.77	29.82	77.82	11.29	115.96	16.82
95.2	21.4	343.15	13.51	49.68	1.964	1.71	.067	41.68	37.93	97.96	14.21	147.13	21.34
110.3	24.8	406.40	16.00	50.35	1.982	2.18	.086	48.66	44.23	113.52	16.46	171.32	24.84
122.8	27.6	465.25	18.32	50.88	1.995	2.51	.099	54.32	49.43	126.34	18.32	191.30	27.74
127.2	28.6	481.58	18.96	51.32	2.005	2.75	.108	56.45	51.38	131.91	19.13	198.71	28.82
139.7	31.4	543.26	21.27	51.35	2.022	3.18	.125	62.33	56.72	143.73	20.84	219.12	31.78
147.2	33.1	574.80	22.63	51.44	2.025	3.26	.129	65.73	59.86	151.51	21.97	231.19	33.53
165.7	37.2	775.89	30.35	57.55	2.271	9.47	.373	80.15	72.84	175.51	24.73	277.82	40.29
171.7	38.6	844.14	33.23	59.61	2.347	11.44	.450	84.97	77.32	175.99	25.62	284.20	42.66



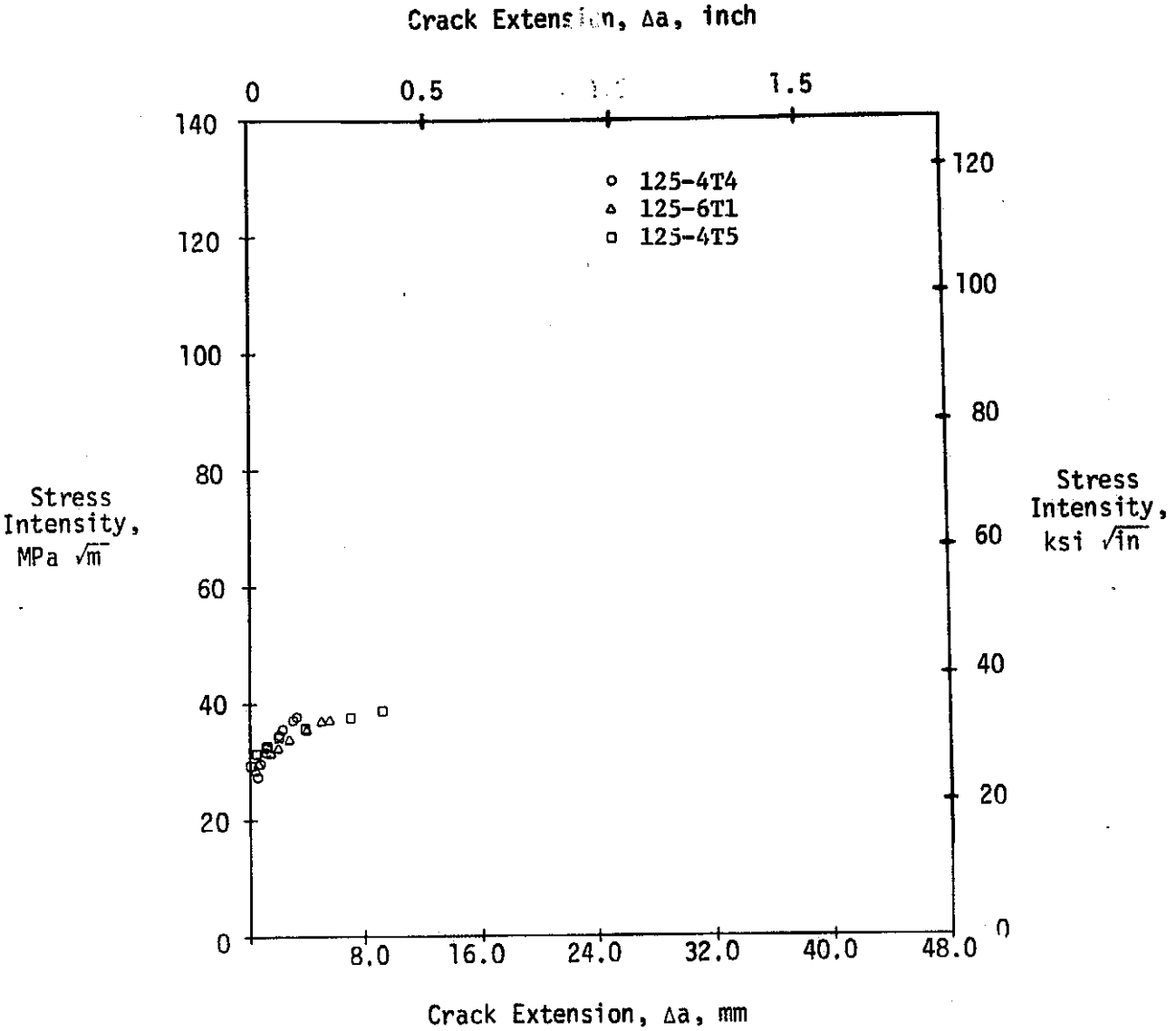
Thickness: 3.18 mm (.125 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C3-1



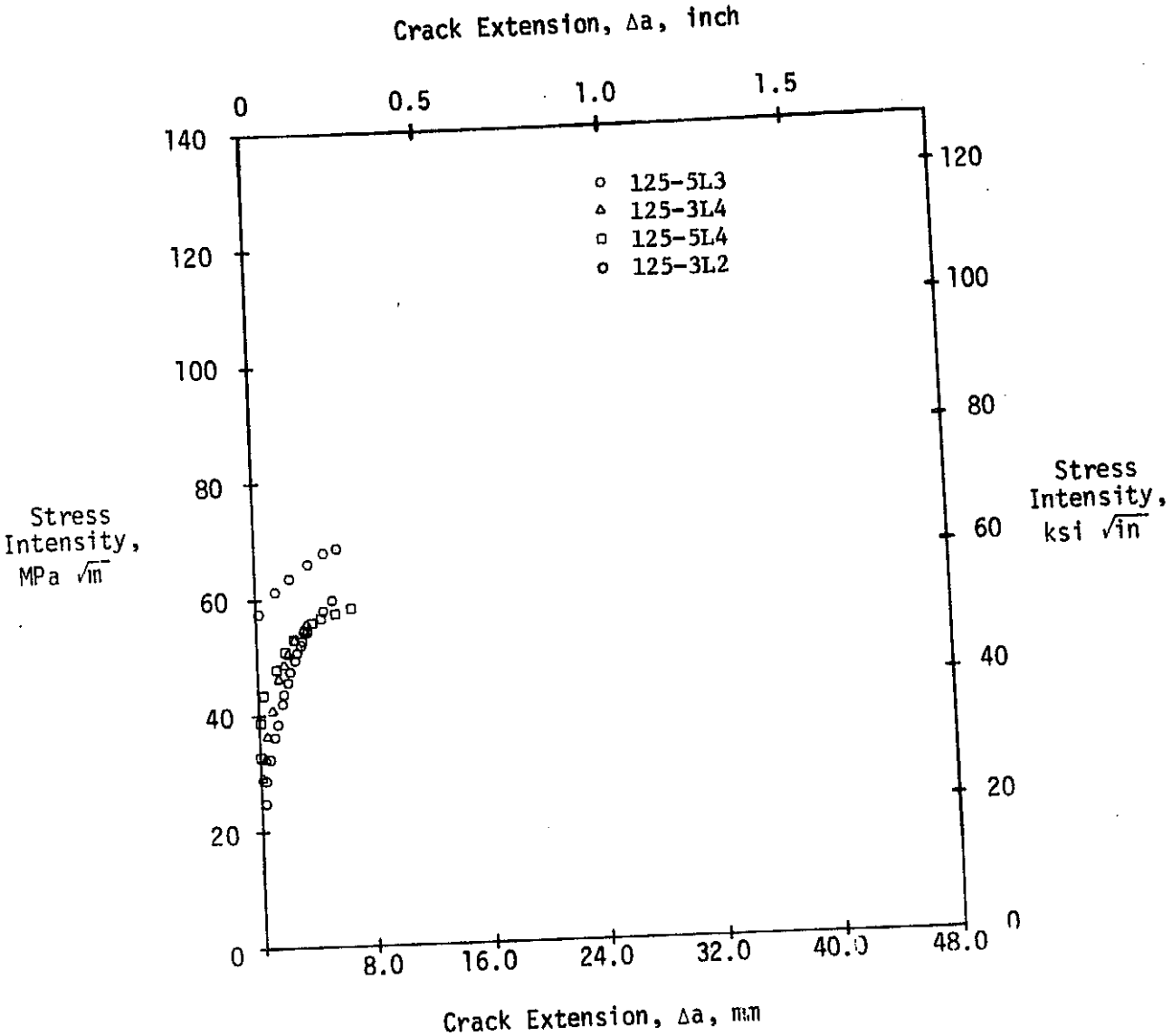
Thickness: 3.18 mm (.125 inch)

Orientation: Transverse

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C3-2



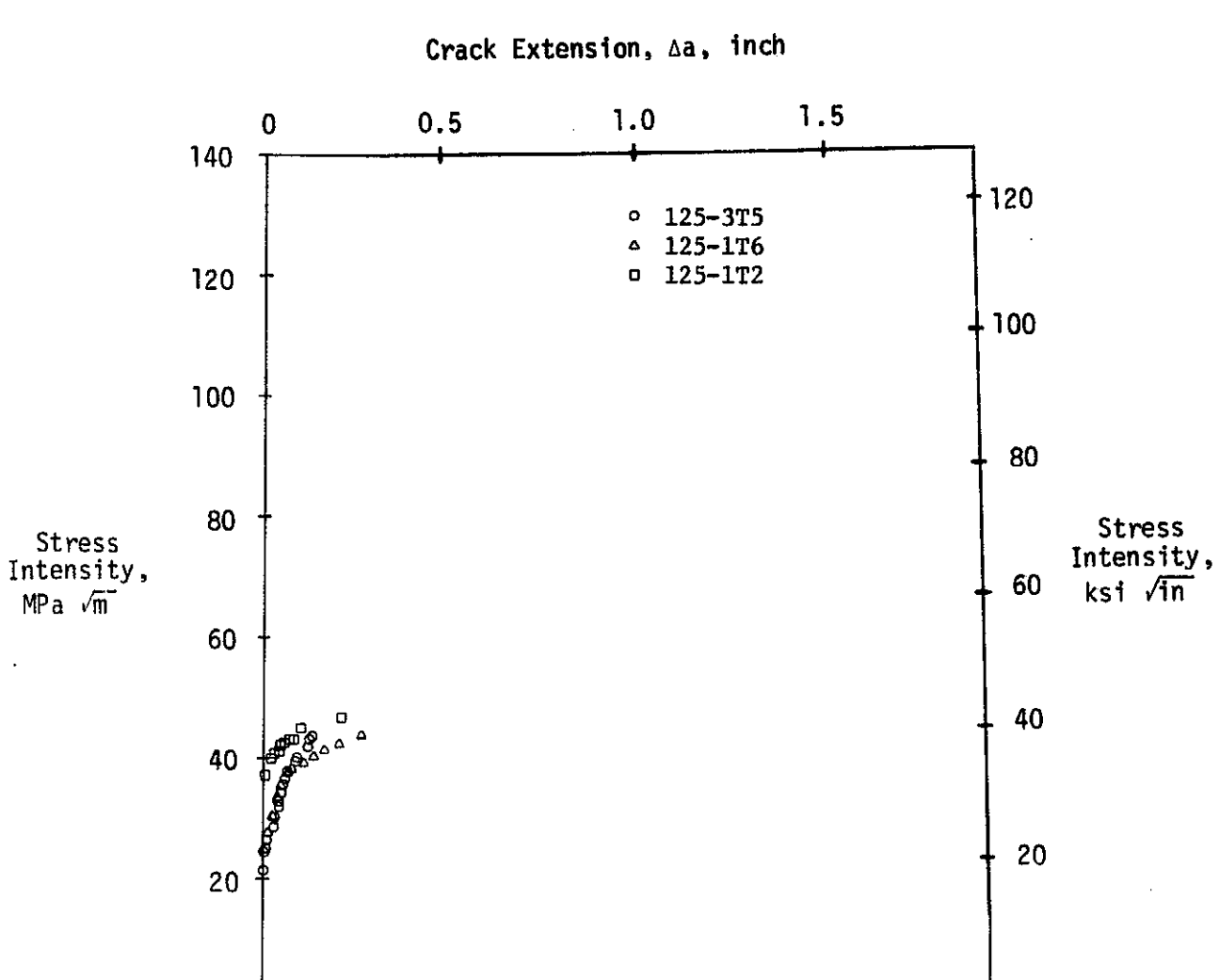
Thickness: 3.18 mm (.125 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C3-3



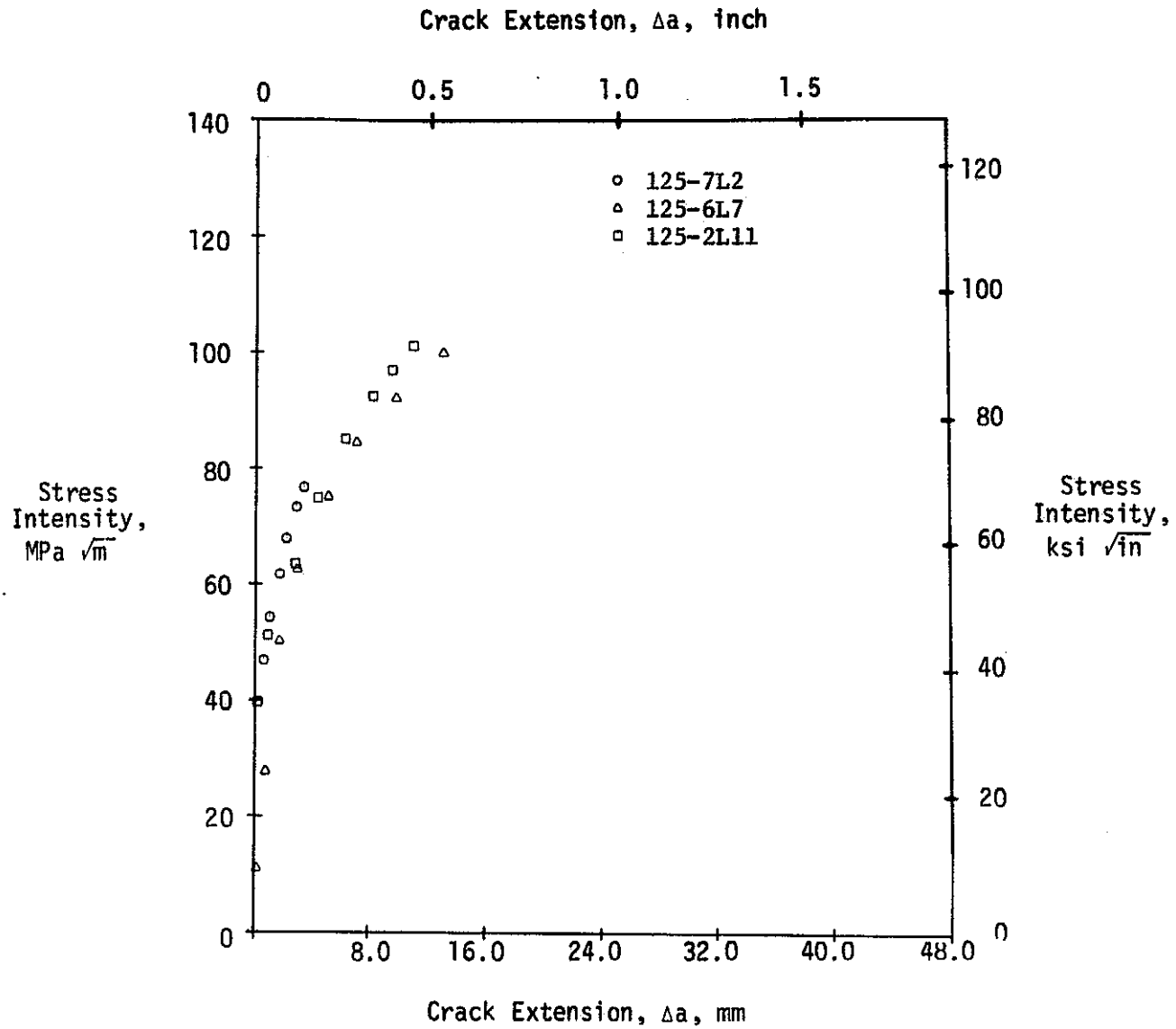
Thickness: 3.18 mm (.125 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C3-4



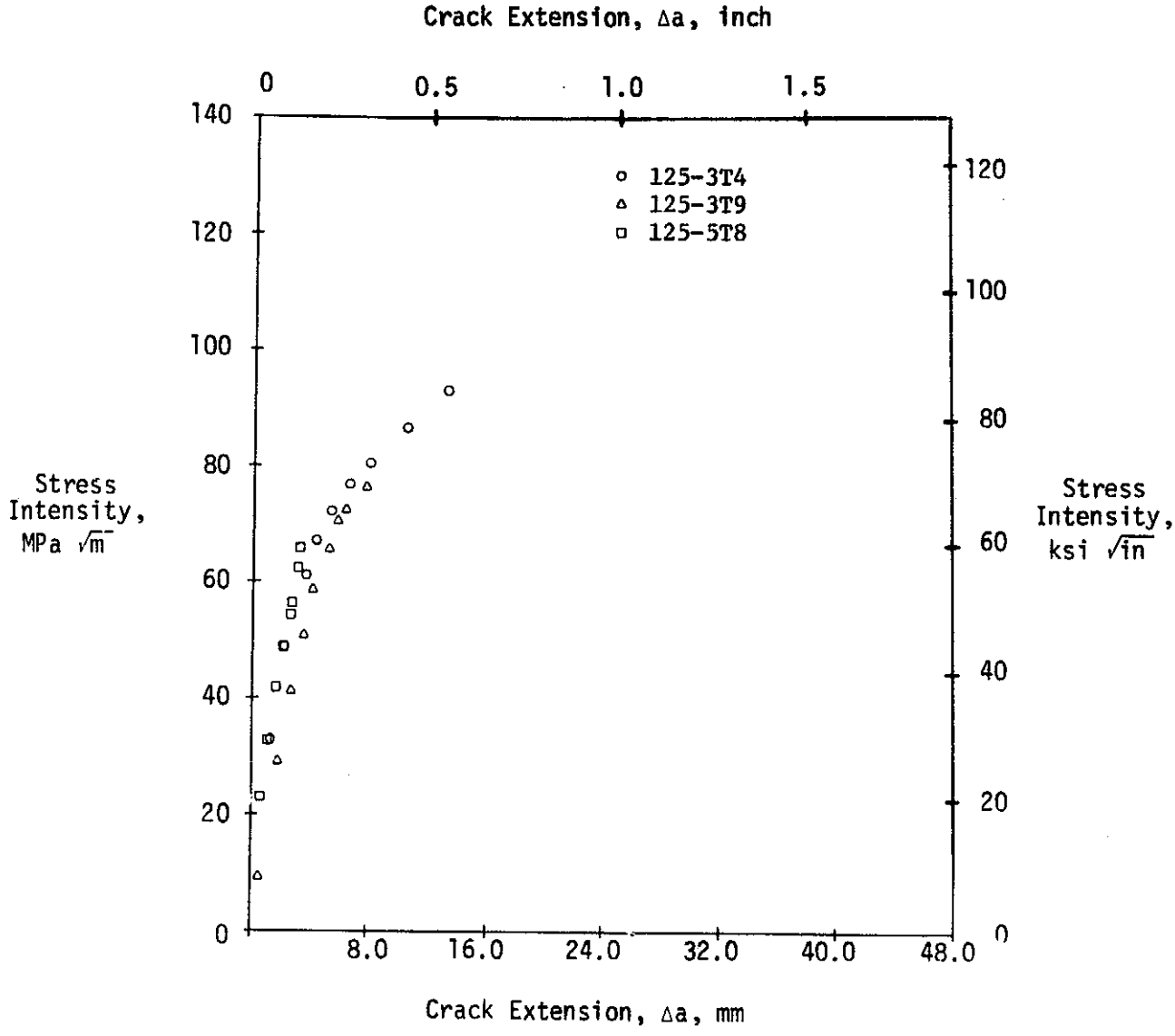
Thickness: 3.18 mm (.125 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C3-5



Thickness: 3.18 mm (.125 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

SECTION C4. FRACTURE TOUGHNESS TEST DATA FOR 3.18 mm (.125 INCH) THICK 2024-T861, BUCKLING UNRESTRAINED

TABLE C4-1.

Fracture Toughness Test Data for 2024-T861 Specimens

(3.18 mm (.125 inch) Thick, Buckling unrestrained)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load kN	Precrack Load kip	Failure Load kN	Failure Load kip	Full Section Failure Stress MPa	Full Section Failure Stress ksi	Critical Stress Intensity, K_c $MPa\sqrt{m}$	Critical Stress Intensity, K_c $ksi\sqrt{in}$	Data Table No.	Figure No.
U125-4L3	144	L	3.24	.1275	29.832	11.745	89.23	3.51	44.5	10.0	109.4	24.6	113.3	16.4	*		C4-2	C4-1
U125-5L2	144	L	3.22	.1266	29.822	11.741	25.17	.99	93.4	21.0	206.0	46.3	214.8	31.1	55.3	50.3	C4-3	C4-1
U125-4L4	144	L	3.22	.1269	29.832	11.745	9.86	.39	146.8	33.0	273.6	61.5	284.5	41.3	67.1	61.6	C4-4	C4-1
														AVG:	61.2	56.0		
U125-6L4	294	L	3.25	.1280	29.807	11.735	80.62	3.17	102.3	23.0	160.8	36.2	166.0	24.1	75.7	68.9	C4-5	C4-2
U125-6L3	294	L	3.22	.1267	29.830	11.744	40.56	1.60	84.5	19.0	195.7	44.0	203.9	29.6	63.5	57.8	C4-6	C4-2
U125-1L16	294	L	3.23	.1270	29.835	11.746	13.28	.52	133.4	30.0	315.4	70.9	327.7	47.5	79.7	72.5	C4-7	C4-2
														AVG:	73.0	66.4		
U125-4L1	450	L	3.23	.1272	29.830	11.744	99.29	3.91	75.6	17.0	199.7	44.9	207.3	30.1	*		C4-8	C4-4
U125-6L5	450	L	3.27	.1287	29.815	11.738	83.34	3.28	97.9	22.0	243.5	54.7	249.3	36.2	**		.**	**
U125-3L1	450	L	3.20	.1261	29.802	11.733	64.01	2.52	124.6	28.0	262.9	59.1	275.5	39.9	NSY		C4-9	C4-4
U125-6T7	144	T	3.24	.1277	29.820	11.740	88.98	3.50	31.1	7.0	78.6	17.7	81.3	11.8	**		**	**
U125-3T1	144	T	3.24	.1275	29.855	11.754	25.20	.99	66.7	15.0	159.7	35.9	165.2	24.0	**		**	**
U125-4T1	144	T	3.24	.1275	29.850	11.752	12.55	.49	102.3	23.0	201.3	45.2	208.2	30.2	**		**	**
U125-4T6	294	T	3.25	.1278	29.909	11.775	82.27	3.24	66.7	15.0	107.9	24.2	111.1	16.1	47.4	43.1	C4-10	C4-3
U125-2T1	294	T	3.27	.1289	29.820	11.740	41.40	1.63	62.3	14.0	147.2	33.1	150.8	21.9	**		**	**
U125-5T6	294	T	3.25	.1280	29.845	11.750	12.47	.49	106.8	24.0	243.8	54.8	251.3	36.4	**		**	**
														AVG:	47.4	43.1		
U125-6T2	450	T	3.25	.1280	29.809	11.736	98.02	3.86	75.6	17.0	184.2	41.4	190.0	27.6	*		C4-11	C4-5
U125-3T1	450	T	3.23	.1273	29.827	11.743	69.37	2.73	84.5	19.0	213.3	48.0	221.2	32.1	94.6	88.8	C4-12	C4-5
U125-6T4	450	T	3.25	.1278	29.809	11.736	53.16	2.09	57.8	13.0	238.9	53.7	246.9	35.8	*		C4-13	C4-5
														AVG:	94.6	88.8		

* Crack resolution near instability lost due to excessive buckling out of the focal plane of the movie camera.

** Crack extension not measurable due to poor resolution on 16mm film.

TABLE C4-2

SPECIMEN NUMBER: U125-4L3
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
K(MAX) DURING PRECRACKING: 18.25 MPA SQRT(M) (16.61 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	44.63	1.756	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00
25.8	5.8	44.63	1.757	[illegible]	[illegible]	12.59	9.64	26.71	3.87	38.11	5.53
74.3	16.7	45.85	1.805	1.24	.049	29.34	26.70	72.76	10.55	105.05	15.23
81.4	18.3	46.75	1.841	2.14	.084	34.42	31.31	84.27	12.22	122.74	17.80
92.5	20.8	47.58	1.873	2.96	.117	39.53	35.98	95.78	13.89	140.64	20.40
84.1	18.9	53.37	2.101	8.71	.343	38.71	35.23	87.03	12.62	135.46	19.64

TABLE C4-3

SPECIMEN NUMBER: U125-5L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 3.22 MM (.127 IN)
K(MAX) DURING PRECRACKING: 19.45 MPA SQRT(M) (17.7[illegible] KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	12.59	.496	0.00	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00
168.1	37.8	14.23	.560	1.64	[illegible]	37.28	33.93	175.36	25.43	193.86	28.11
191.7	43.1	15.87	.625	3.28	.129	44.06	40.91	199.96	29.00	223.77	32.45
202.3	45.5	17.96	.707	5.36	.211	50.64	46.12	211.55	30.68	240.49	34.88
204.2	45.9	21.20	.835	8.51	.335	55.49	51.53	212.94	30.88	248.02	35.97

TABLE C4-4

SPECIMEN NUMBER: U125-4L4
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.5 K
SPECIMEN THICKNESS: 3.22 MM (.127 IN)
K(MAX) DURING PRECRACKING: 19.01 MPA SQRT(M) (17.30 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	4.93	.194	[illegible]	[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00
262.99	59.13	14.73	.580	9.80	.386	59.17	53.84	273.44	39.65	303.39	44.00
267.88	61.24	15.50	.615	10.58	.416	61.87	56.31	278.52	40.39	310.83	45.08
270.85	61.9[illegible]	18.27	.719	13.35	.525	68.02	61.92	281.30	40.79	323.57	46.49

TABLE C4-5

SPECIMEN NUMBER: U125-6L4
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.[illegible] K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
K(MAX) DURING PRECRACKING: 39.[illegible]E MPA SQRT(M) (35.82 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	[illegible]	1.587	0.00	[illegible]	0.00	[illegible]	0.00	0.00	0.00	0.00
111.20	25.[illegible]	[illegible]	1.650	1.85	.173	43.95	40.00	114.77	16.64	160.05	23.21
134.68	30.[illegible]	[illegible]	1.735	[illegible]	.118	54.15	49.28	139.10	20.17	196.08	28.43
155.72	35.[illegible]	47.05	1.852	6.74	.265	65.86	59.93	160.68	23.30	234.80	34.05
150.22	35.[illegible]	48.13	1.895	7.82	.308	63.35	52.20	164.35	23.83	242.75	35.20
154.7	35.[illegible]	54.92	2.162	14.61	.575	74.81	68.08	164.81	23.90	260.99	37.85

TABLE C4-6

SPECIMEN NUMBER: U125-6L3
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 3.22 MM (.127 IN)
K(MAX) DURING PRECRACKING: 22.48 MPA SQRT(M) (20.45 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	20.28	.798	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
134.3	30.2	23.60	.929	3.32	.131	38.70	35.22	139.96	20.30	166.27	24.11
156.6	35.2	24.82	.977	4.54	.179	46.34	42.17	163.13	23.66	195.78	28.39
187.3	42.1	26.79	1.055	6.51	.256	57.74	52.55	195.11	28.29	237.82	34.49
193.5	43.5	28.78	1.133	8.51	.334	62.04	56.46	201.59	29.23	249.79	36.22
194.8	43.8	29.61	1.166	9.33	.367	63.45	57.75	202.99	29.44	253.27	36.73

TABLE C4-7

SPECIMEN NUMBER: U125-1L16
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 3.23 MM (.127 IN)
K(MAX) DURING PRECRACKING: 20.05 MPA SQRT(M) (18.25 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	6.64	.261	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
291.8	65.6	11.23	.442	4.59	.181	57.14	52.00	302.24	43.98	327.92	47.55
309.2	69.5	15.94	.628	9.30	.366	72.43	65.89	321.27	46.59	359.71	52.16
313.3	70.4	18.86	.743	12.22	.481	79.43	72.28	323.12	46.86	369.89	53.64
313.2	70.4	21.44	.844	14.80	.583	85.55	77.85	325.43	47.19	380.07	55.12

TABLE C4-8

SPECIMEN NUMBER: U125-4L1
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.23 MM (.127 IN)
K(MAX) DURING PRECRACKING: 33.29 MPA SQRT(M) (30.30 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	49.64	1.954	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
170.4	38.3	52.84	2.080	3.19	.126	78.16	71.13	176.80	25.64	273.78	39.70
189.0	42.5	55.40	2.181	5.76	.227	89.58	81.52	196.19	28.45	312.13	45.26
193.9	43.6	57.29	2.256	7.65	.301	94.69	85.62	201.26	29.19	326.80	47.39
197.1	44.3	59.25	2.333	9.61	.378	97.93	89.12	204.49	29.66	339.29	49.20
198.4	44.6	61.48	2.421	11.84	.466	101.30	92.19	205.88	29.85	350.27	50.80

TABLE C4-9

SPECIMEN NUMBER: U125-3L1
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.20 MM (.125 IN)
K(MAX) DURING PRECRACKING: 42.59 MPA SQRT(M) (38.76 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	32.00	1.260	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
181.9	40.9	33.94	1.336	1.93	.076	64.14	58.37	190.16	27.58	246.24	35.71
235.8	53.0	36.69	1.444	4.68	.184	87.13	79.29	247.22	35.82	327.71	47.52
247.3	55.6	39.10	1.539	7.09	.279	94.87	86.33	259.14	37.58	351.32	50.95
258.0	58.0	42.81	1.686	10.81	.426			270.32	39.20	379.31	55.01

TABLE C4-10

SPECIMEN NUMBER: U125-4T6
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 394.) K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
K(MAX) DURING PRECRACKING: 25.93 MPA SQRT(M) (23.59 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	41.14	1.619	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
98.08	22.2	42.19	1.660	1.04	.041	38.95	35.45	101.73	14.75	141.69	20.55
100.12	22.5	43.85	1.726	2.71	.107	41.42	36.79	103.10	14.95	145.87	21.15
103.2	23.2	46.14	1.817	5.01	.197	43.02	39.15	106.31	15.42	153.75	22.30
106.3	23.9	51.22	2.017	10.09	.397	47.40	43.14	109.52	15.88	166.58	24.16

TABLE C4-11

SPECIMEN NUMBER: U125-6T2
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.[illegible] K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
K(MAX) DURING PRECRACKING: 32.83 MPA SQRT(M) (29.88 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	49.01	1.929	0.00	0.000	0.00	0.00	[illegible]	0.00	0.00	0.00
10[illegible]	22.[illegible]	49.36	1.943	.34	.014	43.85	39.91	103.74	15.04	155.10	22.49
137.[illegible]	31.[illegible]	50.85	2.002	1.84	.072	61.33	55.81	142.30	20.64	215.98	31.32
152.[illegible]	34.[illegible]	53.[illegible]	2.[illegible]98	4.29	.169	74.52	67.81	167.55	24.30	260.82	37.82
177.[illegible]	40.[illegible]	55.82	2.198	6.81	.268	84.29	76.71	183.62	26.63	293.55	42.57
193.[illegible]	41.2	58.81	2.31[illegible]	9.83	.385	98.09	81.99	189.13	27.43	312.40	45.30

TABLE C4-12

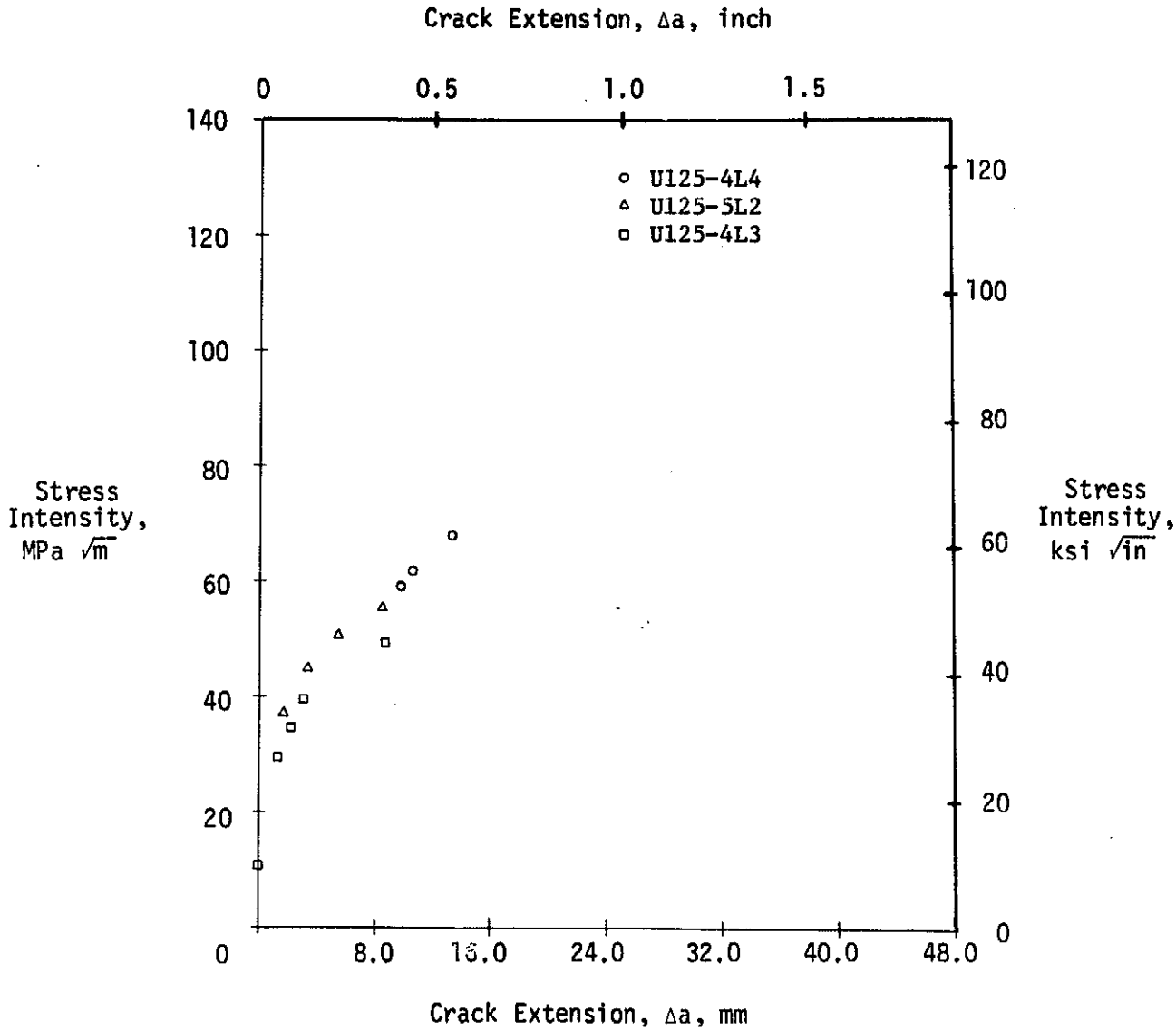
SPECIMEN NUMBER: U125-3T11
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.23 MM (.127 IN)
K(MAX) DURING PRECRACKING: 29.97 MPA SQRT(M) (27.24 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	24.68	1.365	0.00	0.000	0.00	0.00	0.00	0.0	0.00	0.00
[illegible]	[illegible]	25.56	1.400	.88	.034	48.26	43.92	139.31	20.20	182.98	26.53
[illegible]	[illegible]	25.77	1.449	2.09	.082	62.[illegible]	56.45	175.75	25.49	233.12	33.81
[illegible]	[illegible]	27.45	1.490	3.15	.124	72.[illegible]	64.22	196.51	28.50	263.34	38.19
[illegible]	[illegible]	41.31	1.626	7.23	.285	84.[illegible]	75.62	214.65	31.71	305.11	44.25
[illegible]	[illegible]	45.79	1.803	11.14	.439	85.41	77.73	212.19	30.77	306.00	44.38
[illegible]	[illegible]	48.66	1.955	14.37	.589	76.53	69.64	181.36	26.15	270.46	39.21
[illegible]	[illegible]	50.55	2.010	16.37	.643	92.08	83.82	215.12	30.91	324.06	46.99
[illegible]	[illegible]	52.83	2.080	18.19	.715	96.86	88.15	219.11	31.78	339.32	49.21

TABLE C4-13

SPECIMEN NUMBER: U125-6T4
ALLOY: 2124-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
K(MAX) DURING PRECRACKING: 17.62 MPA SQRT(M) (16.03 KSI SQRT(IN))

LOAD KN	LOAD KIPS	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.00	0.00
17.[illegible]	[illegible]	25.58	1.[illegible]46	[illegible]	[illegible]	66.40	60.[illegible]	224.[illegible]	32.[illegible]	273.67	39.69
19[illegible]	[illegible]	26.45	1.[illegible]57	.27	.011	71.45	64.42	230.34	33.40	284.[illegible]	41.29
23[illegible]	[illegible]	26.45	1.[illegible]20	1.88	.174	77.23	70.24	243.21	35.27	305.69	44.33
235.3	52.9	31.45	1.199	4.84	.153						

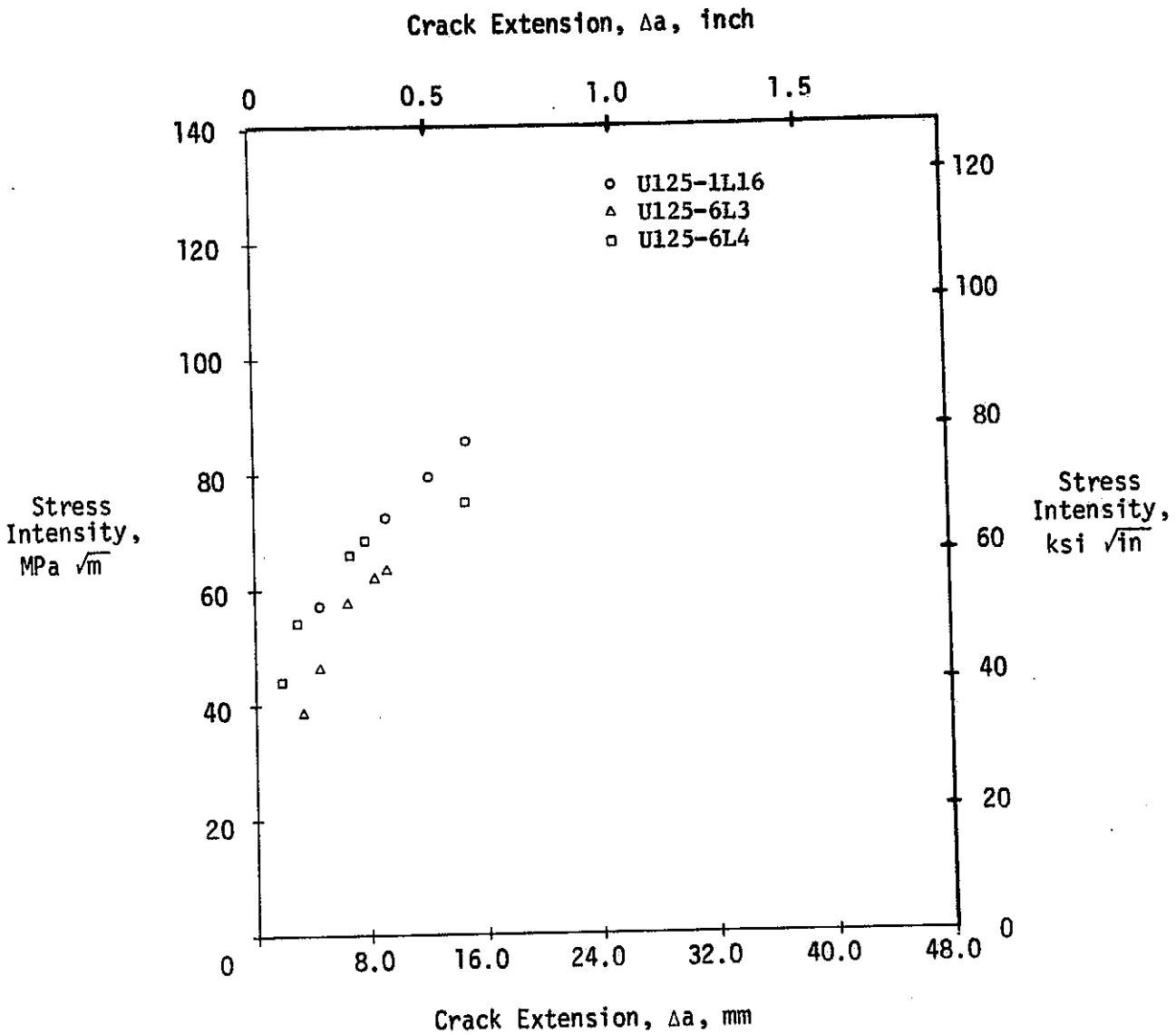


Thickness: 3.18 mm (.125 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861



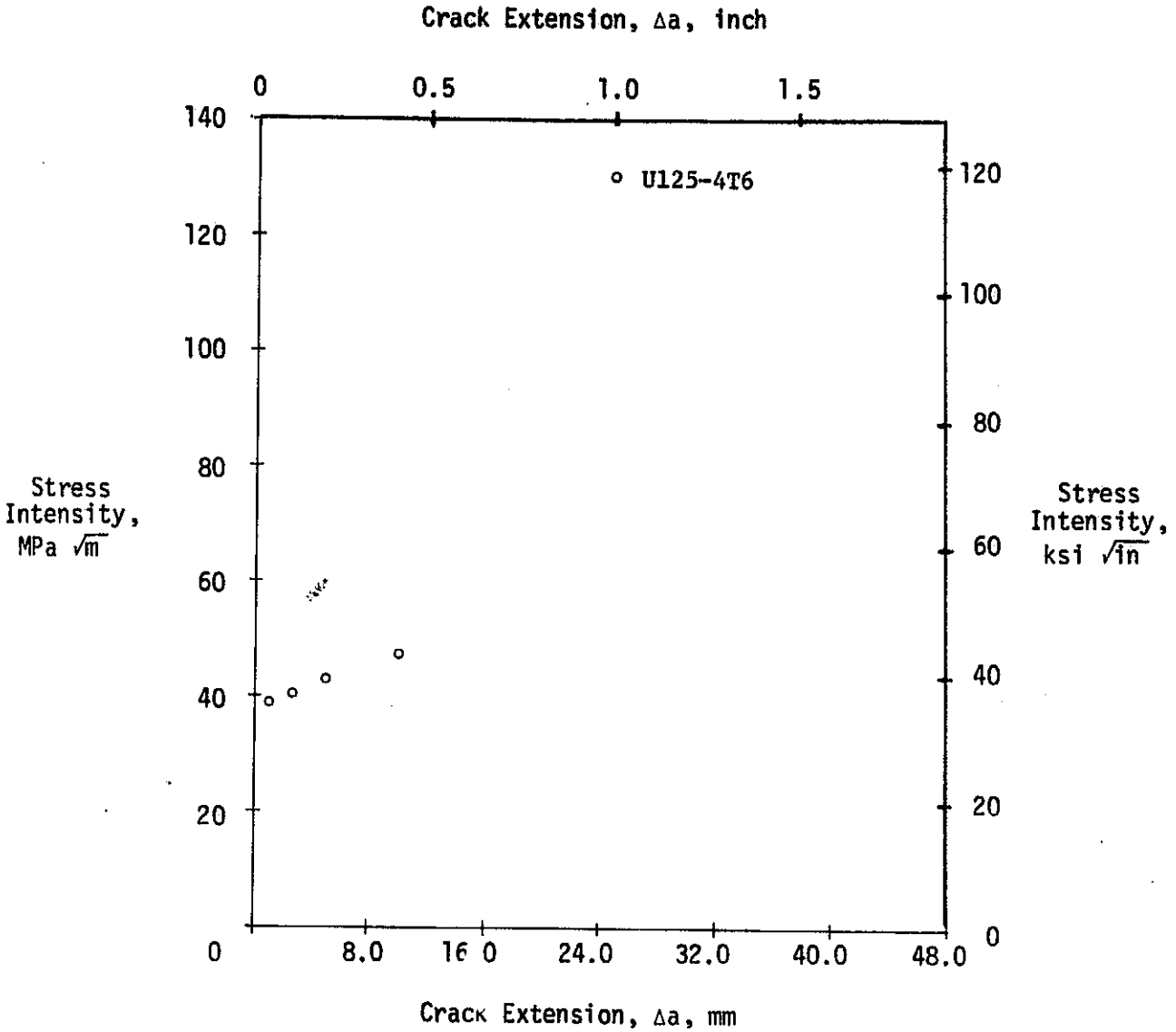
Thickness: 3.18 mm (.125 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C4-2



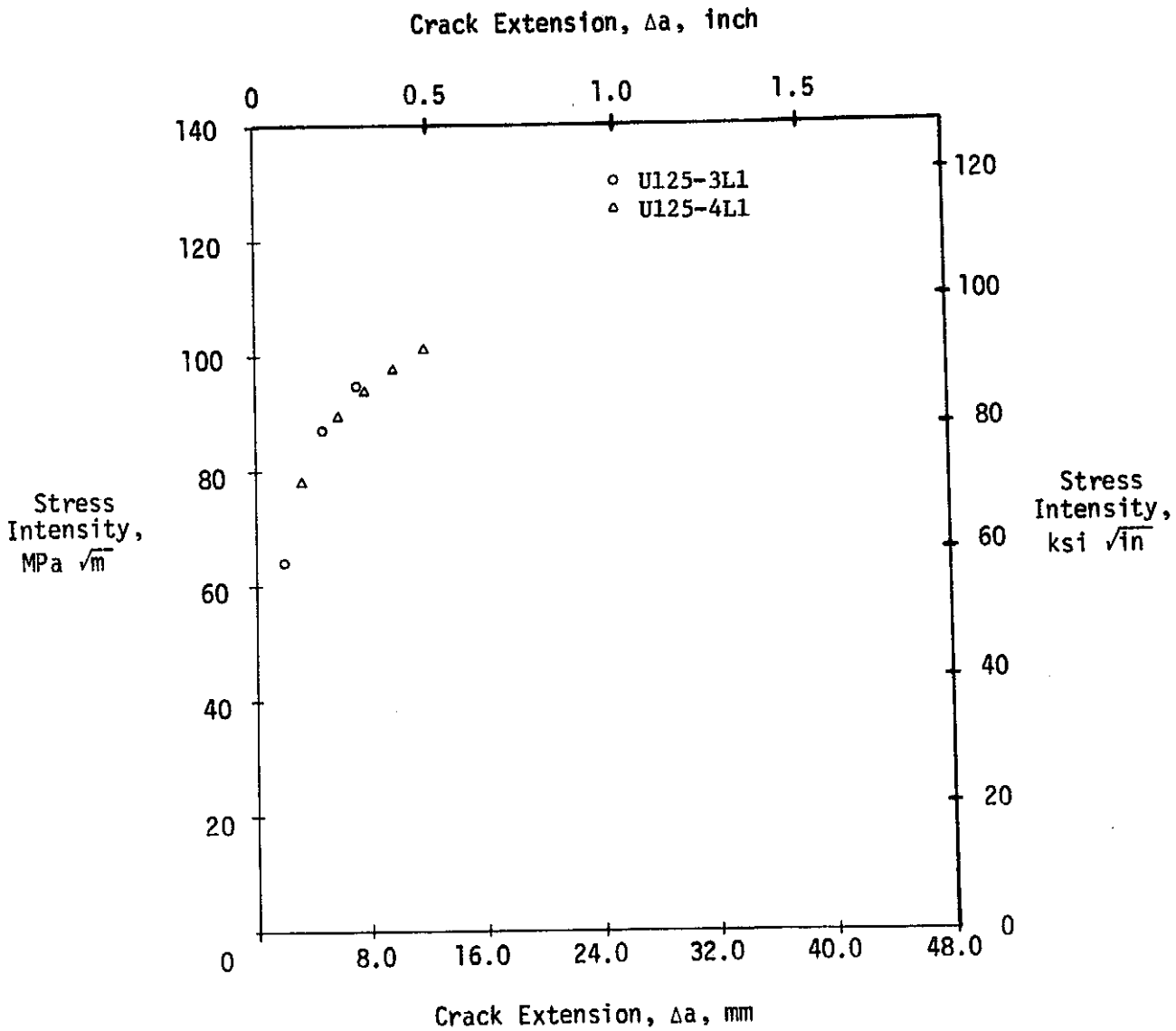
Thickness: 3.18 mm (.125 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C4-3



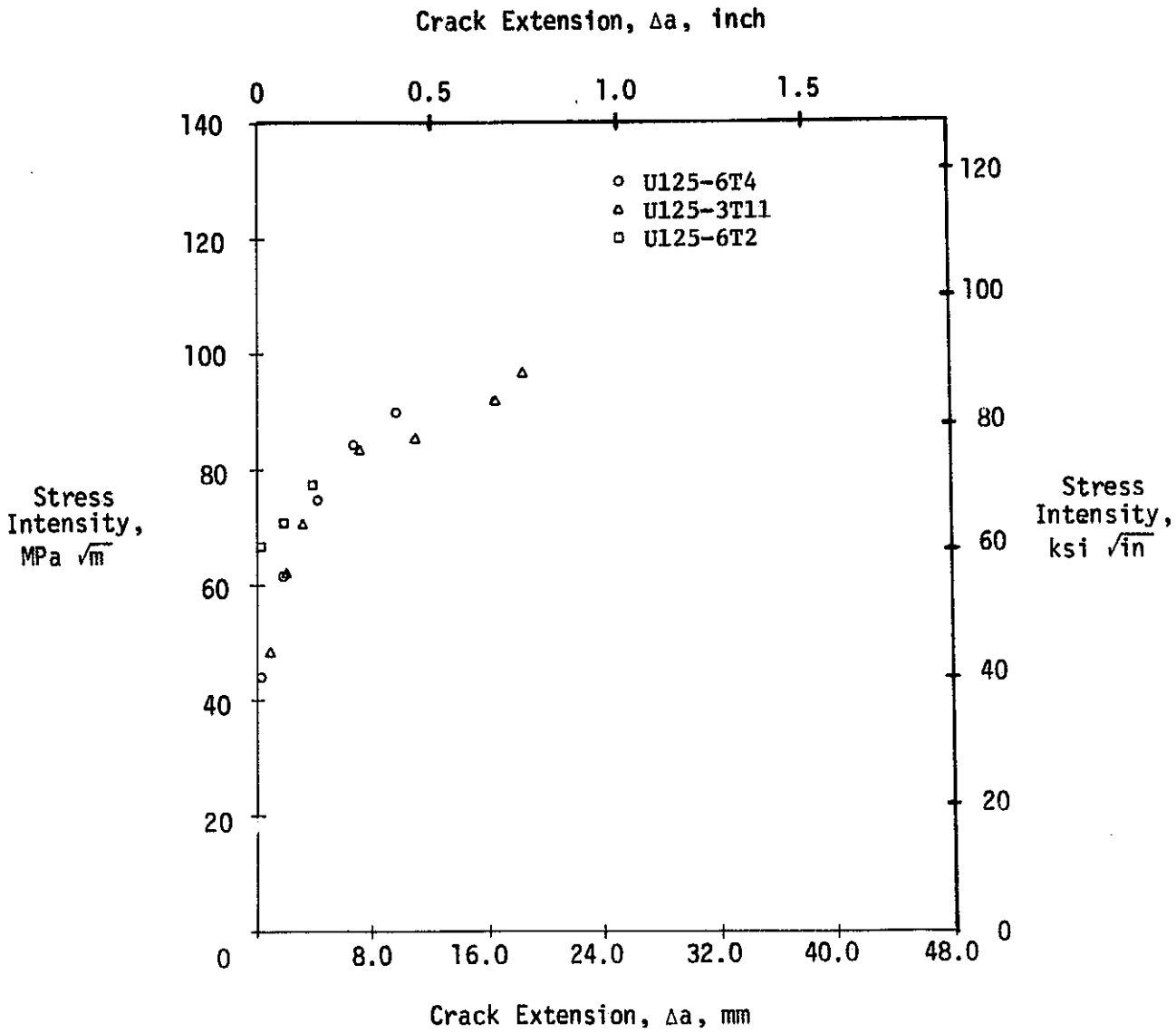
Thickness: 3.18 mm (.125 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C4-4



Thickness: 3.18 mm (.125 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C4-5

SECTION C5. FRACTURE TOUGHNESS TEST DATA FOR 6.35 mm (.250 INCH) THICK 2024-T861

PRECEDING PAGE BLANK NOT FILMED

TABLE C5-1.

Fracture Toughness Test Data for 2024-T861 Specimens

(6.35 mm (.250 inch) thick)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load Kn	Precrack Load kip	Failure Load Kn	Failure Load kip	Full Section Failure Stress MPa	Full Section Failure Stress ksi	Critical Stress Intensity, K_c MPa$\sqrt{m}$	Critical Stress Intensity, K_c ksi$\sqrt{in}$	Data Table No.	Figure No.
250-2L4	144	L	6.47	.2548	29.797	11.731	88.32	3.48	62.3	14.0	154.8	34.8	80.3	11.6	35.1	32.0	C5-2	C5-1
250-2L3	144	L	6.36	.2503	29.815	11.738	25.07	.99	222.4	50.0	295.4	66.4	155.8	22.6	38.9	35.4	C5-3	C5-1
250-1L2	144	L	6.33	.2493	29.802	11.733	10.62	.42	231.3	52.0	392.6	88.2	208.0	30.2	35.4	32.2	C5-4	C5-1
														AVG:	36.5	33.2		
250-3L6	294	L	6.19	.2436	29.807	11.735	82.50	3.25	84.5	19.0	192.4	43.2	104.3	15.1	43.6	39.7	C5-5	C5-3
250-3L4	294	L	6.25	.2460	29.766	11.719	28.93	1.14	177.9	40.0	290.0	65.2	156.0	22.6	42.1	38.4	C5-6	C5-3
250-4L1	294	L	6.40	.2520	29.802	11.733	10.03	.39	244.7	55.0	509.3	114.5	267.0	38.7	45.4	46.3	C5-7	C5-3
														AVG:	43.7	39.8		
250-3L8	450	L	6.18	.2433	29.827	11.743	81.99	3.23	111.2	25.0	347.0	78.0	188.3	27.3	95.9	87.2	C5-8	C5-5
250-3L10	450	L	6.14	.2417	29.812	11.737	50.37	1.98	177.9	40.0	438.1	98.5	239.4	34.7	96.4	87.8	C5-9	C5-5
250-3L12	450	L	6.33	.2493	291794	11.730	30.84	1.21	146.8	33.0	487.1	109.5	258.2	37.4	89.0	81.0	C5-10	C5-5
														AVG:	93.8	85.3		
250-1T4	144	T	6.36	.2502	29.802	11.733	88.62	3.49	57.8	13.0	129.0	29.0	68.1	9.9	30.7	28.0	C5-11	C5-2
250-3T1	144	T	6.14	.2417	29.802	11.733	25.93	1.02	186.8	42.0	214.8	48.3	117.4	17.0	28.3	25.7	C5-12	C5-2
250-1T2	144	T	6.37	.2507	29.822	11.741	10.74	.42	195.7	44.0	357.0	80.2	188.0	27.3	32.1	29.3	C5-13	C5-2
														AVG:	30.4	27.7		
250-2T8	294	T	6.39	.2515	29.820	11.740	81.94	3.23	71.2	16.0	154.4	34.7	81.0	11.8	32.5	29.6	C5-14	C5-4
250-2T7	294	T	6.38	.2510	29.830	11.744	30.38	1.20	177.9	40.0	248.2	55.8	130.5	18.9	32.9	29.9	C5-15	C5-4
250-1T6	294	T	6.33	.2494	29.782	11.725	9.68	.38	209.1	47.0	399.2	89.7	211.6	30.7	35.7	32.5	C5-16	C5-4
														AVG:	33.7	30.7		
250-2T3	450	T	6.40	.2518	29.787	11.727	83.13	3.27	111.2	25.0	290.2	65.2	152.4	22.1	68.3	61.4	C5-17	C5-6
250-2T12	450	T	6.36	.2505	29.789	11.728	37.80	1.49	177.9	40.0	371.4	83.5	196.0	28.4	75.7	68.9	C5-18	C5-6
250-4T5	450	T	6.28	.2473	29.840	11.748	17.37	.68	186.8	42.0	518.2	116.5	276.5	40.1	67.9	61.8	C5-19	C5-6
														AVG:	70.6	64.0		

TABLE C5-2

SPECIMEN NUMBER: 250-2L4
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.47 MM (.255 IN)
K(MAX) DURING PRECRACKING: 12.72 MPA SQRT(M) (11.58 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.16	1.734	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
104.8	23.6	147.32	5.81	44.51	1.753	.36	.014	21.53	19.59	54.37	7.89	77.64	11.26
117.2	26.3	166.32	6.55	44.76	1.762	.61	.024	24.14	21.97	60.76	8.81	86.85	12.59
129.0	29.0	185.57	7.31	45.21	1.780	1.05	.041	26.74	24.33	66.89	9.70	96.03	13.93
140.8	31.6	203.24	8.00	46.02	1.812	1.86	.073	29.78	27.10	73.66	10.68	106.56	15.46
149.6	33.6	222.93	8.78	46.46	1.829	2.30	.091	31.51	28.68	77.49	11.24	112.61	16.33
151.9	34.2	237.33	9.34	48.16	1.896	4.00	.158	32.78	29.83	78.79	11.43	116.42	16.88
154.4	34.7	246.14	9.69	48.91	1.926	4.75	.187	33.64	30.62	80.97	11.61	119.27	17.29
155.2	34.9	258.05	10.55	51.99	2.047	7.83	.308	35.20	32.04	80.48	11.67	123.62	17.93

TABLE C5-3

SPECIMEN NUMBER: 250-2L3
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.36 MM (.250 IN)
K(MAX) DURING PRECRACKING: 23.39 MPA SQRT(M) (21.28 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.52	.493	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
145.4	32.7	54.89	2.16	12.98	.511	.44	.017	15.56	14.15	76.71	11.12	84.02	12.18
191.5	43.1	75.62	2.98	13.13	.517	.60	.024	20.62	18.77	101.07	14.66	110.83	16.07
228.4	51.3	89.48	3.48	13.15	.518	.62	.025	24.61	22.40	120.50	17.47	132.17	19.17
254.9	57.3	101.41	3.99	13.44	.529	.91	.036	27.77	25.28	134.56	19.50	147.83	21.44
275.5	61.9	114.23	4.50	14.41	.568	1.88	.074	31.11	28.31	145.38	21.08	160.95	23.34
286.3	64.4	131.13	5.16	15.33	.604	2.80	.110	33.37	30.37	151.09	21.91	168.41	24.42
290.3	65.3	135.71	5.34	15.62	.615	3.09	.122	34.16	31.09	153.16	22.21	171.10	24.81
291.8	65.6	151.63	5.83	17.21	.677	4.66	.184	36.08	32.83	153.95	22.32	174.02	25.24
294.2	66.1	164.12	6.62	18.98	.746	6.42	.253	38.26	34.82	155.25	22.51	177.97	25.79
294.7	66.3	185.62	7.31	20.81	.819	8.27	.326	40.24	36.62	155.52	22.55	180.74	26.21

TABLE C5-4

SPECIMEN NUMBER: 250-1L2
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.33 MM (.249 IN)
K(MAX) DURING PRECRACKING: 15.84 MPA SQRT(M) (14.42 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	5.31	.209	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
137.3	30.9	21.47	.85	5.49	.216	.09	.003	9.48	8.63	72.75	10.55	75.49	10.95
176.7	39.7	28.45	1.12	5.55	.218	.14	.006	12.26	11.16	93.67	13.58	97.22	14.10
199.2	44.8	32.89	1.30	5.65	.223	.35	.014	14.08	12.81	105.55	15.31	109.72	15.91
207.6	46.7	35.17	1.38	5.79	.228	.48	.019	14.85	13.52	111.04	15.96	114.49	16.60
227.6	51.2	39.17	1.54	5.86	.231	.55	.022	16.39	14.91	120.65	17.50	125.59	18.21
246.4	55.4	42.88	1.69	5.91	.233	.60	.024	17.81	16.21	130.61	18.94	135.80	19.72
267.6	60.2	47.87	1.88	6.05	.238	.74	.029	19.57	17.81	141.84	20.57	147.84	21.44
279.1	62.7	51.00	2.01	6.16	.243	.85	.034	20.60	18.75	147.93	21.45	154.31	22.38
314.9	70.8	58.28	2.29	6.19	.244	.88	.035	23.29	21.20	166.89	24.20	174.13	25.26
334.9	75.3	62.84	2.47	6.24	.246	.93	.037	24.88	22.64	177.49	25.74	185.25	26.86
340.9	76.6	65.39	2.57	6.37	.251	1.06	.042	25.59	23.29	180.67	26.20	188.74	27.37
351.6	78.8	67.67	2.66	6.40	.252	1.09	.043	26.36	23.99	185.81	26.95	194.14	28.15
355.4	79.9	70.79	2.79	6.54	.257	1.28	.050	27.13	24.69	188.34	27.31	197.05	28.58
359.3	80.8	80.12	3.15	7.36	.290	2.06	.081	29.00	26.39	194.41	27.61	200.31	29.05
365.3	82.1	83.24	3.28	7.54	.296	2.20	.087	29.78	27.10	193.59	28.07	203.86	29.56
372.4	83.7	88.06	3.47	7.78	.306	2.47	.097	30.90	28.12	197.38	28.62	208.24	30.20
376.5	84.7	92.02	3.62	8.02	.316	2.72	.107	31.74	28.88	199.56	28.94	210.92	30.59
383.1	86.1	99.10	3.90	8.48	.334	3.17	.125	33.18	30.20	202.98	29.44	215.23	31.21
390.1	87.7	104.66	4.10	8.71	.343	3.41	.134	34.28	31.20	206.77	29.98	219.61	31.85
390.6	87.7	107.87	4.25	9.04	.356	3.73	.147	34.90	31.76	206.69	29.97	220.04	31.91
392.9	88.3	112.54	4.43	9.35	.368	4.04	.159	35.76	32.55	208.22	30.19	222.15	32.22
393.3	88.4	116.78	4.60	9.68	.381	4.37	.172	36.45	33.17	208.45	30.23	222.94	32.33
393.2	88.4	117.06	4.61	9.71	.382	4.40	.173	36.49	33.21	208.45	30.23	222.97	32.33

TABLE C5-5

SPECIMEN NUMBER: 25U-3L5
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 6.19 MM (.244 IN)
K(MAX) DURING PRECRACKING: 17.32 MPA SQRT(M) (15.76 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	0.00	41.25	1.624	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
93.2	21.0	133.85	5.27	41.32	1.627	.07	.003	19.12	17.41	53.54	7.33	69.93	11.14
116.7	26.2	166.82	6.57	41.32	1.627	.07	.003	23.95	21.80	63.31	9.18	87.61	12.70
127.2	28.6	183.44	7.21	41.53	1.635	.28	.011	26.17	23.82	68.97	10.00	95.61	13.86
137.4	30.9	194.50	7.66	41.62	1.639	.37	.015	28.31	25.76	74.49	10.80	103.36	14.98
146.8	33.0	212.70	8.41	41.82	1.647	.57	.023	30.34	27.61	79.62	11.55	110.68	16.05
152.6	34.3	222.57	8.76	41.86	1.648	.61	.024	31.56	28.72	82.78	12.00	115.10	16.69
155.8	35.0	227.49	8.97	41.95	1.652	.70	.028	32.26	29.36	84.49	12.25	117.58	17.05
156.3	35.1	229.87	9.05	42.13	1.659	.89	.035	32.45	29.53	84.76	12.29	118.17	17.14
162.3	36.5	241.56	9.47	42.38	1.669	1.13	.045	33.80	30.76	88.00	12.76	122.96	17.83
168.0	37.8	252.51	9.94	42.83	1.686	1.58	.062	35.22	32.05	91.10	13.21	127.84	18.54
175.9	39.6	268.43	10.57	43.31	1.705	2.06	.081	37.14	33.80	95.41	13.84	134.50	19.50
180.7	40.6	276.89	10.90	43.44	1.710	2.19	.086	38.21	34.77	97.97	14.21	138.28	20.05
183.6	41.3	281.86	11.10	43.47	1.712	2.22	.088	38.85	35.36	99.58	14.44	140.59	20.39
183.9	41.3	283.85	11.18	43.67	1.719	2.42	.095	39.02	35.51	99.72	14.46	141.36	20.49
187.4	42.1	291.07	11.46	43.75	1.723	2.53	.099	39.80	36.22	101.61	14.74	143.84	20.86
188.2	42.3	293.31	11.72	44.24	1.754	3.29	.130	40.41	36.78	102.04	14.80	145.53	21.10
189.7	42.6	304.04	12.17	45.46	1.790	4.21	.166	41.28	37.55	102.88	14.92	148.33	21.47
191.7	43.1	312.27	12.29	45.56	1.794	4.31	.170	41.75	38.00	103.96	15.08	149.73	21.71
192.2	43.2	314.76	12.69	46.32	1.824	5.07	.200	42.31	38.51	104.25	15.12	151.26	21.94
192.3	43.2	331.00	13.03	47.58	1.873	6.33	.249	43.06	39.18	104.30	15.13	153.22	22.22
192.2	43.2	342.24	13.47	48.97	1.928	7.62	.300	43.77	39.83	104.21	15.11	155.06	22.49

TABLE C5-6

SPECIMEN NUMBER: 25U-3L4
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.25 MM (.246 IN)
K(MAX) DURING PRECRACKING: 20.51 MPA SQRT(M) (18.67 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	14.47	.569	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
34.1	7.7	15.62	.615	14.63	.576	.16	.006	3.96	3.60	18.36	2.66	20.35	2.95
118.5	26.6	54.31	2.14	14.56	.573	.10	.004	13.71	12.48	63.73	9.24	70.64	10.24
184.8	41.6	85.52	3.37	14.56	.573	.10	.004	21.38	19.46	99.40	14.41	110.18	15.98
204.3	45.9	95.69	3.77	14.58	.574	.22	.009	23.74	21.61	109.88	15.93	121.91	17.68
209.2	47.1	103.44	4.07	15.47	.609	1.00	.040	24.96	23.71	112.48	16.31	125.52	18.20
218.9	49.2	109.54	4.31	15.62	.615	1.15	.045	26.25	23.89	117.71	17.07	131.51	19.07
223.4	50.2	114.93	4.52	16.04	.631	1.57	.062	27.14	24.70	120.06	17.41	134.56	19.51
232.0	52.2	122.07	4.80	16.35	.644	1.88	.074	28.48	25.92	124.76	18.09	140.15	20.32
243.2	54.7	130.55	5.12	16.54	.653	2.11	.083	30.07	27.37	131.78	18.95	147.17	21.34
251.5	56.5	137.58	5.42	16.90	.666	2.44	.096	31.41	28.58	135.22	19.61	152.54	22.12
266.5	59.9	151.76	5.97	17.50	.689	3.04	.120	33.89	30.84	143.31	20.78	162.41	23.56
276.7	62.2	163.57	6.44	18.10	.713	3.63	.143	35.83	32.58	148.78	21.58	169.38	24.56
280.1	63.0	169.97	6.69	18.55	.731	4.08	.161	36.73	33.42	151.59	21.84	172.05	24.95
285.4	64.2	176.71	6.96	18.88	.743	4.41	.174	37.74	34.35	153.46	22.25	175.75	25.49
286.3	64.4	182.10	7.17	19.33	.761	4.87	.192	38.41	34.95	154.22	22.36	177.24	25.70
288.9	64.9	221.75	8.73	23.15	.911	8.68	.342	42.52	38.69	155.33	22.53	183.94	26.67

TABLE C5-7

SPECIMEN NUMBER: 256-4L1
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.40 MM (.252 IN)
K(MAX) DURING PRECRACKING: 16.11 MPA SQRT(M) (14.66 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	5.02	.197	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
62.6	14.1	10.18	.40	5.38	.212	.37	.014	4.27	3.88	32.81	4.76	34.03	4.94
138.6	31.2	24.33	.96	5.77	.227	.75	.030	9.79	8.91	72.69	10.54	75.62	10.97
301.9	67.9	55.17	2.17	5.80	.228	.78	.031	21.38	19.46	158.26	22.95	164.67	23.88
348.5	78.4	65.81	2.63	5.99	.236	.98	.039	25.10	22.84	182.74	26.50	190.40	27.61
385.4	86.6	75.41	2.95	6.00	.236	.99	.039	27.77	25.27	202.05	29.30	210.53	30.53
406.2	91.3	79.98	3.15	6.00	.237	1.00	.040	29.32	26.68	213.00	30.89	221.96	32.19
421.0	94.6	85.78	3.37	6.18	.243	1.17	.046	30.79	28.02	220.74	32.01	230.30	33.40
430.9	96.9	90.69	3.57	6.36	.251	1.35	.053	31.97	29.10	225.91	32.76	235.99	34.22
435.8	98.0	94.67	3.73	6.55	.258	1.53	.060	32.82	29.86	228.51	33.14	239.02	34.66
447.0	100.5	100.89	3.97	6.77	.267	1.75	.069	34.21	31.14	234.34	33.98	245.49	35.60
445.9	100.2	108.62	4.28	7.31	.288	2.29	.090	35.47	32.28	233.76	33.90	245.82	35.65
460.6	103.6	115.34	4.54	7.46	.294	2.44	.096	37.61	33.68	241.52	35.02	254.24	36.87
461.9	103.8	117.58	4.63	7.57	.298	2.56	.101	37.41	34.04	242.18	35.12	255.14	37.00
470.6	105.8	123.31	4.85	7.75	.306	2.74	.108	38.58	35.11	246.72	35.78	260.27	37.74
484.2	108.9	134.76	5.31	8.18	.322	3.16	.124	40.76	37.09	253.87	36.82	268.61	38.95
492.3	110.7	139.99	5.51	8.30	.327	3.29	.129	41.81	38.05	258.40	37.47	273.65	39.68
506.5	113.9	151.20	5.95	8.65	.341	3.64	.143	43.87	39.93	265.56	38.51	281.93	40.88
506.5	113.9	154.69	6.09	8.85	.349	3.84	.151	44.38	40.39	265.59	38.51	282.36	40.95

TABLE C5-8

SPECIMEN NUMBER: 253-3L8
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.18 MM (.243 IN)
K(MAX) DURING PRECRACKING: 22.72 MPA SQRT(M) (20.68 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	41.00	1.614	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
145.9	32.8	217.39	8.56	41.36	1.628	.36	.014	29.96	27.26	79.14	11.48	109.51	15.88
184.3	41.4	282.54	11.12	41.97	1.653	.98	.039	38.19	34.75	100.00	14.50	139.16	20.18
213.8	47.9	343.39	13.52	43.10	1.697	2.11	.083	44.84	40.81	115.55	16.76	162.51	23.57
244.7	55.0	408.06	16.07	43.72	1.721	2.73	.107	51.98	47.30	132.76	19.25	187.83	27.24
274.0	61.6	464.10	18.43	44.55	1.754	3.55	.140	58.87	53.58	148.65	21.56	211.96	30.74
298.9	67.2	543.27	21.27	46.12	1.816	5.12	.202	65.64	59.74	162.21	23.52	234.82	34.05
316.8	71.2	605.15	23.82	47.91	1.886	6.91	.272	71.08	64.69	171.46	24.86	252.59	36.63
327.6	73.6	651.82	25.66	49.02	1.930	8.03	.316	74.79	68.06	177.74	25.77	264.77	38.40
339.1	76.2	729.19	28.55	51.56	2.030	10.57	.416	80.03	72.83	184.00	26.68	281.24	40.78
346.4	77.9	787.54	31.01	53.77	2.117	12.78	.503	84.08	76.52	187.95	27.26	293.94	42.63
350.0	78.7	835.48	32.89	55.61	2.190	14.62	.576	86.95	79.13	189.92	27.54	302.86	43.92
350.0	78.7	888.17	34.97	58.09	2.287	17.09	.673	89.65	81.58	189.90	27.54	311.05	45.11
351.8	79.1	955.24	37.61	60.81	2.394	19.81	.780	93.15	84.77	190.86	27.68	322.25	46.73

SPECIMEN NUMBER: 250-3L10
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.14 MM (.242 IN)
K(MAX) DURING PRECRACKING: 27.84 MPA SQRT(M) (25.33 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	25.18	.991	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
52.8	11.9	46.16	1.82	25.99	1.023	.80	.031	8.39	7.64	28.84	4.18	34.92	5.06
136.2	30.6	122.21	4.81	26.28	1.035	1.09	.043	21.80	19.84	74.44	10.79	90.37	13.11
209.9	47.2	201.04	7.91	27.37	1.078	2.19	.086	34.34	31.25	114.68	16.63	140.48	20.37
262.6	59.0	266.31	10.48	28.25	1.113	3.08	.121	43.74	39.80	143.53	20.81	177.11	25.68
322.8	72.6	353.40	13.91	29.42	1.158	4.23	.167	54.94	50.00	176.40	25.58	219.78	31.87
356.0	80.0	405.12	15.95	29.87	1.176	4.68	.184	61.09	55.60	194.52	28.21	243.26	35.28
385.5	86.7	473.71	18.85	31.66	1.246	6.47	.255	68.33	62.19	210.64	30.55	267.45	38.78
411.3	92.5	568.68	22.39	34.15	1.344	8.96	.353	76.08	69.24	224.76	32.59	291.55	42.28
426.1	95.8	639.91	25.18	36.24	1.427	11.06	.435	81.55	74.21	232.84	33.77	307.64	44.61
440.9	99.1	718.72	28.30	38.41	1.512	13.23	.521	87.28	79.43	241.00	34.94	324.56	47.07
441.0	99.1	877.16	34.53	45.28	1.783	20.10	.791	96.43	87.76	241.31	34.99	346.17	50.20

TABLE C5-10

SPECIMEN NUMBER: 250-3L12
ALLOY: 2024-T861
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.33 MM (.249 IN)
K(MAX) DURING PRECRACKING: 17.24 MPA SQRT(M) (15.69 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	15.42	.607	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
29.9	6.7	19.22	.63	16.88	.665	1.46	.058	3.68	3.35	15.87	2.30	17.90	2.597
86.6	19.5	43.69	1.95	17.79	.700	2.37	.093	9.98	6.67	45.97	6.67	52.20	7.570
224.6	50.5	137.35	5.41	18.38	.724	2.96	.117	28.88	26.28	119.08	17.27	135.84	19.702
231.3	52.0	147.17	5.79	19.05	.750	3.63	.143	30.31	27.57	122.61	17.78	140.59	20.392
272.1	61.2	190.98	7.52	19.75	.778	4.34	.171	35.32	33.06	144.24	20.92	166.30	24.122
294.6	66.2	203.22	8.00	20.04	.789	4.62	.182	39.62	36.06	156.19	22.65	180.46	26.172
318.3	71.6	230.25	9.07	20.71	.816	5.30	.209	43.56	39.64	168.75	24.47	196.00	28.427
351.1	78.9	266.51	10.45	21.18	.834	5.77	.227	48.62	44.25	186.15	27.00	217.31	31.527
375.3	84.4	289.30	11.39	21.24	.836	5.82	.229	52.07	47.38	199.05	28.87	232.16	33.677
388.5	87.3	302.83	11.92	21.30	.839	5.88	.232	53.91	49.06	205.82	29.85	240.15	34.837
412.5	92.7	339.36	13.36	21.75	.856	6.33	.249	57.91	52.71	218.68	31.71	256.06	37.157
426.4	95.8	363.93	14.29	22.45	.884	7.04	.277	60.89	55.41	226.03	32.78	266.16	38.617
437.8	98.4	388.64	15.30	23.13	.911	7.72	.304	63.51	57.80	232.09	33.66	274.76	39.867
446.8	100.4	411.49	16.20	23.79	.936	8.36	.329	65.76	59.85	236.87	34.35	281.85	40.897
451.6	101.5	425.98	16.77	24.19	.952	8.77	.345	67.08	61.04	239.40	34.72	285.81	41.467
456.2	102.5	447.55	17.61	24.92	.981	9.50	.374	68.96	62.76	242.23	35.13	290.89	42.207
462.2	103.9	466.91	18.38	25.52	1.005	10.11	.398	71.67	64.31	245.07	35.54	295.73	42.907
466.4	104.9	484.14	19.06	26.07	1.026	10.65	.419	72.12	65.63	247.26	35.86	299.71	43.487
473.5	106.5	511.96	20.16	26.98	1.062	11.56	.455	74.59	67.88	251.02	36.40	306.15	44.417
475.8	107.0	529.23	20.84	27.53	1.084	12.11	.477	75.77	68.96	252.26	36.58	309.04	44.837
477.8	107.4	536.56	21.12	27.79	1.094	12.37	.487	76.34	69.48	252.87	36.67	310.45	45.047
479.5	107.8	561.42	22.10	28.75	1.132	13.33	.525	78.18	71.15	254.85	36.96	314.97	45.697
482.4	108.4	591.31	23.28	29.88	1.177	14.47	.570	80.35	73.13	255.75	37.09	319.93	46.417
485.4	109.1	621.29	24.46	31.21	1.228	15.73	.621	82.79	75.34	257.31	37.31	325.47	47.217
488.4	109.8	648.37	25.51	31.90	1.255	16.48	.649	84.34	76.76	258.90	37.54	329.44	47.797
488.9	109.9	672.48	26.46	32.92	1.296	17.50	.689	86.94	78.21	259.18	37.58	332.69	48.257
490.0	110.2	698.53	27.53	33.97	1.337	18.55	.730	87.68	79.79	259.78	37.67	336.52	48.806
490.0	110.2	719.46	28.33	34.81	1.371	19.42	.764	89.93	80.93	259.74	37.67	339.02	49.166

TABLE C5-11

SPECIMEN NUMBER: 250-1T4
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 6.35 MM (.250 IN)
K(MAX) DURING PRECRACKING: 12.06 MPA SQRT(M) (10.97 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.31	1.744	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
86.5	19.5	123.58	4.87	44.39	1.748	.08	.003	16.56	16.44	45.69	6.63	65.09	9.44
98.8	22.2	142.67	5.62	44.77	1.763	.46	.018	21.73	19.86	52.16	7.56	74.57	10.81
111.0	25.0	162.39	6.39	45.19	1.779	.88	.035	23.43	21.32	58.63	8.50	84.15	12.20
120.1	27.0	178.27	7.02	45.70	1.799	1.39	.055	25.52	23.23	63.42	9.20	91.47	13.27
122.8	27.6	187.76	7.39	46.78	1.842	2.47	.097	26.48	24.10	64.84	9.40	94.51	13.71
126.2	28.4	197.89	7.79	47.70	1.878	3.39	.134	27.56	25.08	66.64	9.66	98.02	14.21
128.1	28.8	204.22	8.04	48.33	1.902	3.99	.157	28.21	25.67	67.67	9.81	100.13	14.52
128.1	28.8	216.17	8.51	50.48	1.987	6.16	.243	29.02	26.41	67.66	9.41	102.31	14.84
129.3	29.1	231.93	9.13	52.84	2.080	8.53	.336	30.19	27.48	68.28	9.90	105.50	15.34

TABLE C5-12

SPECIMEN NUMBER: 250-3T1
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 6.14 MM (.242 IN)
K(MAX) DURING PRECRACKING: 20.71 MPA SQRT(M) (18.84 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.97	.511	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
155.5	34.9	51.95	2.05	12.99	.511	.003	.000	17.24	15.69	84.98	12.32	93.08	13.50
176.5	39.7	69.82	2.75	13.05	.514	.008	.003	19.63	17.86	96.50	13.99	105.76	15.34
197.1	44.3	81.27	3.20	13.55	.534	.59	.023	22.34	20.33	107.74	15.62	118.52	17.19
203.4	45.7	87.89	3.46	14.17	.558	1.21	.048	23.59	21.47	111.19	16.12	122.88	17.82
210.2	47.2	93.22	3.67	14.32	.572	1.36	.061	24.69	22.47	114.93	16.67	127.34	18.47
213.6	48.0	101.72	4.00	15.56	.613	2.59	.102	25.98	23.65	116.76	16.93	130.37	18.91
215.5	48.4	108.90	4.29	16.48	.649	3.51	.138	27.00	24.57	117.79	17.15	132.43	19.21
215.4	48.4	114.03	4.67	17.91	.705	4.94	.195	28.17	25.64	117.73	17.07	133.81	19.40
215.7	48.5	134.96	5.31	20.23	.796	7.26	.286	30.06	27.35	117.89	17.10	136.41	19.78

TABLE C5-13

SPECIMEN NUMBER: 25J-1T2
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 6.37 MM (.251 IN)
K(MAX) DURING PRECRACKING: 13.43 MPA SQRT(M) (12.19 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.	[illegible]	0.00	5.37	.211	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
117.8	26.5	[illegible]	.00	6.07	.239	.70	.028	8.52	7.76	61.64	8.94	64.26	9.32
264.1	59.4	45.81	1.96	6.41	.253	1.04	.041	19.76	17.99	139.09	20.17	145.34	21.08
287.4	64.6	54.70	2.15	6.44	.254	1.07	.042	21.55	19.62	151.35	21.95	158.18	22.94
315.5	70.9	61.81	2.43	6.55	.258	1.19	.047	23.88	21.74	166.19	24.10	173.84	25.21
324.1	72.9	66.84	2.63	6.91	.272	1.54	.061	25.19	22.92	170.69	24.75	178.99	25.96
329.6	74.1	72.47	2.85	7.37	.290	2.00	.079	26.43	24.05	173.25	25.12	182.26	26.44
335.7	75.5	77.72	3.06	7.73	.304	2.36	.093	27.58	25.11	176.78	25.64	186.45	27.04
338.1	76.0	82.51	3.25	8.14	.321	2.77	.109	28.52	25.96	178.05	25.82	188.34	27.31
344.8	77.5	86.54	3.41	8.39	.330	3.02	.119	29.47	26.82	181.59	26.33	192.37	27.90
352.1	79.2	95.68	3.76	8.99	.354	3.62	.143	31.24	28.43	185.43	26.89	197.33	28.62
355.1	79.8	100.59	3.96	9.39	.371	4.02	.158	32.20	29.30	187.32	27.12	199.60	28.94
356.3	80.1	105.01	4.13	9.76	.384	4.39	.173	32.95	29.98	187.65	27.21	200.83	29.12

TABLE C5-14

SPECIMEN NUMBER: 25J-2T8
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.39 MM (.252 IN)
K(MAX) DURING PRECRACKING: 14.08 MPA SQRT(M) (12.80 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.	[illegible]	0.00	40.97	1.613	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
87.6	19.7	119.42	4.72	40.99	1.614	.01	.000	17.36	15.80	46.11	6.69	63.59	9.22
104.7	23.5	143.66	5.66	41.12	1.619	.15	.006	20.71	18.84	54.99	7.96	75.80	10.99
114.7	25.8	159.65	6.29	41.56	1.636	.59	.023	22.86	20.80	60.20	8.73	83.47	12.10
126.2	28.4	174.01	7.02	41.96	1.652	.99	.039	25.31	23.03	66.28	9.61	92.23	13.38
135.1	30.4	191.90	7.52	42.03	1.655	1.06	.042	27.11	24.67	70.93	10.29	98.77	14.32
135.6	30.5	193.14	7.62	42.26	1.664	1.29	.051	27.30	24.84	71.19	10.32	99.35	14.41
141.7	31.9	193.14	7.62	42.39	1.669	1.53	.060	28.64	26.06	74.42	10.79	104.39	15.14
142.2	32.0	[illegible]	[illegible]	42.53	1.673	1.67	.066	28.88	26.28	74.68	10.83	104.83	15.20
145.0	32.6	[illegible]	[illegible]	42.85	1.687	1.88	.074	29.47	26.82	76.10	11.04	106.89	15.50
150.4	33.8	[illegible]	[illegible]	43.82	1.725	2.85	.112	30.96	28.17	78.96	11.45	111.82	16.22
150.4	33.8	[illegible]	[illegible]	44.54	1.753	3.57	.141	31.27	28.46	78.96	11.45	112.62	16.33
154.1	34.6	[illegible]	[illegible]	44.84	1.767	3.92	.154	32.24	29.30	80.91	11.73	115.76	16.78
154.1	34.6	[illegible]	[illegible]	45.53	1.793	4.56	.180	32.49	29.57	80.91	11.73	116.49	16.89

TABLE C5-15

SPECIMEN NUMBER: 250-2T7
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.38 MM (.251 IN)
K(MAX) DURING PRECRACKING: 20.57 MPA SQRT(M) (18.72 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	[illegible]	15.13	.598	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
186.0	41.8	[illegible]	[illegible]	15.23	.600	.04	.002	21.54	19.60	97.83	14.19	108.96	15.80
199.4	44.8	94.73	3.73	15.24	.600	.05	.002	23.09	21.01	104.86	15.21	116.79	16.94
203.9	45.8	101.07	3.98	15.87	.625	.68	.027	24.11	21.94	107.24	15.55	120.00	17.40
220.8	49.6	113.35	4.46	16.36	.644	1.17	.046	26.52	24.14	116.12	16.84	130.43	18.91
224.8	50.5	117.11	4.61	16.57	.652	1.38	.054	27.18	24.73	118.22	17.14	132.99	19.29
234.7	52.8	123.37	4.88	16.77	.660	1.58	.062	28.55	25.99	123.44	17.90	139.08	20.17
241.8	54.3	131.33	5.17	17.21	.677	2.02	.079	29.79	27.11	127.12	18.43	143.69	20.84
245.8	55.3	139.31	5.48	17.51	.689	2.32	.091	30.93	28.15	129.25	18.74	146.89	21.30
248.3	55.8	145.67	5.73	17.90	.705	2.72	.107	31.78	28.92	130.99	18.94	149.39	21.62
248.4	55.8	151.70	5.97	18.25	.718	3.31	.130	32.44	29.52	130.65	18.95	149.98	21.75

TABLE C5-16

SPECIMEN NUMBER: 250-1T6
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.33 MM (.249 IN)
K(MAX) DURING PRECRACKING: 13.67 MPA SQRT(M) (12.44 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	[illegible]	4.94	.198	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
51.3	11.5	[illegible]	[illegible]	5.10	.203	.32	.013	3.46	3.15	27.19	3.94	28.16	4.08
87.3	19.6	[illegible]	[illegible]	5.26	.207	.41	.016	5.95	5.41	46.28	6.71	47.97	6.96
118.4	26.7	19.51	.77	5.36	.211	.53	.021	8.15	7.42	62.77	9.10	65.12	9.44
181.2	40.7	33.33	1.32	5.51	.217	.67	.026	12.65	11.51	96.09	13.93	99.78	14.47
255.1	57.3	44.45	1.71	5.41	.213	.57	.022	17.64	16.05	135.23	19.61	140.33	21.35
277.0	62.2	47.98	1.89	5.47	.215	.63	.025	19.26	17.53	146.87	21.30	152.47	22.11
316.7	71.2	55.44	2.18	5.46	.215	.63	.025	22.01	20.03	167.88	24.35	174.28	25.27
326.4	73.4	58.93	2.32	5.61	.221	.77	.031	23.00	20.93	173.03	25.09	179.41	26.08
337.8	75.9	62.72	2.47	5.75	.227	.92	.036	24.07	21.91	178.83	25.93	186.12	27.04
342.8	77.1	65.53	2.58	5.91	.232	1.06	.042	24.92	22.54	181.72	26.35	189.22	27.44
345.1	77.6	68.67	2.70	6.02	.237	1.17	.046	25.63	23.32	182.96	26.53	190.35	27.69
347.5	78.1	72.14	2.84	6.22	.245	1.39	.055	26.34	23.97	184.21	26.71	192.61	27.93
356.5	80.2	74.22	2.92	6.53	.256	1.66	.065	27.50	25.08	189.51	27.41	197.98	28.71
366.1	82.4	76.94	3.03	6.75	.266	1.91	.075	28.62	26.04	194.47	28.20	203.89	29.57
375.3	84.4	81.28	3.20	6.88	.271	2.04	.080	29.91	27.22	198.34	28.85	209.31	30.31
382.4	86.0	85.26	3.36	7.14	.281	2.34	.092	31.84	28.97	202.78	29.41	213.30	30.93
393.9	88.6	89.52	3.52	7.34	.289	2.55	.100	32.05	29.17	207.25	30.05	218.39	31.67
400.6	90.1	94.62	3.72	7.59	.299	2.75	.108	33.46	30.45	212.36	30.80	224.22	32.52
400.6	90.1	104.77	4.12	7.89	.311	3.05	.120	33.49	30.47	212.35	30.79	224.24	32.52

TABLE C5-17

SPECIMEN NUMBER: 250-2T3
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.40 MM (.252 IN)
K(MAX) DURING PRECRACKING: 22.17 MPA SQRT(M) (20.17 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	41.57	1.636	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
74.2	16.7	198.40	7.81	42.25	1.663	.68	.027	14.94	13.59	38.96	5.65	54.38	7.89
138.8	31.2	2634.73	8.06	42.44	1.671	.87	.034	27.85	25.35	72.44	10.50	101.36	14.69
196.8	44.2	3138.21	12.13	43.80	1.724	2.23	.088	40.51	36.85	103.34	14.99	146.38	21.23
246.5	55.4	4506.82	16.62	45.06	1.774	3.49	.137	51.62	46.98	129.40	18.77	185.53	26.91
266.1	59.8	4465.31	17.53	45.25	1.782	3.69	.145	55.89	50.86	139.78	20.26	200.69	29.10
277.1	62.3	4814.32	18.95	46.44	1.828	4.87	.192	59.15	53.83	145.49	21.10	211.41	30.66
286.9	64.5	5173.33	20.37	47.65	1.876	6.08	.240	62.25	56.65	150.64	21.84	221.51	32.12
291.8	65.6	5334.13	21.03	48.12	1.895	6.56	.258	63.71	57.99	153.21	22.22	226.34	32.82
292.4	65.7	5584.33	21.97	49.70	1.957	8.13	.320	65.18	59.32	153.52	22.26	230.40	33.41
294.9	66.3	5944.73	23.39	51.73	2.037	10.17	.400	67.49	61.42	154.80	22.45	237.19	34.40
290.5	65.3	6132.31	24.89	54.85	2.160	13.29	.523	69.19	62.97	152.53	22.12	241.47	35.02

TABLE C5-18

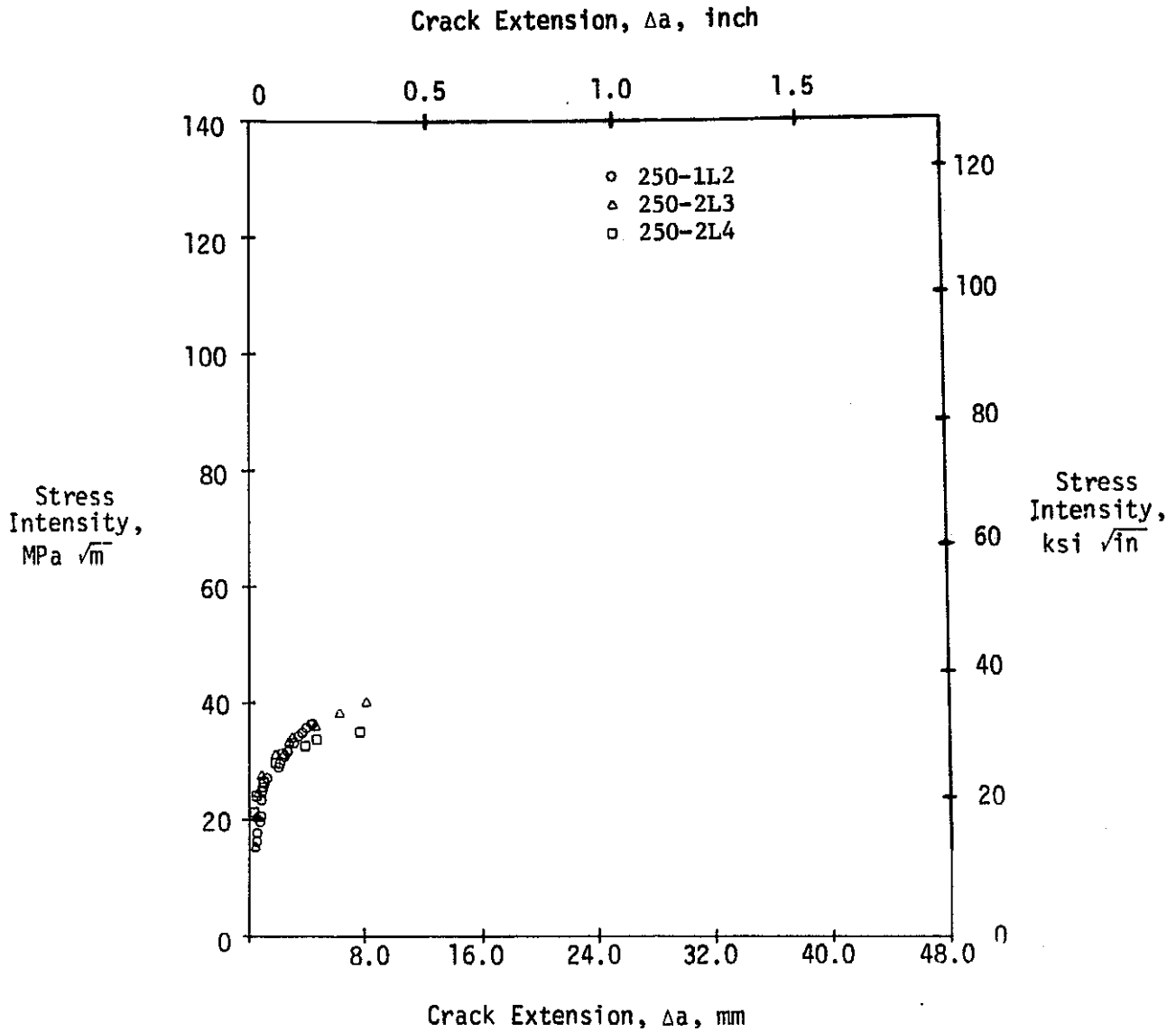
SPECIMEN NUMBER: 250-2T12
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.36 MM (.251 IN)
K(MAX) DURING PRECRACKING: 23.10 MPA SQRT(M) (21.02 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A,HALF CRACK LENGTH MM	A,HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	18.90	.744	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
53.9	12.1	34.44	1.37	20.18	.794	1.28	.050	7.24	6.59	28.45	4.13	32.91	4.77
110.3	24.8	91.78	3.57	25.19	.992	6.30	.248	16.67	15.17	58.20	8.44	70.05	10.16
159.3	35.8	139.73	5.50	26.47	1.042	7.58	.298	24.73	22.50	84.07	12.19	102.25	14.83
198.5	44.6	181.73	7.15	27.26	1.073	8.36	.329	31.30	28.49	104.77	15.19	128.24	18.60
239.0	53.7	221.36	8.71	29.43	1.159	10.53	.415	39.29	35.76	126.22	18.29	157.18	22.79
278.2	62.5	257.31	10.13	30.32	1.212	11.62	.458	46.67	42.47	146.82	21.29	184.66	26.78
307.7	69.2	285.82	11.25	30.73	1.209	11.80	.465	51.77	47.12	162.35	23.54	204.50	29.66
326.1	73.3	374.41	14.74	31.33	1.253	12.94	.509	55.99	50.95	172.36	24.95	218.43	31.73
342.0	76.9	416.53	16.40	33.26	1.310	14.36	.566	60.19	54.78	181.48	26.17	232.37	33.70
364.1	81.9	472.68	18.61	34.75	1.368	15.85	.624	65.69	59.78	192.13	27.86	250.59	36.34
370.3	83.2	511.35	20.13	36.54	1.438	17.64	.694	68.75	62.57	195.38	28.33	258.88	37.54
370.3	83.2	556.57	21.79	38.13	1.539	20.20	.795	71.53	65.10	195.40	28.34	264.94	38.42
372.8	83.8	609.45	24.01	42.19	1.657	23.20	.913	75.27	68.50	196.71	28.53	274.22	39.77

TABLE C5-19

SPECIMEN NUMBER: 250-4T5
ALLOY: 2024-T861
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.28 MM (.247 IN)
K(MAX) DURING PRECRACKING: 16.50 MPA SQRT(M) (15.02 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	8.69	.342	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
13.4	3.0	4.11	.16	9.40	.370	.72	.028	1.24	1.12	7.17	1.04	7.65	1.11
192.4	43.3	65.34	2.57	13.38	.409	1.69	.067	18.59	16.92	102.68	14.89	110.36	16.00
195.5	43.9	67.66	2.66	10.57	.416	1.88	.074	19.66	17.35	104.30	15.13	112.26	16.28
271.8	61.1	104.27	3.95	10.33	.432	2.24	.088	26.96	24.53	145.02	21.03	156.48	22.69
304.1	68.4	117.22	4.62	11.23	.442	2.54	.100	30.58	27.83	162.26	23.53	175.47	25.45
307.7	69.2	123.47	5.06	12.13	.478	3.44	.136	32.17	29.28	164.16	23.81	178.69	25.91
374.1	84.1	169.31	6.67	12.54	.496	3.91	.154	39.87	36.28	199.60	28.94	218.00	31.61
412.4	92.7	197.18	7.76	12.90	.508	4.21	.166	44.50	41.49	220.05	31.91	240.88	34.93
442.2	99.4	223.37	8.79	13.26	.522	4.57	.180	48.38	44.03	235.94	34.22	258.95	37.55
467.7	105.1	245.48	9.66	13.69	.539	4.96	.195	51.94	47.26	249.54	36.19	274.66	39.83
487.6	109.5	277.78	10.93	14.21	.559	5.52	.217	55.27	50.30	260.18	37.73	287.56	41.70
493.6	111.1	289.63	11.36	14.47	.570	5.79	.228	56.48	51.41	263.39	38.20	291.69	42.30
497.8	111.9	301.95	11.89	14.93	.588	6.24	.246	57.87	52.66	265.63	38.52	295.16	42.80
503.7	113.2	311.26	12.25	15.09	.594	6.40	.252	58.88	53.58	268.78	38.98	299.02	43.36
508.6	112.5	313.54	12.34	15.35	.604	6.66	.262	59.03	53.72	267.11	38.74	297.74	43.18
506.5	113.9	322.51	12.70	15.48	.609	6.79	.267	59.99	54.59	270.26	39.19	301.55	43.73
511.6	115.1	339.40	13.36	16.00	.630	7.32	.288	61.64	56.10	272.98	39.59	305.79	44.34
516.0	116.1	360.26	14.18	16.72	.658	8.04	.316	63.59	57.87	275.32	39.93	310.08	44.97
517.4	116.3	376.14	14.81	17.36	.683	8.67	.341	65.00	59.16	276.10	40.04	312.44	45.31
518.3	116.5	390.36	15.37	17.94	.706	9.25	.364	66.23	60.28	276.56	40.11	314.36	45.59
518.6	116.6	404.91	15.94	18.57	.731	9.88	.389	67.46	61.41	276.70	40.13	316.33	45.83
519.5	116.8	416.15	16.38	19.00	.748	10.32	.406	68.41	62.26	277.21	40.20	317.67	46.07
519.8	116.8	430.70	16.96	19.63	.773	10.94	.431	69.60	63.34	277.34	40.22	319.35	46.31



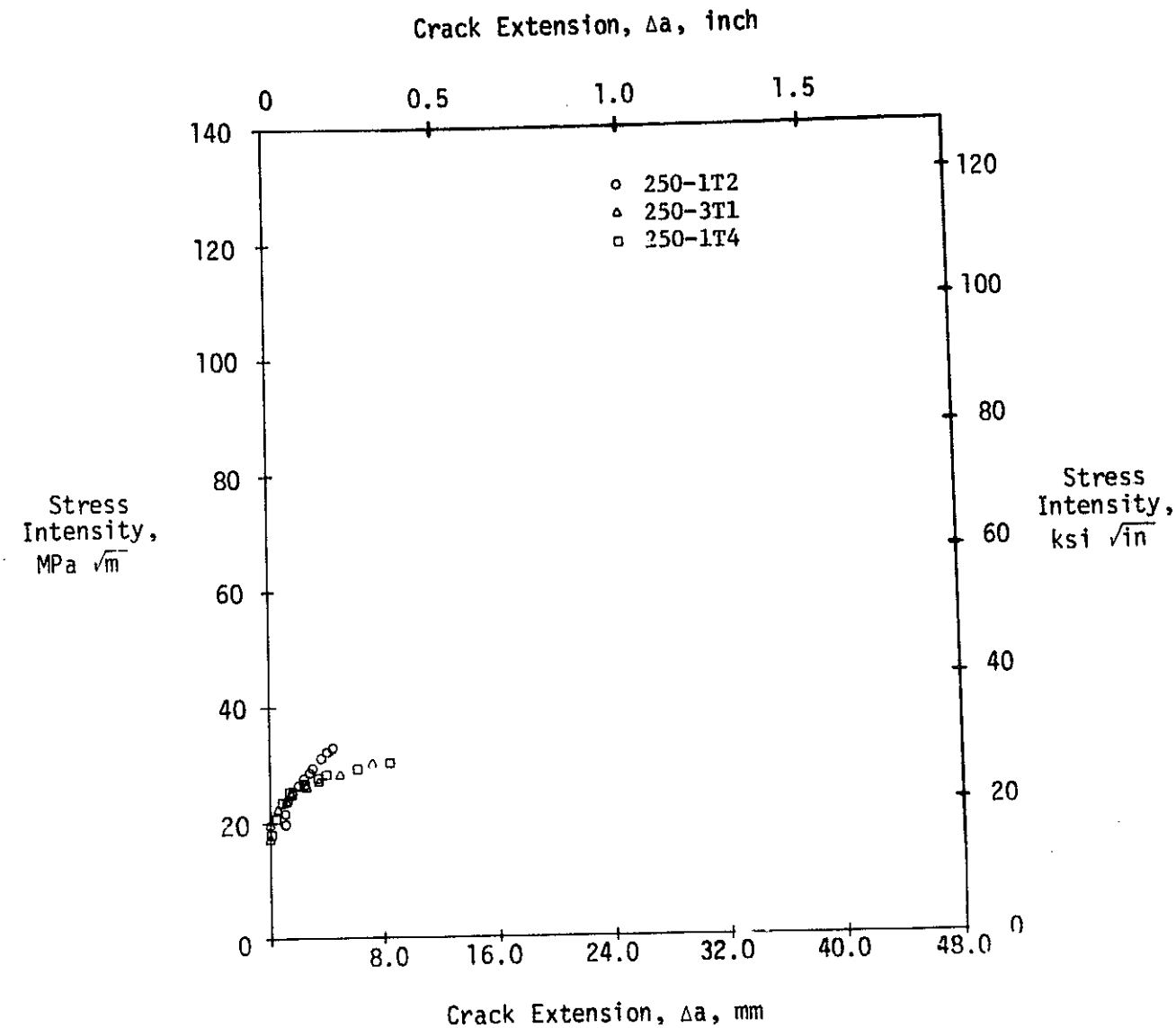
Thickness: 6.36 mm (.250 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C5-1



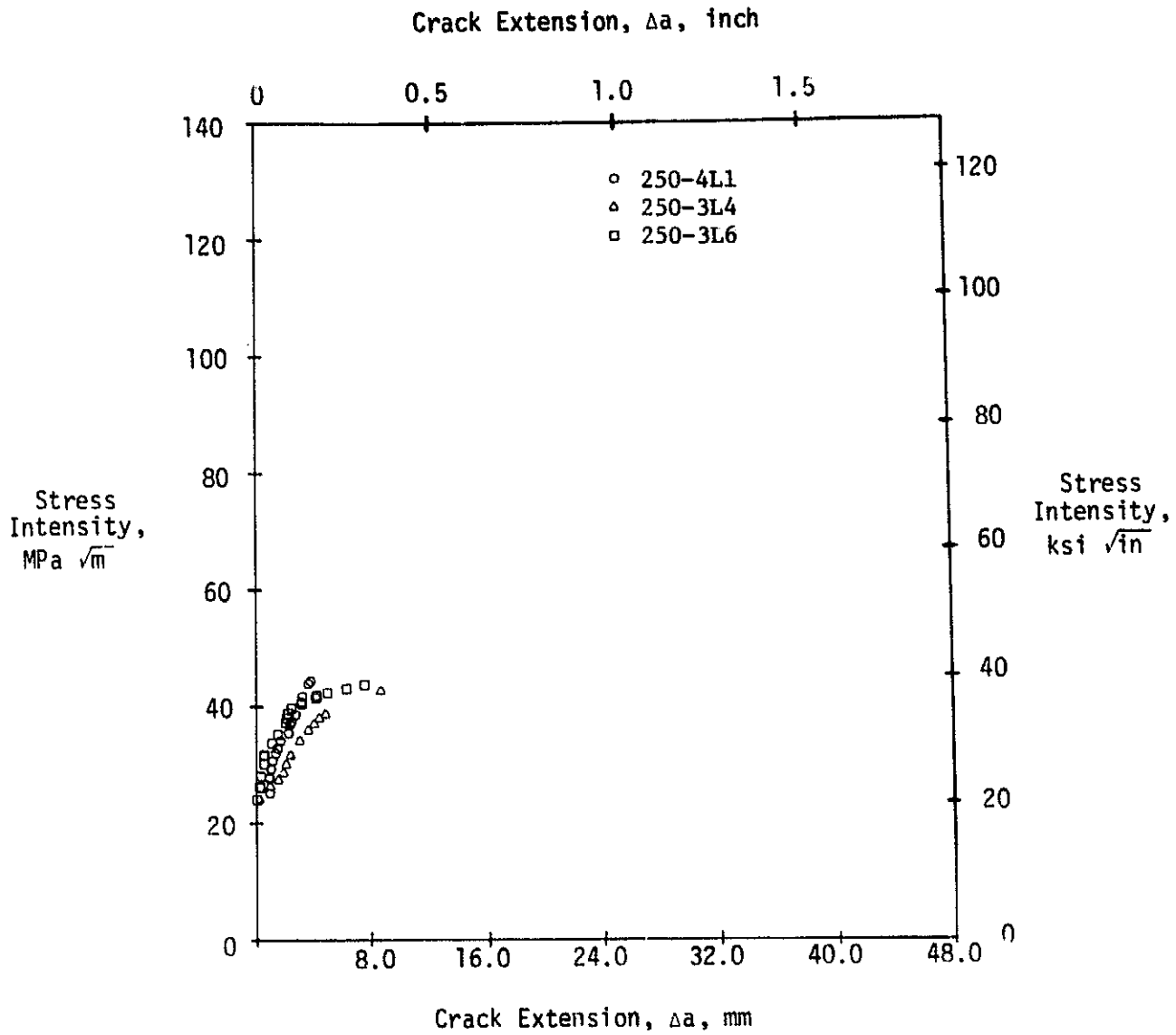
Thickness: 6.35 mm (.250 inch)

Orientation: Transverse

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C5-2



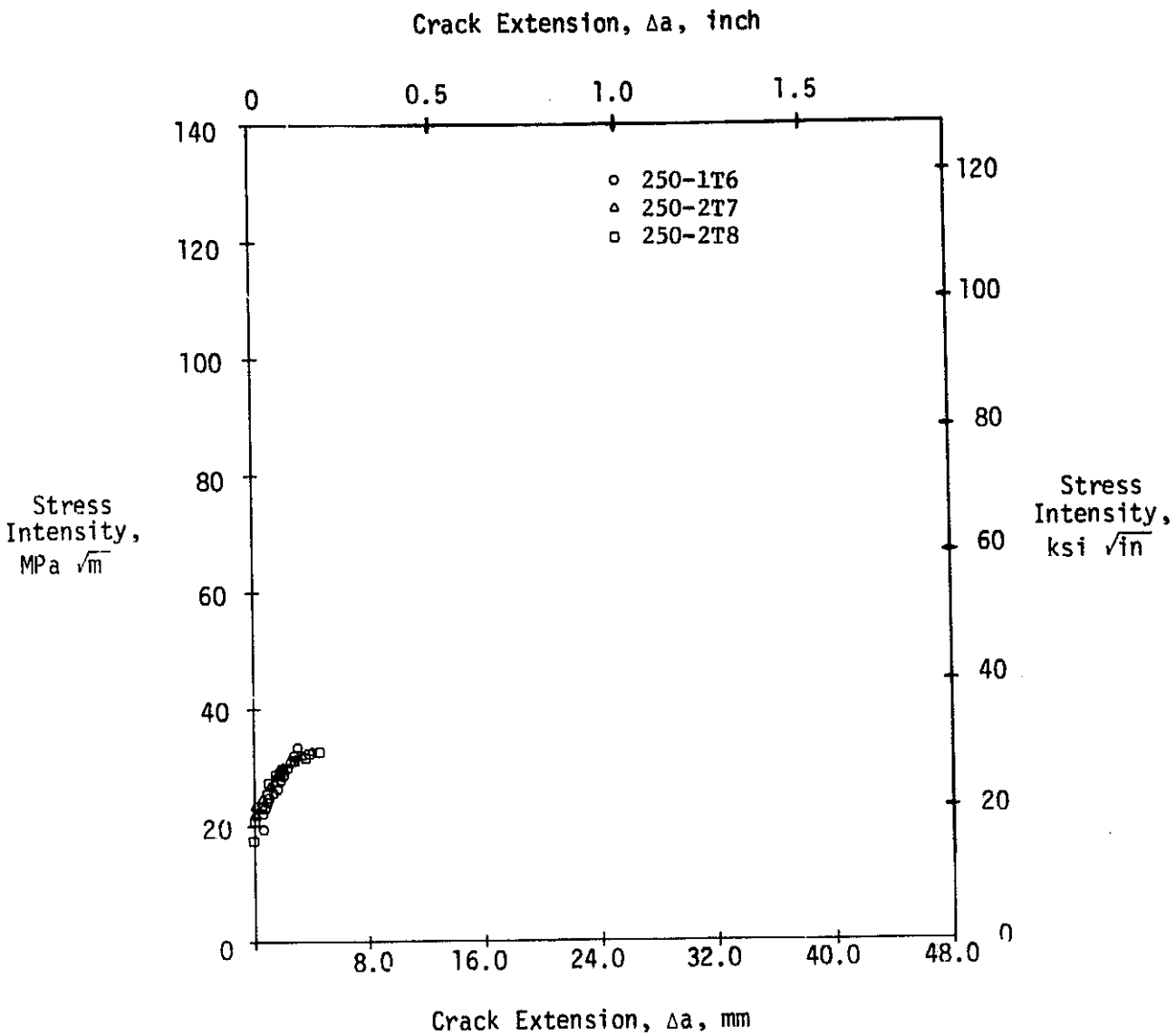
Thickness. 6.35 mm (.250 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C5-3



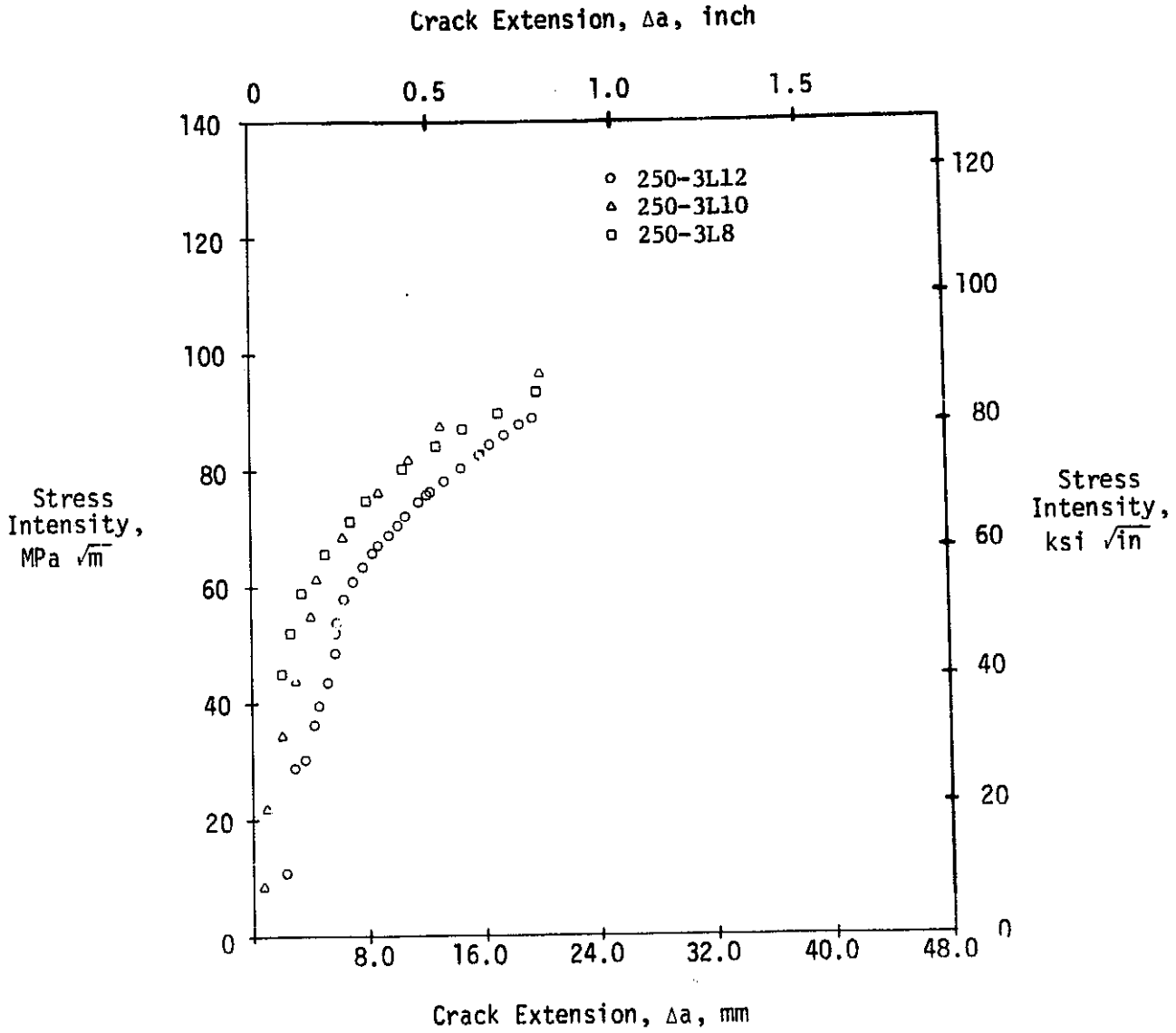
Thickness: 6.35 mm (.250 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C5-4



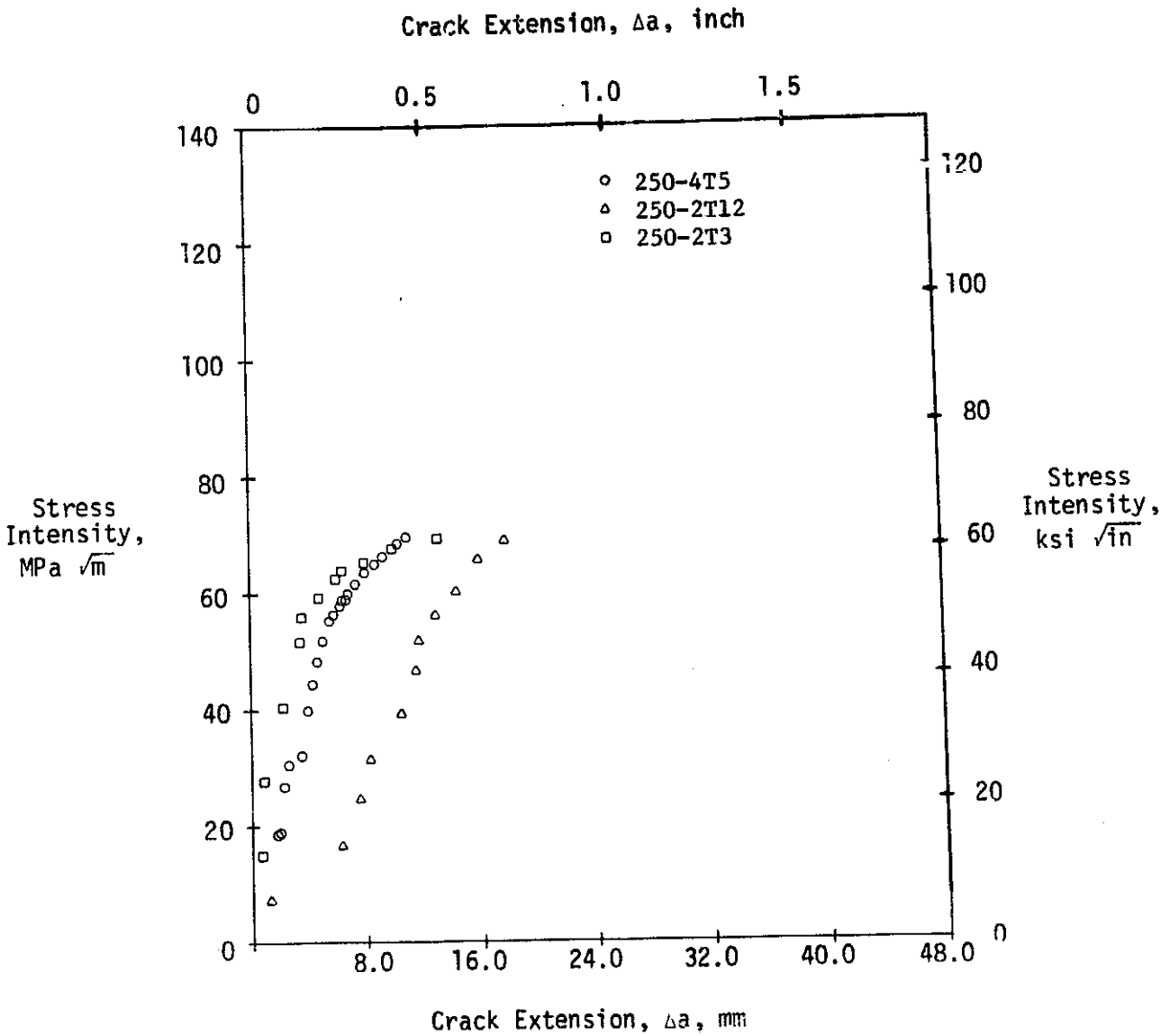
Thickness: 6.35 mm (.250 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C5-5



Thickness: 6.35 mm (.250 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2024-T861

FIGURE C5-6

SECTION C6. FRACTURE TOUGHNESS TEST DATA

FOR 6.35 mm (.250 INCH) THICK 2124-T851

TABLE C6-1.

Fracture Toughness Test Data for 2124-T851 Specimens

(6.35 mm (.250 inch) thick)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load kN	Precrack Load Kip	Failure Load kN	Failure Load Kip	Full Section Failure Stress MPa	Full Section Failure Stress Ksi	Critical Stress Intensity K_c MPa$\sqrt{m}$	Critical Stress Intensity K_c Ksi$\sqrt{in}$	Data Table No.	Figure No.
1L1-253-2	144	L	6.42	.2526	29.733	11.706	88.37	3.48	164.5	37.0	332.5	74.7	174.3	25.3	94.6	86.1	C6-2	C6-1
2L1-256-2	144	L	6.41	.2524	29.596	11.652	44.55	1.75	222.4	50.0	492.6	110.7	259.7	37.7	86.0	78.3	C6-3	C6-1
5L5-259-1	144	L	6.48	.2550	29.708	11.695	28.63	1.13	306.9	69.0	618.3	139.0	321.4	46.6	87.3	79.4	C6-4	C6-1
														AVG:	89.3	81.3		
2L2-253-2	294	L	6.42	.2529	29.685	11.687	89.03	3.50	151.2	34.0	385.2	86.6	202.0	29.3	100.0	91.0	C6-5	C6-3
4L3-259-1	294	L	6.07	.2390	29.708	11.696	50.39	1.98	222.4	50.0	451.5	103.7	255.9	37.1	84.6	77.0	C6-6	C6-3
1L2-256-3	294	L	6.40	.2520	29.548	11.633	28.09	1.11	177.9	40.0	532.7	119.7	281.7	40.8	77.4	70.4	C6-7	C6-3
														AVG:	87.2	79.5		
2L2-253-1	450	L	6.44	.2534	29.695	11.691	124.87	4.92	173.5	39.0	367.0	82.5	192.0	27.8	NSY		C6-8	C6-5
5L5-259-3	450	L	6.31	.2483	29.670	11.681	99.95	3.94	204.6	46.0	434.8	97.7	232.4	33.7	NSY		C6-9	C6-5
2L3-256-1	450	L	6.40	.2518	29.705	11.695	88.72	3.49	129.0	29.0	444.8	100.0	234.2	34.0	*		*	*
2T7-253-4	144	T	6.37	.2507	29.731	11.705	89.08	3.51	106.8	35.0	257.6	57.9	136.1	19.7	76.4	69.5	C6-10	C6-2
3T8-259-2	144	T	6.31	.2484	29.688	11.688	40.72	1.60	169.0	38.0	351.4	79.0	187.6	27.2	58.3	53.0	C6-11	C6-2
5T2-256-3	144	T	6.41	.2524	29.604	11.655	24.21	.95	209.1	47.0	434.8	97.7	229.1	33.2	56.7	51.6	C6-12	C6-2
														AVG:	63.1	58.0		
1T1-253-2	294	T	6.34	.2498	29.710	11.697	89.59	3.53	111.2	25.0	262.0	58.9	139.0	20.2	54.7	49.8	C6-13	C6-4
1T8-256-2	294	T	6.43	.2530	29.759	11.716	28.68	1.13	177.9	40.0	412.4	92.7	215.7	31.3	52.9	48.2	C6-14	C6-4
3T8-259-3	294	T	6.36	.2503	29.670	11.681	12.27	.48	311.4	70.0	645.0	145.0	342.0	49.6	58.9	53.6	C6-15	C6-4
														AVG:	55.5	50.5		
2T7-253-2	450	T	6.38	.2513	29.708	11.696	99.19	3.91	195.7	44.0	421.5	94.7	222.3	32.2	NSY		C6-16	C6-6
2T3-256-2	450	T	6.41	.2525	29.588	11.649	87.48	3.44	129.0	29.0	424.8	95.5	223.9	32.5	NSY		C6-17	C6-5
1T4-259-2	450	T	6.36	.2503	29.632	11.666	76.73	3.02	226.9	51.0	462.6	104.0	245.6	35.6	NSY		C6-18	C6-6

* Compliance gage slipped on knife edges.

NSY Net section stress greater than 0.2 percent offset yield strength prior to failure.

TABLE C6-2

SPECIMEN NUMBER: 1L1-253-2
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.42 MM (.253 IN)
K(MAX) DURING PRECRACKING: 34.01 MPA SQRT(M) (30.95 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.18	1.739	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
116.7	26.2	169.38	6.67	45.10	1.775	.91	.036	24.43	22.24	61.20	8.88	87.85	12.74
151.1	34.0	215.47	8.48	44.35	1.746	.16	.006	31.31	28.49	79.24	11.49	112.92	16.38
227.0	51.1	328.33	12.93	44.29	1.744	.11	.004	47.18	42.93	119.60	17.33	170.21	24.68
255.6	57.5	375.78	14.79	44.92	1.769	.74	.029	53.24	48.45	133.57	19.39	191.55	27.78
278.2	62.5	419.39	16.51	45.45	1.789	1.27	.050	58.67	53.39	146.24	21.21	210.65	30.55
299.2	67.3	468.13	18.43	46.72	1.840	2.54	.100	64.64	58.28	156.87	22.75	228.76	33.17
315.2	70.9	513.02	20.20	48.64	1.891	3.86	.152	68.66	62.48	165.24	23.96	244.13	35.40
321.8	72.4	543.81	21.41	49.37	1.944	5.18	.204	71.38	64.96	168.78	24.48	252.70	36.65
331.8	74.6	575.86	22.67	50.30	1.980	6.12	.241	74.46	67.76	173.94	25.22	262.88	38.12
335.5	75.4	611.77	24.09	52.17	2.054	7.99	.314	77.13	70.19	175.87	25.50	270.95	39.29
336.1	75.6	659.23	25.95	55.13	2.167	10.85	.427	80.13	72.92	176.19	25.55	279.76	40.57
337.5	76.1	716.94	28.23	58.17	2.290	13.98	.551	83.77	76.24	177.16	25.69	291.02	42.20
338.1	76.0	764.40	30.09	60.70	2.390	16.52	.650	86.57	78.78	177.48	25.74	299.95	43.50
337.9	76.0	811.85	31.96	63.27	2.491	19.08	.751	89.14	81.13	177.16	25.69	308.40	44.72
337.9	76.0	864.44	34.03	65.87	2.593	21.69	.854	91.98	83.71	177.16	25.69	318.11	46.13
334.2	75.1	919.59	36.21	68.96	2.715	24.78	.975	94.41	85.92	175.23	25.41	326.82	47.39

TABLE C6-3

SPECIMEN NUMBER: 2L1-256-2
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.41 MM (.252 IN)
K(MAX) DURING PRECRACKING: 31.45 MPA SQRT(M) (28.62 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	22.28	.877	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
183.5	41.3	122.12	4.81	22.32	.879	.05	.002	25.98	23.65	96.75	14.03	113.94	16.52
389.5	87.6	273.93	10.78	22.42	.883	.14	.006	55.26	50.29	205.31	29.77	241.97	35.09
407.7	91.7	295.66	11.64	22.93	.903	.66	.026	58.55	53.28	214.90	31.16	254.32	36.88
420.4	94.6	314.51	12.38	23.50	.925	1.23	.048	61.16	55.66	221.60	32.14	263.44	38.20
436.7	98.2	345.33	13.62	24.64	.970	2.37	.093	65.15	59.29	230.17	33.38	276.16	40.05
455.1	101.4	372.15	14.65	25.45	1.002	3.18	.125	68.49	62.33	237.80	34.49	287.20	41.65
461.6	102.4	383.44	15.10	25.89	1.019	3.61	.142	69.79	63.51	240.10	34.82	291.31	42.23
469.5	105.6	399.20	15.72	26.52	1.044	4.24	.167	71.55	65.11	243.00	35.24	296.36	42.93
475.7	106.9	419.53	16.52	27.19	1.071	4.92	.194	73.88	67.24	247.53	35.90	303.26	43.98
481.8	108.3	438.45	17.30	27.97	1.101	5.69	.224	76.00	69.16	250.76	36.36	309.20	44.84
488.8	109.7	466.40	18.35	29.09	1.145	6.81	.268	78.65	71.58	253.99	36.83	316.13	45.84
491.7	110.5	486.74	19.16	29.84	1.175	7.56	.298	80.78	73.51	255.92	37.11	322.18	46.72
494.1	111.1	505.82	19.91	30.63	1.206	8.36	.329	82.58	75.15	259.16	37.58	326.81	47.39
494.1	111.1	522.33	20.58	31.38	1.236	9.11	.359	84.12	76.55	260.45	37.77	330.56	47.94
494.1	111.1	539.01	21.22	32.25	1.270	9.97	.393	85.41	77.72	260.45	37.77	333.03	48.30
495.3	111.4	555.51	21.87	33.04	1.301	10.76	.424	86.79	78.93	261.10	37.86	336.15	48.75

TABLE C6-4

SPECIMEN NUMBER: 5L5-259-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 6.48 MM (.255 IN)
K(MAX) DURING PRECRACKING: 34.02 MPA SQRT(M) (30.96 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	14.31	.563	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
464.6	104.4	208.09	8.19	14.33	.564	.02	.001	51.53	46.89	241.47	35.02	267.25	38.76
500.1	112.4	232.71	9.16	14.64	.576	.33	.013	56.08	51.03	259.96	37.70	288.38	41.82
522.0	117.4	252.28	9.93	15.02	.591	.71	.028	59.33	53.99	271.45	39.36	301.99	43.80
537.1	120.7	270.50	10.65	15.53	.612	1.22	.048	62.07	56.48	279.12	40.48	311.75	45.22
553.0	124.3	295.24	11.62	16.29	.641	1.98	.078	65.50	59.61	287.44	41.68	322.05	46.71
567.8	127.6	322.40	12.69	17.15	.675	2.83	.112	69.06	62.85	295.13	42.80	333.65	48.39
590.1	132.6	356.92	14.05	17.97	.708	3.66	.144	73.52	66.91	306.65	44.47	348.87	50.60
601.1	135.1	383.69	15.11	18.81	.741	4.50	.177	76.71	69.81	312.44	45.31	357.75	51.88
607.3	136.5	403.91	15.90	19.49	.768	5.18	.204	78.95	71.85	315.66	45.78	363.35	52.69
617.2	138.8	431.72	17.00	20.33	.800	6.01	.237	82.00	74.63	320.81	46.52	371.67	53.90
618.5	139.1	457.63	18.02	21.43	.844	7.11	.280	84.49	76.89	321.50	46.62	379.69	55.06
618.7	139.1	486.38	19.14	22.68	.893	8.37	.329	87.08	79.25	321.57	46.63	379.51	55.04
622.4	139.9	512.30	20.16	23.62	.930	9.31	.367	89.52	81.47	323.53	46.92	384.71	55.79

TABLE C6-5

SPECIMEN NUMBER: 2L2-253-2
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.42 MM (.253 IN)
K(MAX) DURING PRECRACKING: 31.42 MPA SQRT(M) (28.59 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.1	[illegible]	[illegible]	0.[illegible]	44.31	1.752	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
229.7	51.[illegible]	356.49	14.[illegible]	44.62	1.757	.10	.004	47.80	43.50	120.50	17.47	172.06	24.95
248.7	55.[illegible]	390.30	15.37	44.88	1.767	.36	.014	51.95	47.28	130.50	18.92	187.06	27.13
274.7	60.[illegible]	441.39	17.36	45.42	1.788	.94	.037	57.82	52.62	144.09	20.90	207.68	30.12
302.6	66.[illegible]	503.81	19.83	46.02	1.828	1.91	.075	64.53	58.73	158.78	23.01	230.92	33.48
327.6	73.[illegible]	557.91	21.96	46.93	1.848	2.94	.116	70.73	64.37	171.52	24.87	252.14	36.56
344.6	77.[illegible]	617.13	24.29	47.45	1.868	4.11	.162	75.71	68.90	181.75	26.21	268.82	38.98
355.[illegible]	80.[illegible]	651.33	25.64	48.63	1.914	4.77	.188	78.86	71.77	186.65	27.07	279.43	40.52
362.[illegible]	81.[illegible]	679.23	26.74	49.28	1.940	5.53	.218	81.19	73.89	191.24	27.59	287.59	41.70
367.[illegible]	82.[illegible]	709.[illegible]	27.94	50.[illegible]	1.973	6.69	.263	83.41	75.91	192.54	27.92	293.94	42.62
372.[illegible]	83.[illegible]	736.[illegible]	28.98	51.[illegible]	2.016	7.52	.296	85.44	77.75	195.16	28.29	300.64	43.60
375.[illegible]	84.[illegible]	761.[illegible]	29.98	52.[illegible]	2.042	8.37	.329	87.28	79.43	197.46	28.63	306.78	44.49
380.[illegible]	85.[illegible]	795.[illegible]	31.31	53.[illegible]	2.082	9.56	.376	89.66	81.59	199.47	28.93	313.68	45.49
382.[illegible]	86.[illegible]	821.[illegible]	32.33	54.[illegible]	2.129	10.57	.416	91.26	83.05	200.49	29.07	318.69	46.21
382.[illegible]	86.[illegible]	856.[illegible]	33.70	55.[illegible]	2.169	12.20	.480	93.27	84.88	201.00	29.15	324.44	47.04
383.[illegible]	86.[illegible]	900.99	35.47	56.[illegible]	2.233	14.18	.558	95.79	87.18	201.00	29.15	332.44	48.20
383.[illegible]	86.[illegible]	917.46	36.12	57.[illegible]	2.311	14.92	.587	96.57	87.88	201.77	29.26	335.24	48.61
384.[illegible]	86.[illegible]	928.87	36.57	58.93	2.340	15.24	.600	97.32	88.57	201.77	29.26	337.73	48.98
384.7	85.[illegible]	941.27	37.06	59.75	2.352	15.74	.620	97.92	89.11	201.77	29.25	339.65	49.26
				60.25	2.372								

TABLE C6-6

SPECIMEN NUMBER: 4L3-259-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.07 MM (.239 IN)
K (MAX) DURING PRECRACKING: 35.33 MPA SQRT(M) (32.15 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	25.20	.992	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
313.2	70.4	279.52	11.00	25.51	1.004	.31	.012	50.07	45.57	173.69	25.19	209.69	30.414
331.5	74.5	301.39	11.87	25.78	1.015	.58	.023	53.29	48.50	183.82	26.66	222.41	32.25
353.4	79.4	328.89	12.95	26.11	1.028	.91	.036	57.21	52.06	195.97	28.42	237.76	34.48
368.6	82.9	350.05	13.78	26.43	1.040	1.23	.048	60.07	54.66	204.41	29.64	248.65	36.06
381.4	85.7	374.61	14.72	27.07	1.066	1.87	.074	62.96	57.29	211.50	30.67	258.62	37.50
399.0	89.7	401.51	15.81	27.48	1.082	2.29	.090	66.42	60.45	221.28	32.09	271.45	39.38
411.2	92.4	428.28	16.86	28.19	1.110	3.00	.118	69.40	63.16	228.02	33.07	281.74	40.84
423.9	95.3	451.13	17.72	28.50	1.122	3.31	.130	71.99	65.51	235.11	34.09	290.95	42.19
437.9	98.5	477.52	18.80	28.99	1.141	3.79	.149	75.05	68.30	242.87	35.22	301.75	43.76
445.2	100.1	504.39	19.86	29.88	1.177	4.69	.185	77.59	70.61	246.90	35.80	309.08	44.82
454.3	102.1	530.45	20.88	30.55	1.203	5.35	.211	80.14	72.93	251.95	36.54	317.17	46.00
456.1	102.5	550.16	21.66	31.42	1.237	6.23	.245	81.73	74.38	252.94	36.68	320.81	46.53
461.6	103.8	572.00	22.52	32.09	1.263	6.89	.271	83.68	76.15	255.97	37.12	326.50	47.35
462.1	103.9	584.67	23.02	32.67	1.286	7.48	.294	84.64	77.02	256.29	37.17	328.56	47.65

TABLE C6-7

SPECIMEN NUMBER: 1L2-256-3
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 6.40 MM (.252 IN)
K (MAX) DURING PRECRACKING: 19.87 MPA SQRT(M) (18.09 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	14.05	.553	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
500.4	112.5	290.83	11.45	16.31	.642	2.26	.089	60.34	54.91	264.63	38.38	297.47	43.14
514.2	115.6	312.93	12.32	16.80	.665	2.85	.112	63.15	57.47	271.92	39.43	307.04	44.53
528.4	118.8	338.33	13.32	17.57	.692	3.52	.139	66.22	60.27	279.45	40.53	317.17	45.99
536.0	120.5	356.62	14.14	18.13	.714	4.09	.161	68.28	62.14	283.45	41.11	323.11	46.85
542.2	121.9	379.48	14.94	18.95	.746	4.90	.193	73.67	64.31	286.74	41.58	328.93	47.70
547.6	123.1	394.72	15.54	19.42	.764	5.37	.211	72.28	65.78	289.57	41.99	333.38	48.35
553.4	124.4	414.02	16.30	20.03	.789	5.98	.236	74.24	67.56	292.62	42.44	338.52	49.09
533.8	120.0	461.50	18.13	23.27	.916	9.22	.363	77.49	70.52	282.27	40.93	335.04	48.59

TABLE C6-8

SPECIMEN NUMBER: 2L2-253-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.44 MM (.253 IN)
K(MAX) DURING PRECRACKING: 45.24 MPA SQRT(M) (41.17 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	52.43	2.458	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
247.2	55.6	646.46	25.24	52.49	2.466	.05	.002	64.49	58.69	129.34	18.76	223.85	32.38
272.7	61.3	718.19	28.27	52.55	2.465	.17	.007	71.26	64.85	142.71	20.70	246.75	35.78
295.2	66.4	802.73	31.60	53.41	2.496	.98	.038	77.89	71.89	154.47	22.40	269.61	39.10
313.4	70.5	879.35	34.64	54.26	2.530	1.83	.072	83.55	76.03	163.99	23.78	289.13	41.93
329.7	74.1	964.32	37.97	55.50	2.579	3.07	.121	89.22	81.14	172.54	25.02	308.74	44.77
344.8	77.5	1072.59	42.23	57.62	2.662	5.18	.204	*	*	180.42	26.16	331.29	48.04
352.5	79.2	1137.43	44.78	58.99	2.715	6.54	.258	*	*	184.19	26.71	344.51	49.89
358.6	80.6	1197.15	47.53	70.47	2.774	8.03	.316	*	*	187.63	27.21	357.13	51.79
363.9	81.8	1283.35	50.55	72.25	2.844	9.81	.386	*	*	190.43	27.62	370.90	53.79
367.4	82.6	1363.10	53.67	74.22	2.922	11.79	.464	*	*	192.26	27.88	384.42	55.75
370.9	83.4	1456.61	57.35	76.46	3.010	14.03	.552	*	*	194.07	28.14	400.12	58.02
371.9	83.6	1523.64	59.99	78.16	3.077	15.73	.619	*	*	194.63	28.22	411.00	59.600
372.4	83.7	1586.35	62.53	79.80	3.142	17.37	.684	*	*	194.87	28.26	421.33	61.100
371.7	83.6	1651.58	64.98	81.43	3.208	19.05	.750	*	*	194.48	28.20	431.01	62.50

TABLE C6-9

SPECIMEN NUMBER: 5L5-259-3
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.31 MM (.248 IN)
K(MAX) DURING PRECRACKING: 46.63 MPA SQRT(M) (42.44 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	49.97	1.967	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
324.0	72.8	659.95	25.98	50.02	1.969	.04	.002	73.93	67.28	173.27	25.13	261.41	37.91
357.0	80.2	769.17	30.28	51.22	2.017	1.25	.049	82.69	75.25	190.79	27.67	291.42	42.26
382.4	86.0	872.85	34.36	52.53	2.073	2.61	.103	90.15	82.04	204.39	29.64	316.62	45.92
395.7	88.9	949.17	37.37	54.14	2.127	4.66	.160	*	*	211.48	30.67	332.64	48.24
412.5	92.7	1065.32	41.98	56.32	2.217	6.34	.250	*	*	220.46	31.97	355.37	51.53
424.4	95.4	1183.39	46.59	58.86	2.317	8.86	.349	*	*	226.83	32.89	375.94	54.52
431.4	97.0	1311.40	51.20	61.69	2.429	11.72	.461	*	*	230.58	33.44	394.72	57.247
434.8	97.7	1401.04	55.16	64.28	2.531	14.31	.563	*	*	232.36	33.70	410.07	59.447
436.8	98.2	1539.72	60.62	67.91	2.674	17.94	.706	*	*	233.42	33.86	430.57	62.442
435.2	97.8	1659.32	65.33	71.26	2.806	21.29	.838	*	*	232.62	33.73	447.66	64.922
430.0	96.7	1778.86	70.03	74.32	2.950	24.95	.982	*	*	229.81	33.33	464.29	67.331
427.3	96.1	1865.82	73.46	77.29	3.043	27.31	1.075	*	*	228.36	33.12	476.73	69.13
428.4	96.3	1909.33	75.17	78.09	3.074	28.11	1.107	*	*	228.95	33.20	483.35	70.09

TABLE C6-10

SPECIMEN NUMBER: 2T7-253-4
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.2 K
SPECIMEN THICKNESS: 6.37 MM (.251 IN)
K(MAX) DURING PRECRACKING: 22.34 MPA SQRT(M) (20.33 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	0.00	44.54	1.753	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
207.8	46.7	[illegible]	[illegible]	44.56	1.754	.02	.0015	43.53	39.59	139.77	15.92	155.77	22.73
220.1	49.5	[illegible]	[illegible]	44.92	1.769	.38	.0215	46.38	42.14	116.26	16.86	166.61	24.16
229.4	51.6	[illegible]	[illegible]	46.34	1.785	.81	.0322	48.55	44.19	121.20	17.58	174.46	25.20
237.8	53.5	[illegible]	[illegible]	46.12	1.816	1.58	.0662	50.86	46.28	125.62	18.22	182.12	26.41
245.2	55.1	[illegible]	[illegible]	47.30	1.858	2.66	.1105	53.21	48.43	129.52	18.78	189.78	27.52
251.6	56.6	[illegible]	[illegible]	48.54	1.899	3.75	.1465	55.37	50.39	132.91	19.27	196.76	28.53
257.0	57.8	[illegible]	[illegible]	50.07	1.979	5.73	.2256	58.10	52.88	135.79	19.69	205.16	29.75
257.1	57.8	[illegible]	[illegible]	51.75	2.038	7.21	.2884	59.24	53.91	135.81	19.69	208.34	30.21
257.1	57.8	[illegible]	[illegible]	53.58	2.109	9.04	.3556	60.65	55.19	135.83	19.70	212.37	30.80
257.1	57.8	[illegible]	[illegible]	55.41	2.166	10.48	.4112	62.12	56.53	136.62	19.81	216.89	31.45
258.7	58.1	[illegible]	[illegible]	56.82	2.237	12.24	.4833	63.55	57.83	136.65	19.82	221.19	32.08
258.7	58.1	[illegible]	[illegible]	58.71	2.420	16.94	.6667	67.06	61.03	136.19	19.75	228.63	33.16
257.3	57.8	[illegible]	[illegible]	61.48	2.544	20.67	.7990	69.67	63.41	136.24	19.76	240.97	34.94
257.9	58.0	[illegible]	[illegible]	64.31	2.671	23.51	.9118	72.19	65.69	135.77	19.69	249.77	36.22
257.6	57.9	[illegible]	[illegible]	67.85	2.776	26.91	1.0924	73.87	67.22	134.51	19.51	256.21	37.15
254.7	57.2	[illegible]	[illegible]	73.33	2.887	28.79	1.134	76.39	69.52	134.56	19.51	265.56	38.51
254.3	57.2	[illegible]	[illegible]	74.73	2.941	30.17	1.188	77.53	70.56	134.32	19.48	270.02	39.16

TABLE C6-11

SPECIMEN NUMBER: 3T8-259-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.2 K
SPECIMEN THICKNESS: 6.31 MM (.248 IN)
K(MAX) DURING PRECRACKING: 23.09 MPA SQRT(M) (21.01 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	0.00	21.36	.401	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
197.1	44.3	[illegible]	4.77	20.37	.802	.61	.0304	26.34	24.55	115.27	15.27	122.01	17.69
285.7	64.2	[illegible]	7.08	20.45	.819	.15	.0059	39.07	35.56	132.34	22.09	176.68	25.62
303.7	68.3	[illegible]	7.71	20.31	.819	.45	.0178	41.96	38.18	162.14	23.51	188.57	27.35
313.4	70.5	[illegible]	8.14	21.21	.835	.84	.0333	43.74	39.80	167.36	24.27	195.25	28.31
320.8	72.1	[illegible]	8.67	21.97	.855	1.62	.0664	46.61	41.51	171.28	24.94	201.84	29.15
328.1	73.8	[illegible]	9.23	22.76	.896	2.40	.0955	47.55	43.26	175.19	25.41	256.92	30.01
342.8	77.1	[illegible]	9.74	22.86	.900	2.55	.099	49.78	45.30	183.03	26.54	216.35	31.37
351.7	79.1	[illegible]	[illegible]	23.20	.913	2.84	.1112	51.42	46.79	187.60	27.21	222.33	32.25
352.5	79.2	[illegible]	[illegible]	25.32	.997	2.96	.1195	54.05	49.19	188.22	27.30	226.96	32.91
353.1	79.4	[illegible]	[illegible]	27.98	1.099	7.55	.2997	57.16	51.92	188.52	27.34	232.16	33.67
353.6	79.5	[illegible]	[illegible]	30.17	1.184	9.71	.3802	59.53	54.18	188.81	27.38	236.77	34.33
354.2	79.6	[illegible]	[illegible]	31.97	1.259	11.62	.457	61.79	56.15	189.11	27.42	241.3	34.99
352.3	79.2	[illegible]	[illegible]	34.17	1.345	13.81	.544	63.71	57.94	188.10	27.28	244.4	35.43

TABLE C6-12

SPECIMEN NUMBER: 5T2-256-3
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.41 MM (.252 IN)
K(MAX) DURING PRECRACKING: 21.57 MPA SQRT(M) (19.63 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	12.10	.476	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
85.6	19.3	30.34	1.19	12.26	.483	.15	.006	8.89	8.09	45.13	6.54	49.28	7.143
323.0	72.6	120.60	4.75	12.34	.486	.24	.009	33.65	30.63	170.20	24.68	185.69	26.93
345.0	77.6	135.20	5.32	12.85	.506	.79	.029	36.69	33.39	181.80	26.36	199.09	28.87
362.7	81.5	150.94	5.94	13.55	.533	1.44	.057	39.63	36.07	191.15	27.72	210.41	30.51
380.3	85.9	165.54	6.52	13.98	.550	1.88	.074	42.45	38.63	201.47	29.22	222.48	32.26
387.8	87.2	169.76	6.68	14.13	.555	2.00	.079	43.25	39.36	204.37	29.64	225.89	32.76
392.7	88.3	176.68	6.96	14.46	.569	2.35	.093	44.36	40.37	206.95	30.01	229.35	33.26
405.6	91.2	187.05	7.36	14.73	.580	2.63	.104	46.25	42.09	213.72	30.99	237.34	34.42
415.3	93.4	197.80	7.79	15.14	.596	3.04	.120	48.04	43.72	218.88	31.74	243.81	35.36
422.7	95.1	210.86	8.30	15.79	.622	3.69	.145	49.95	45.46	222.74	32.30	249.34	36.16
428.8	96.4	224.30	8.83	16.49	.649	4.39	.173	51.82	47.16	225.97	32.77	254.30	36.88
430.7	96.7	238.13	9.38	17.41	.686	5.31	.209	53.45	48.65	226.61	32.86	256.83	37.24
433.7	97.5	249.07	9.81	18.02	.710	5.92	.233	54.88	49.94	228.55	33.14	260.23	37.74
433.7	97.5	261.56	10.30	18.88	.743	6.77	.267	56.21	51.16	228.55	33.14	261.95	37.99
433.7	97.5	271.93	10.71	19.59	.771	7.49	.295	57.32	52.16	228.55	33.14	263.41	38.20

TABLE C6-13

SPECIMEN NUMBER: 1T1-253-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.3 K
SPECIMEN THICKNESS: 6.34 MM (.251 IN)
K(MAX) DURING PRECRACKING: 23.46 MPA SQRT(M) (21.35 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.79	1.763	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
130.8	29.4	3.17	0.12	44.82	1.764	.13	.005	27.64	25.15	69.39	10.06	99.47	14.42
194.2	43.7	16.76	0.66	44.87	1.767	.18	.007	41.62	37.88	103.05	14.94	147.65	21.41
210.3	47.3	34.14	1.34	44.91	1.768	.22	.009	44.61	40.60	111.59	16.18	160.38	23.26
221.6	49.8	54.77	2.16	44.95	1.770	.26	.010	46.84	42.63	117.54	17.05	169.24	24.54
231.6	52.1	72.42	2.85	44.99	1.771	.30	.012	48.77	44.38	122.72	17.80	176.94	25.66
237.7	53.4	85.71	3.37	45.02	1.772	.33	.013	49.97	45.47	126.09	18.28	182.14	26.41
241.1	54.2	93.35	3.67	45.03	1.773	.34	.013	50.77	46.21	127.90	18.55	185.15	26.85
241.5	54.3	93.14	3.67	45.03	1.773	.34	.013	50.77	46.21	127.90	18.55	185.15	26.85
245.6	55.2	93.93	3.70	45.04	1.773	.35	.014	51.66	47.01	128.15	18.58	186.41	27.03
249.3	56.1	106.93	4.21	45.09	1.775	.40	.016	52.11	47.42	130.22	18.88	189.90	27.54
249.3	56.1	119.21	4.69	45.14	1.777	.45	.018	53.14	48.36	132.29	19.18	193.31	28.03
249.3	56.1	129.32	5.09	45.18	1.779	.49	.019	54.13	49.26	132.29	19.18	195.33	28.285
248.1	55.8	137.76	5.42	45.23	1.781	.53	.021	54.79	49.86	132.02	19.15	196.19	28.45

TABLE C6-14

SPECIMEN NUMBER: 1T8-256-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294. K
SPECIMEN THICKNESS: 6.43 MM (.253 IN)
K(MAX) DURING PRECRACKING: 19.86 MPA SQRT(M) (18.07 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
314.5	70.7	146.[illegible]	5.75	14.47	.570	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
336.3	75.6	161.32	6.37	14.86	.585	.113	.0045	35.27	32.10	164.48	23.85	182.98	26.54
357.6	80.4	177.55	6.99	15.19	.598	.559	.0221	38.23	34.79	175.87	25.50	195.71	28.38
361.8	81.3	183.39	7.22	15.48	.611	.859	.0344	41.12	37.42	187.34	27.42	208.51	30.23
379.0	85.2	194.[illegible]	7.64	15.51	.611	1.125	.0445	41.09	38.21	193.14	27.43	211.18	30.61
388.8	87.4	202.[illegible]	7.96	15.72	.619	1.117	.0446	44[illegible]	[illegible]	198.21	28.74	221.28	32.09
393.2	88.4	212.60	8.37	16.25	.640	1.39	.0554	45.48	41.38	203.33	29.49	227.34	32.97
401.7	90.3	220.38	8.71	16.66	.648	1.91	.0775	46.86	42.59	205.65	29.82	230.86	33.48
419.7	94.4	228.51	9.04	16.62	.654	2.12[illegible]	.0[illegible]	48.12	43.73	211.17	30.66	236.25	34.26
412.4	92.7	236.14	9.34	16.57	.655	2.28[illegible]	.0[illegible]	49.33	44.89	214.26	31.07	241.20	34.98
411.9	92.6	262.13	10.32	18.95	.742	2.33	.092	48.73	43.26	215.56	31.27	242.87	35.22
						4.51	.178	52.94	48.17	215.42	31.24	246.67	35.77

TABLE C6-15

SPECIMEN NUMBER: 3T8-259-3
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.6 K
SPECIMEN THICKNESS: 6.36 MM (.250 IN)
K(MAX) DURING PRECRACKING: 22.94 MPA SQRT(M) (20.88 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
[illegible]	[illegible]	[illegible]	0.00	6.13	.241	[illegible]	0.000	[illegible]	[illegible]	[illegible]	[illegible]	0.00	0.00
492.2	110.7	107.54	4.23	6.16	.243	.03	.001	30.34	33.07	260.39	37.85	272.29	39.49
506.7	113.9	115.20	4.54	6.34	.250	.21	.008	37.96	34.55	268.68	38.96	280.68	40.70
521.2	117.2	124.03	4.91	6.51	.264	.47	.019	39.86	36.27	276.35	40.08	289.23	41.94
533.3	121.2	135.62	5.34	6.53	.269	.70	.027	41.94	38.17	285.96	41.47	299.76	43.47
555.6	124.8	143.54	5.65	6.93	.273	.80	.031	43.47	39.56	294.30	42.68	308.72	44.77
571.9	128.6	159.16	6.11	7.16	.282	1.02	.040	45.52	41.43	303.24	43.97	318.61	46.20
588.8	132.4	166.78	6.57	7.35	.289	1.21	.048	47.49	43.22	312.19	45.27	328.45	47.65
593.6	134.8	177.26	6.98	7.38	.298	1.45	.057	49.13	44.71	317.9[illegible]	46.10	335.[illegible]	48.58
611.5	137.5	188.[illegible]	7.41	7.73	.307	1.66	.065	50.81	46.24	324.25	47.02	342.[illegible]	49.63
624.7	140.4	193.35	7.85	7.35	.313	1.82	.072	52.44	47.72	331.25	48.04	350.01	50.76
633.0	142.4	212.09	8.35	8.26	.325	2.13	.084	54.17	49.30	335.64	48.67	355.43	51.54
637.7	143.4	222.85	8.77	8.37	.337	2.43	.096	55.58	50.58	338.10	49.03	358.82	52.04
639.8	143.8	235.41	9.25	8.38	.353	2.84	.112	57.[illegible]	51.95	339.24	49.20	361.09	52.36
640.8	144.1	244.31	9.64	9.32	.367	3.13	.126	58.29	53.04	339.77	49.27	362.58	52.57
643.0	144.6	254.25	10.01	9.52	.379	3.48	.137	59.41	54.06	340.95	49.44	364.58	52.87

TABLE C6-16

SPECIMEN NUMBER: 2T7-253-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.38 MM (.251 IN)
K(MAX) DURING PRECRACKING: 43.79 MPA SQRT(M) (39.85 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA a MM	DELTA a IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.00	0.0	0.00	0.00	49.79	1.952	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
105.25	23.7	131.25	7.53	49.82	1.962	.23	.009	23.61	21.49	55.50	8.05	83.51	12.11
309.55	69.6	606.38	23.90	49.61	1.953	.62	.001	69.26	63.03	163.23	23.67	245.09	35.54
334.47	75.2	679.15	26.74	50.30	1.980	.70	.028	75.59	68.71	176.35	25.57	266.64	38.67
350.74	78.8	739.17	29.10	51.24	2.017	1.65	.065	80.17	72.96	184.98	26.83	282.40	40.95
366.44	82.4	808.71	31.84	52.53	2.068	2.94	.116	85.17	77.51	193.28	28.03	299.15	43.38
379.83	85.4	871.12	34.29	53.59	2.110	4.00	.158	89.47	81.42	200.29	29.05	313.35	45.44
390.09	87.7	928.48	36.55	54.59	2.153	5.10	.201	93.17	84.79	205.71	29.83	325.59	47.22
402.14	90.4	1016.19	40.85	56.46	2.223	6.87	.271	*	*	212.36	30.75	342.10	49.61
412.32	92.7	1095.34	43.14	58.24	2.293	8.65	.340	*	*	217.44	31.53	357.68	51.87
417.64	93.9	1157.45	45.96	60.06	2.365	10.47	.412	*	*	220.26	31.94	369.79	53.63
421.11	94.7	1234.23	48.59	61.85	2.435	12.25	.482	*	*	222.15	32.21	380.59	55.19
422.22	94.9	1293.80	50.94	63.64	2.505	14.04	.553	*	*	222.71	32.30	389.64	56.50
423.90	95.3	1367.67	53.85	65.70	2.587	16.11	.634	*	*	223.60	32.43	400.93	58.14
425.02	95.5	1433.14	56.66	67.67	2.664	18.07	.712	*	*	224.17	32.51	411.79	59.71
423.68	95.2	1512.90	59.56	70.04	2.757	20.44	.805	*	*	223.12	32.36	422.19	61.22
421.00	94.7	1596.19	62.84	72.55	2.857	22.97	.904	*	*	222.07	32.20	434.16	62.96
418.44	94.1	1674.70	65.93	74.94	2.950	25.34	.998	*	*	220.75	32.01	445.39	64.59
413.44	92.9	1775.94	69.96	78.12	3.076	28.52	1.123	*	*	218.02	31.62	459.97	66.69
409.52	92.1	1862.55	73.33	80.53	3.173	31.00	1.220	*	*	216.00	31.32	472.19	68.48
407.52	91.6	1963.13	77.17	82.95	3.266	33.36	1.313	*	*	214.93	31.17	486.74	70.59

TABLE C6-17

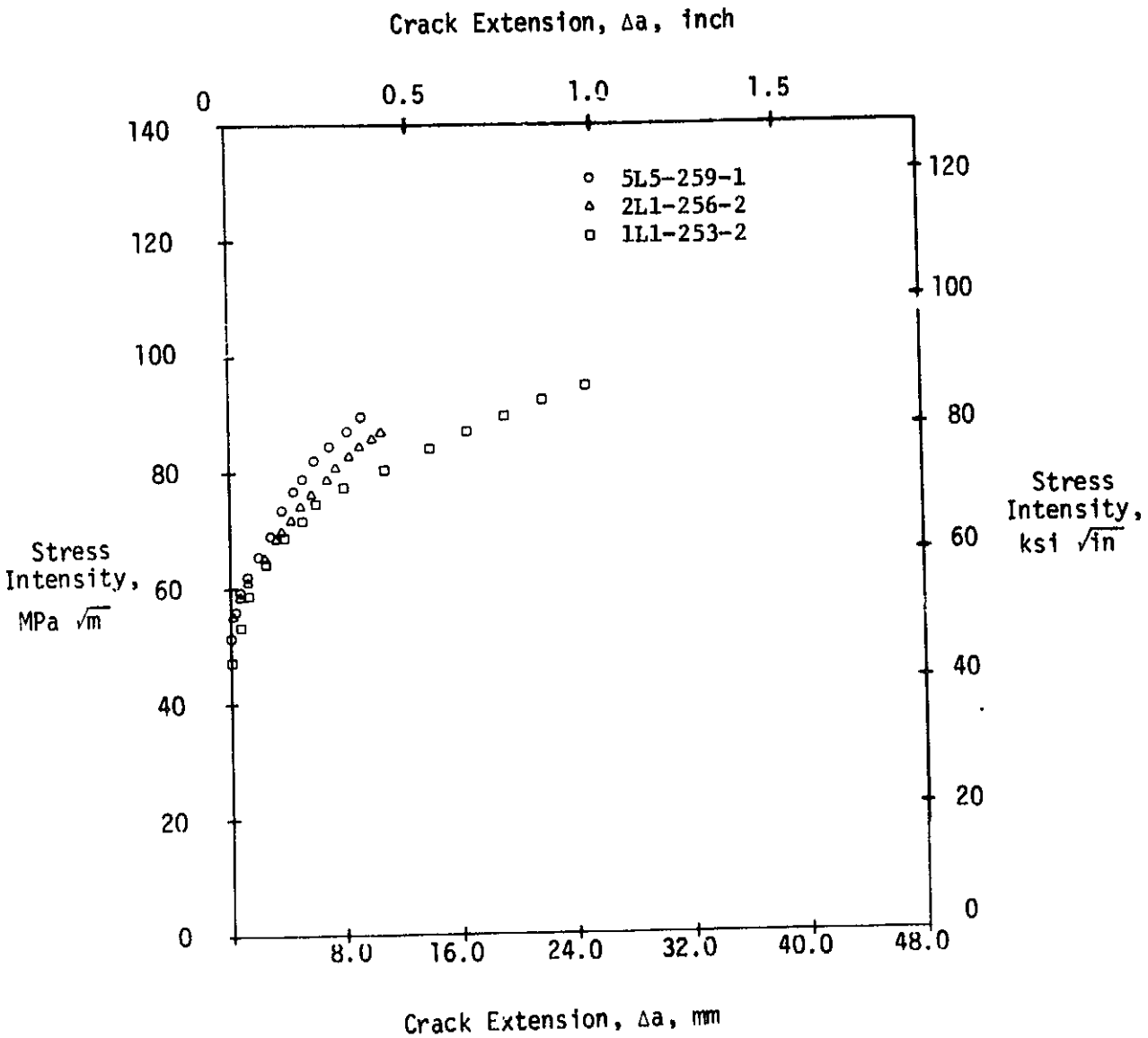
SPECIMEN NUMBER: 2T3-256-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.41 MM (.252 IN)
K(MAX) DURING PRECRACKING: 26.65 MPA SQRT(M) (24.25 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA a MM	DELTA a IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.00	0.0	0.00	0.00	43.74	1.722	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
191.22	43.0	301.74	11.88	43.77	1.723	.03	.001	39.51	35.95	100.75	14.61	143.08	20.75
247.15	55.6	402.86	15.86	44.15	1.735	.34	.013	51.30	46.69	130.25	18.89	185.53	26.91
288.52	64.8	487.33	19.19	44.56	1.754	.82	.032	60.29	54.87	152.05	22.05	217.59	31.55
327.42	73.6	580.95	22.87	45.44	1.789	1.70	.067	69.25	63.02	172.54	25.02	249.32	36.15
348.09	78.2	639.35	25.17	46.14	1.817	2.40	.095	74.33	67.65	183.42	26.60	266.55	38.68
366.98	82.5	698.99	27.56	46.98	1.850	3.24	.128	79.25	72.12	193.37	28.04	283.29	41.08
381.33	85.7	755.87	29.76	47.92	1.887	4.18	.165	83.44	75.93	200.99	29.15	297.20	43.11
392.22	88.2	807.31	31.77	48.95	1.927	5.21	.205	87.60	79.17	206.72	29.98	308.93	44.80
402.25	90.4	863.67	34.24	50.43	1.986	6.69	.264	91.03	82.84	212.12	30.76	321.82	46.67
411.55	92.5	941.52	37.07	52.23	2.059	8.55	.337	*	*	216.86	31.45	335.42	48.64
419.99	94.4	1011.05	39.81	53.94	2.124	10.21	.402	*	*	221.28	32.09	348.27	50.51
423.44	95.2	1066.56	41.98	55.58	2.188	11.84	.466	*	*	223.15	32.36	357.43	51.83
426.98	96.0	1133.61	44.63	57.32	2.269	13.58	.547	*	*	224.67	32.58	368.01	53.37
429.25	96.5	1202.94	47.36	59.62	2.347	15.89	.625	*	*	226.20	32.80	378.94	54.95
427.82	96.2	1281.37	50.46	62.41	2.457	18.67	.735	*	*	225.46	32.69	389.96	56.55
426.64	95.8	1366.73	53.81	65.27	2.570	21.53	.848	*	*	224.71	32.59	402.13	58.32
424.64	95.4	1441.52	56.59	66.86	2.632	23.12	.910	*	*	223.69	32.44	408.13	59.19

TABLE C6-18

SPECIMEN NUMBER: 1T4-259-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.36 MM (.250 IN)
K(MAX) UPING PRECRACKING: 43.63 MPA SQRT(M) (39.70 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-4 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	38.37	1.510	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
219.6	49.4	3111.77	11.88	38.42	1.513	.06	.002	42.24	38.44	116.52	16.90	157.31	22.81
273.7	61.5	3988.70	15.31	38.66	1.522	.29	.011	52.81	48.06	145.16	21.05	196.40	28.48
323.7	72.8	4937.92	19.25	39.27	1.546	.90	.035	63.19	57.43	171.84	24.92	233.81	33.91
360.6	81.1	5655.43	22.26	39.93	1.572	1.56	.062	70.97	64.59	191.37	27.75	261.98	37.99
393.6	88.5	6501.63	25.60	41.21	1.623	2.85	.112	78.98	71.87	208.95	30.30	289.47	41.98
419.6	94.3	7541.52	29.68	43.19	1.700	4.82	.190	86.56	78.32	221.31	32.09	312.37	45.30
436.9	98.2	8151.57	32.11	44.41	1.748	6.04	.238	89.86	81.78	227.17	32.94	324.39	47.04
448.8	100.9	8781.12	34.57	45.93	1.811	7.63	.300			231.73	33.60	336.06	48.73
456.1	102.5	9621.40	37.89	47.80	1.882	9.44	.372			238.24	34.55	351.72	51.01
461.6	103.8	10431.96	41.10	50.06	1.971	11.70	.461			241.49	35.02	364.74	52.89
464.4	104.4	11222.81	44.20	52.34	2.061	13.68	.538			244.75	35.49	377.27	54.71
464.4	104.4	12152.23	47.84	54.54	2.147	16.27	.641			246.70	35.78	390.83	56.68
467.1	105.0	13372.57	52.66	58.14	2.289	19.77	.778			248.00	35.96	408.16	59.19
464.4	104.4	14376.44	56.51	61.37	2.416	23.00	.906			246.70	35.78	421.13	61.07
461.7	103.8	15602.51	61.44	65.35	2.573	26.98	1.062			244.75	35.49	437.99	63.52
459.0	103.2	16890.43	66.79	69.72	2.745	31.35	1.234			241.49	35.02	456.13	66.15
452.4	101.7	18643.98	73.42	74.02	2.914	35.65	1.404			240.19	34.83	479.97	69.60



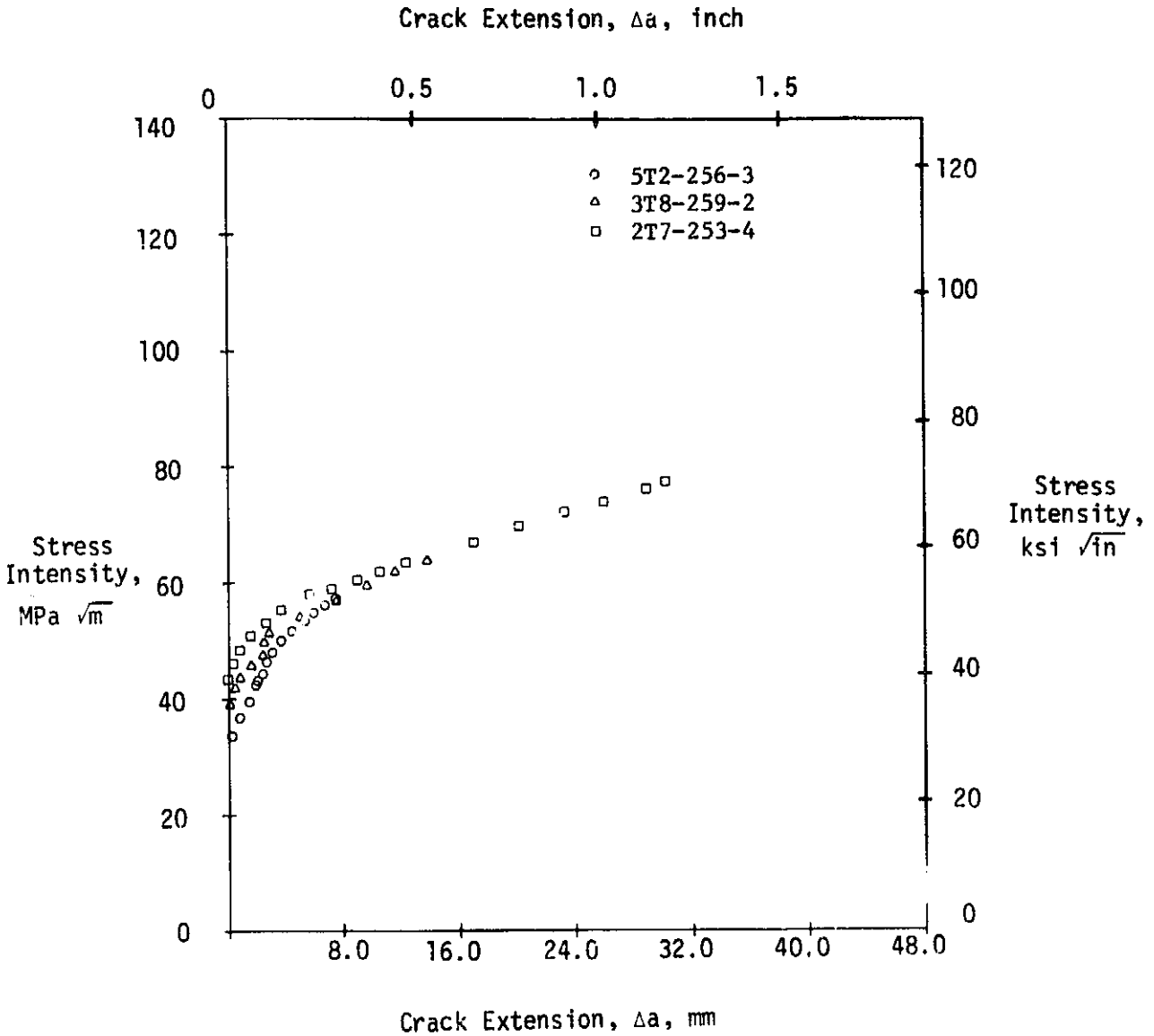
Thickness: 6.35 mm (.250 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C6-1



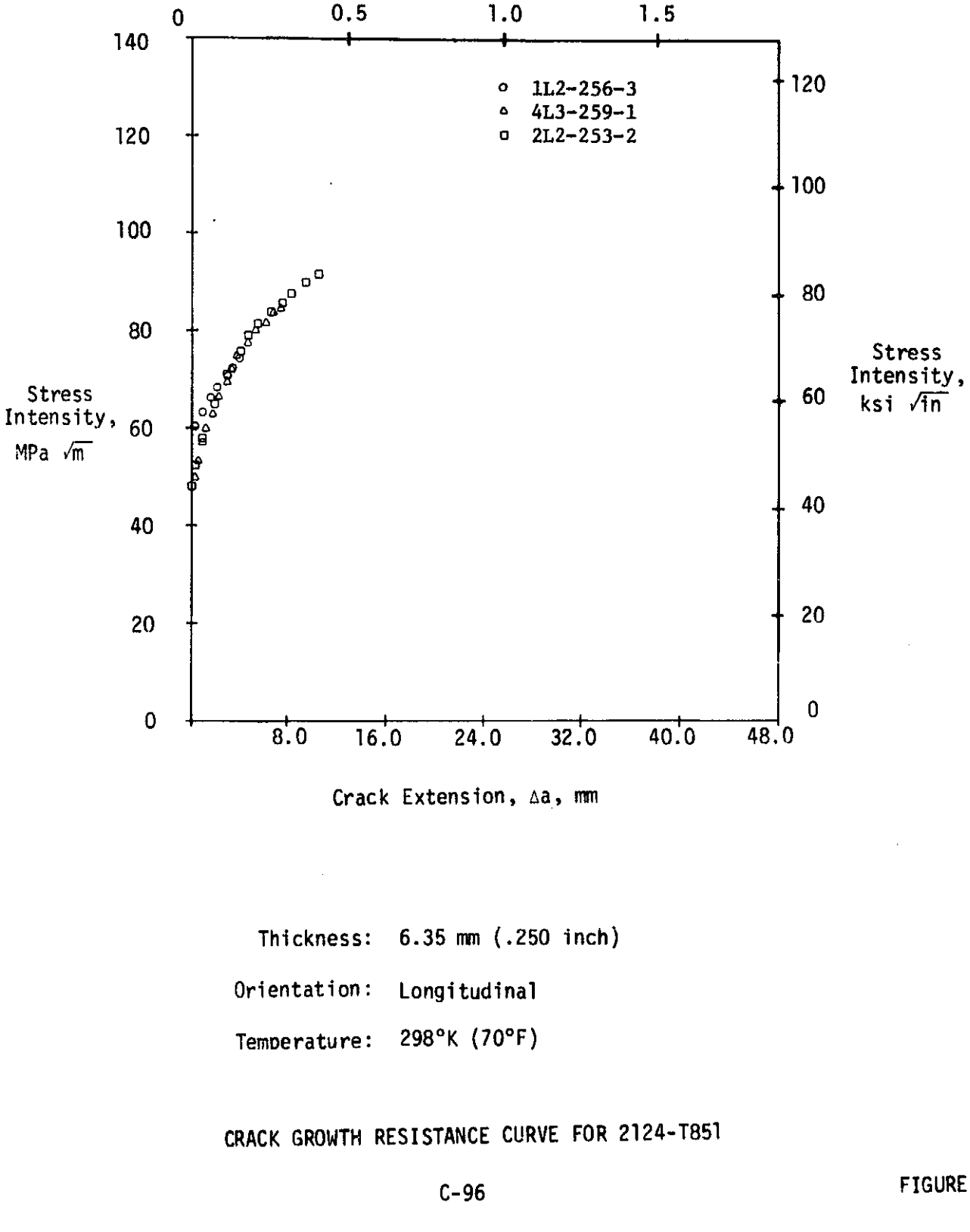
Thickness: 6.35 mm (.250 inch)

Orientation: Transverse

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C6-2

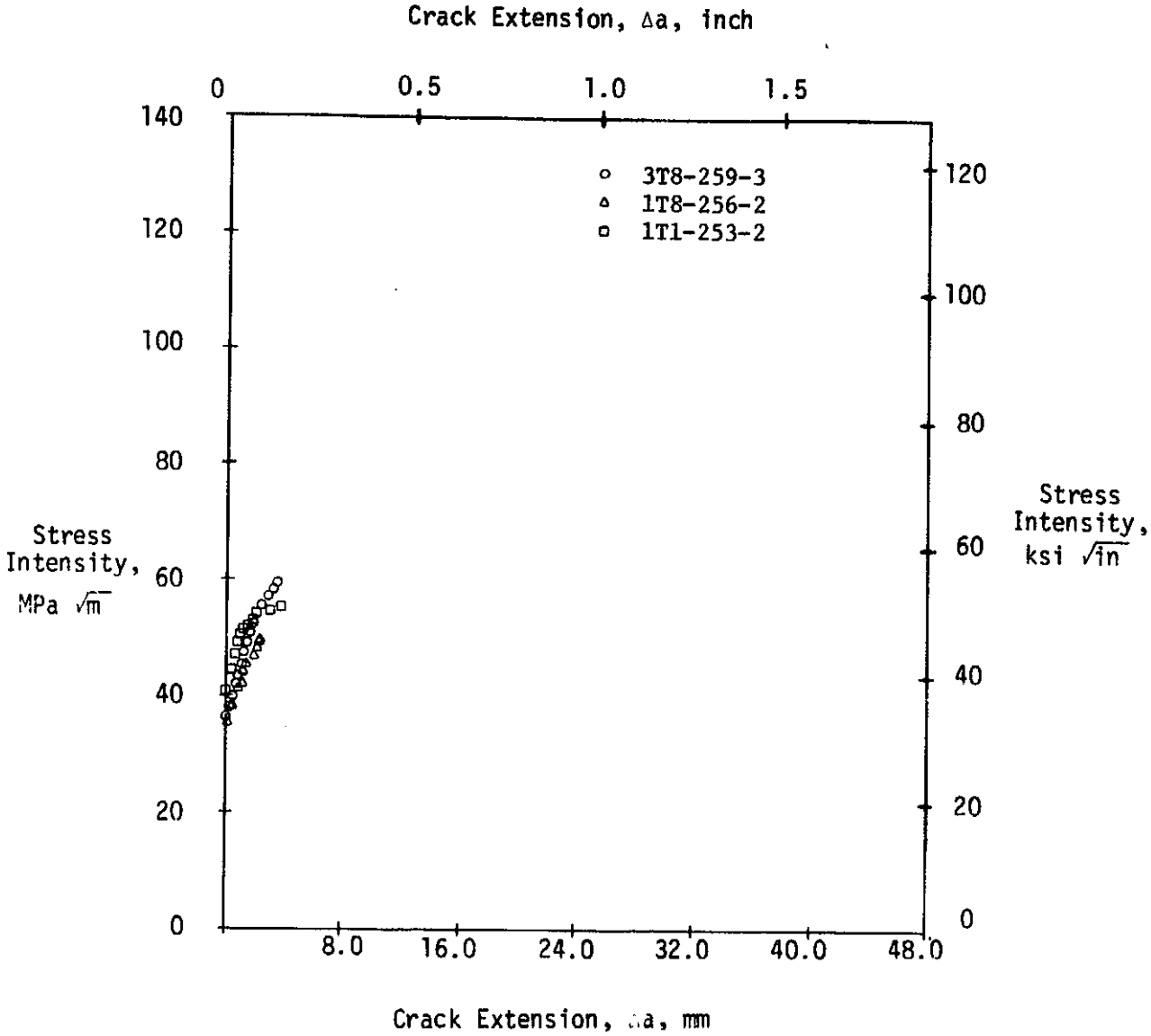


Thickness: 6.35 mm (.250 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

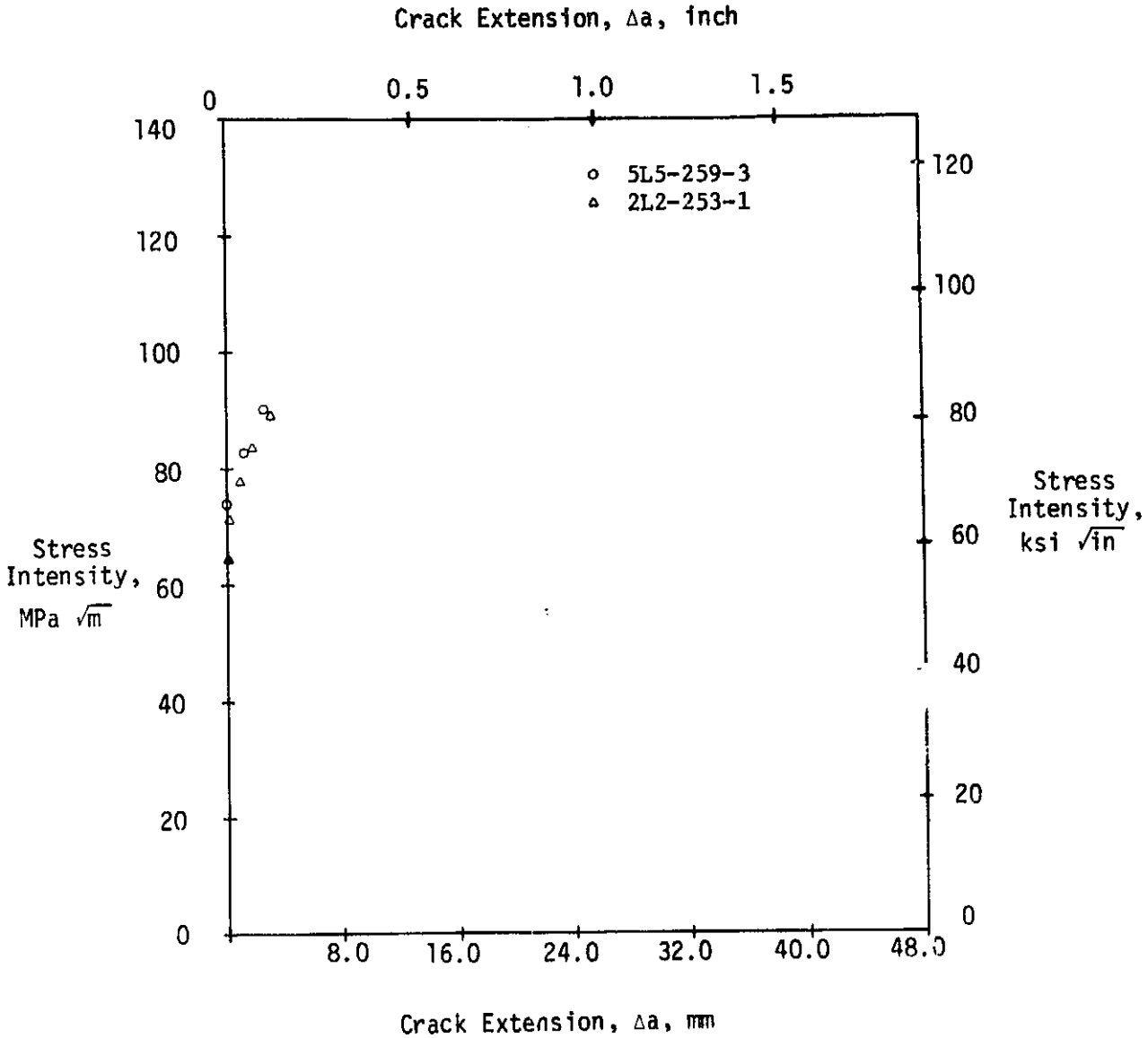


Thickness: 6.35 mm (.250 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851



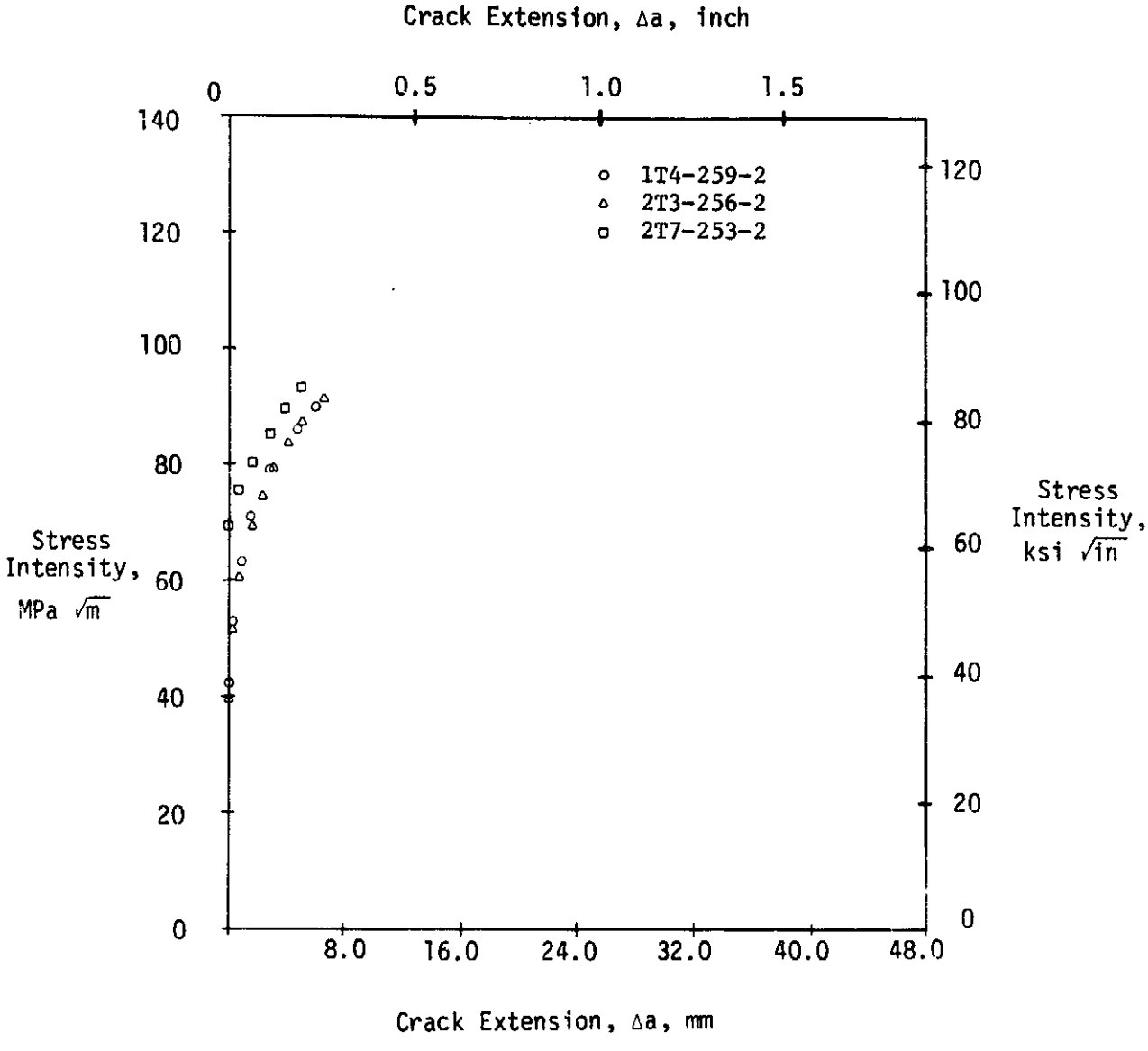
Thickness: 6.35 mm (.250 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C6-5



Thickness: 6.35 mm (.250 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C6-6

SECTION C7. FRACTURE TOUGHNESS TEST DATA
FOR 11.43 mm (.450 INCH) THICK 2124-T851

PRECEDING PAGE BLANK NOT FILMED

TABLE C7-1.

Fracture Toughness Test Data for 2124-T851 Specimens

(11.43 mm (.450 inch) thick)

Specimen Number	Temperature (K)	Orientation	Specimen Dimensions Thickness mm	Thickness in	Width cm	Width in	Precrack Length mm	Precrack Length in	Precrack Load kN	Precrack Load kip	Failure Load kN	Failure Load kip	Full Section Failure Stress MPa	Full Section Failure Stress ksi	Critical Stress Intensity, K_c MPa$\sqrt{m}$	Critical Stress Intensity, K_c ksi$\sqrt{in}$	Data Table No.	Figure No.
5L1-453-1	144	L	11.43	.4500	29.726	11.703	88.24	3.47	249.1	56.0	633.9	142.5	186.6	27.1	114.6	104.3	C7-3	C7-1
4L1-456-2	144	L	11.52	.4536	29.703	11.694	39.57	1.56	333.6	75.0	780.7	175.5	228.2	33.1	*		C7-3	C7-1
4L5-459-2	144	L	11.49	.4522	29.662	11.678	19.86	.78	333.6	75.0	1003.1	225.5	294.5	42.7	78.3	71.2	C7-4	C7-1
														AVG:	96.5	87.8		
4L12-453-3	294	L	11.39	.4486	29.705	11.695	88.62	3.49	249.1	56.0	834.0	187.5	246.4	35.7	**		C7-5	C7-3
5L3-459-2	294	L	11.48	.4520	29.675	11.683	31.60	1.24	333.6	75.0	960.8	216.0	282.1	40.9	88.1	80.2	C7-6	C7-3
4L5-456-1	294	L	11.43	.4500	29.721	11.701	15.87	.63	355.9	80.0	1296.7	291.5	381.8	55.4	70.1	63.8	C7-7	C7-3
														AVG:	79.1	72.0		
4L6-456-2	450	L	11.42	.4498	29.688	11.688	113.33	4.46	311.4	70.0	725.1	163.0	213.8	31.0	NSY		C7-8	C7-5
4L9-453-1	450	L	11.34	.4465	29.705	11.695	89.43	3.52	306.9	69.0	722.8	162.5	214.6	31.1	NSY		C7-9	C7-5
4L1-459-1	450	L	11.51	.4532	29.682	11.686	78.84	3.10	333.6	75.0	866.3	194.7	253.6	36.8	NSY		C7-10	C7-5
3T6-456-1	144	T	11.59	.4563	29.693	11.690	89.51	3.52	151.2	34.0	350.3	78.7	101.8	14.8	47.7	43.4	C7-11	C7-2
5T9-459-2	144	T	11.37	.4477	29.644	11.671	21.03	.83	333.6	75.0	612.7	137.7	181.8	26.4	43.9	39.9	C7-12	C7-2
3T1-459-2	144	T	11.41	.4493	29.675	11.683	13.03	.51	333.6	75.0	814.0	183.0	240.4	34.9	41.9	38.1	C7-13	C7-2
														AVG:	44.5	40.5		
2T2-453-2	294	T	11.36	.4474	29.642	11.670	87.73	3.45	154.6	37.0	411.0	92.4	122.0	17.7	51.9	47.2	C7-14	C7-4
5T1-456-1	294	T	11.22	.4416	29.705	11.695	16.00	.63	355.9	80.0	830.7	186.7	349.4	36.2	45.4	41.3	C7-15	C7-4
3T7-459-1	294	T	11.64	.4583	29.736	11.707	11.15	.44	333.6	75.0	874.1	196.5	252.6	36.6	36.1	33.0	C7-16	C7-4
														AVG:	44.5	40.5		
1T7-453-3	450	T	11.44	.4502	29.677	11.684	92.25	3.63	329.2	74.0	730.6	164.2	215.3	31.2	NSY		C7-17	C7-6
1T5-459-1	450	T	11.47	.4516	29.688	11.688	67.01	2.64	333.6	75.0	795.1	178.7	233.5	33.9	NSY		C7-18	C7-6
5T4-456-2	450	T	11.37	.4477	29.698	11.692	38.76	1.53	266.9	60.0	1030.9	231.7	305.3	44.3	**		C7-19	C7-6

* Recorder malfunction prior to failure.

** Compliance gage slipped on knife edges.

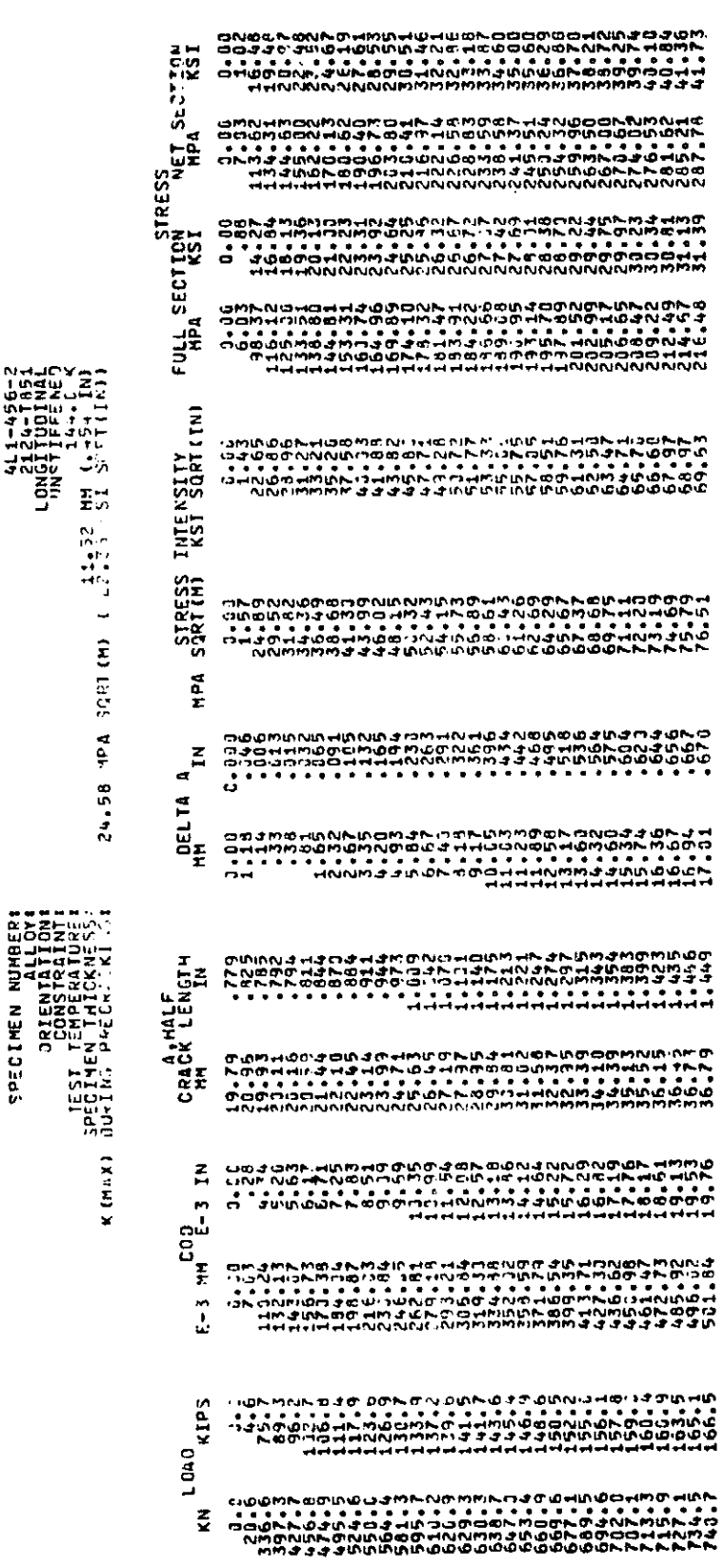
NSY Net section stress greater than 0.2 percent offset yield strength prior to failure.

TABLE C7-2

SPECIMEN NUMBER: 5L1-453-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.4 K
SPECIMEN THICKNESS: 11.43 MM (.450 IN)
K(MAX) DURING PRECRACKING: 28.88 MPA SQRT(M) (26.28 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.12	1.737	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
291.5	65.6	233.75	9.20	44.31	1.745	.19	.008	33.92	30.87	85.90	12.46	122.39	17.75
391.1	87.9	321.32	12.67	44.98	1.771	.86	.034	45.89	41.76	115.13	16.70	165.09	23.94
460.6	108.8	399.94	15.74	44.99	1.771	.87	.034	56.40	51.33	141.48	20.52	202.90	29.42
519.8	116.9	444.95	17.52	45.83	1.805	1.71	.068	61.72	56.17	153.03	22.19	221.26	32.09
529.7	119.1	459.30	18.08	46.26	1.821	2.14	.084	63.25	57.56	155.92	22.61	226.38	32.83
539.5	121.3	483.91	19.05	47.46	1.869	3.34	.132	65.48	59.59	158.80	23.03	233.30	33.83
546.1	123.2	520.82	20.50	49.59	1.952	5.47	.215	68.42	62.27	161.33	23.40	242.13	35.11
562.8	126.5	565.93	22.28	51.58	2.035	7.56	.298	72.20	65.70	165.66	24.02	253.96	36.83
568.9	127.9	608.99	23.98	54.09	2.129	9.97	.392	75.26	68.49	167.46	24.29	263.27	38.18
592.2	133.1	682.80	26.88	56.91	2.240	12.79	.503	81.16	73.86	174.32	25.28	282.48	40.96
614.3	138.1	754.57	29.71	59.33	2.336	15.21	.599	86.74	78.93	180.82	26.22	300.95	43.64
631.4	142.0	811.98	31.97	61.48	2.405	16.96	.668	91.09	82.89	185.87	26.95	315.55	45.76
636.3	143.1	832.49	32.78	61.75	2.431	17.63	.694	92.55	84.22	187.31	27.16	320.46	46.47
636.3	143.1	859.14	33.82	63.05	2.482	18.93	.745	94.02	85.56	187.31	27.16	325.37	47.18
636.3	143.1	926.81	36.49	66.20	2.606	22.08	.869	97.65	88.87	187.31	27.16	337.76	48.98
637.6	143.3	998.53	39.23	69.14	2.722	25.02	.985	101.34	92.23	187.68	27.22	350.92	50.89
633.9	142.5	1047.79	41.25	71.50	2.815	27.38	1.078	103.65	94.33	186.59	27.05	359.59	52.15
630.2	141.7	1105.20	43.51	74.00	2.913	29.88	1.176	106.18	96.63	185.51	26.90	369.45	53.58
625.3	140.6	1215.92	47.87	78.32	3.083	34.20	1.346	110.98	101.03	184.07	26.69	380.19	56.42
622.8	140.0	1302.04	51.26	81.50	3.201	37.15	1.464	114.64	104.33	183.34	26.59	404.73	58.69

TABLE C7-3



ORIGINAL PAGE IS
OF POOR QUALITY

TABLE C7-4

SPECIMEN NUMBER: 4L5-459-2
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 11.49 MM (.452 IN)
K(MAX) DURING PRECRACKING: 17.34 MPA SQRT(M) (15.78 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	3.93	.391	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
826.4	185.8	447.40	5.84	12.15	.400	.23	.009	43.44	39.54	242.58	35.18	260.42	37.76
857.9	192.9	161.56	6.35	13.63	.418	.71	.027	46.16	42.00	251.84	36.52	271.28	39.34
884.5	198.9	175.36	6.89	11.08	.436	1.15	.045	48.62	44.24	259.66	37.65	280.63	40.70
906.3	203.7	188.56	7.42	11.58	.456	1.66	.065	50.92	46.34	266.04	38.58	288.56	41.85
925.5	208.1	203.34	8.01	12.15	.478	2.22	.087	53.29	48.49	271.69	39.40	295.93	42.91
935.0	210.2	218.74	8.61	12.88	.507	2.95	.116	55.47	50.48	274.47	39.80	300.58	43.59
951.8	214.0	232.23	9.14	13.36	.526	3.43	.135	57.52	52.35	279.42	40.52	307.08	44.53
963.8	216.7	244.43	9.62	13.83	.544	3.89	.153	59.28	53.94	282.93	41.03	312.02	45.25
982.6	220.9	279.73	11.01	15.39	.606	5.45	.215	63.83	58.09	288.46	41.83	321.85	46.67
989.6	222.5	298.34	11.75	16.23	.639	6.30	.248	66.08	60.13	290.50	42.13	326.20	47.30
994.0	223.5	320.79	12.63	17.32	.682	7.38	.291	68.63	62.45	291.80	42.32	330.37	47.91
993.6	223.4	341.95	13.46	18.43	.725	8.49	.334	70.84	64.47	291.67	42.30	333.05	48.30
997.9	224.3	366.32	14.42	19.58	.771	9.64	.380	73.43	66.83	292.96	42.48	337.51	48.94
999.8	224.8	393.90	15.51	20.93	.824	11.00	.433	76.19	69.34	293.51	42.56	341.74	49.56
1004.2	225.8	416.99	16.42	21.97	.865	12.04	.474	78.51	71.45	294.80	42.75	346.08	50.19
1004.1	225.7	424.69	16.72	22.36	.880	12.43	.489	79.23	72.10	294.75	42.74	347.09	50.33

TABLE C7-5

SPECIMEN NUMBER: 4L12-453-3
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 11.39 MM (.449 IN)
K(MAX) DURING PRECRACKING: 29.07 MPA SQRT(M) (26.46 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.31	1.744	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
349.6	78.6	305.40	12.02	44.90	1.768	.59	.023	41.13	37.43	103.29	14.98	148.05	21.47
383.9	86.3	341.31	13.44	45.38	1.787	1.07	.042	45.47	41.38	113.43	16.45	163.35	23.69
419.4	94.3	379.79	14.95	45.88	1.806	1.57	.062	50.02	45.52	123.94	17.97	179.33	26.01
458.7	103.1	423.39	16.67	46.38	1.826	2.07	.081	55.07	50.12	135.53	19.65	197.06	28.58
488.1	109.7	469.53	18.49	47.73	1.879	3.42	.135	59.68	54.32	144.22	20.91	212.51	30.82
527.3	118.5	523.37	20.61	48.65	1.915	4.34	.171	65.27	59.40	155.80	22.59	231.69	33.60
561.5	126.2	584.88	23.03	50.24	1.978	5.93	.233	70.98	64.60	165.93	24.06	250.74	36.36
595.8	133.9	647.67	25.50	51.62	2.032	7.31	.288	76.68	69.78	176.06	25.53	269.83	39.13
635.0	142.8	718.15	28.27	52.82	2.080	8.51	.335	82.99	75.53	187.63	27.21	291.20	42.23
665.6	149.6	778.37	30.64	53.86	2.120	9.55	.376	88.14	80.21	196.67	28.52	308.56	44.75
690.1	155.1	824.50	32.46	54.47	2.144	10.16	.400	92.09	83.81	203.90	29.57	321.98	46.69
719.4	161.7	883.44	34.78	55.25	2.175	10.94	.431	96.96	88.24	212.58	30.83	338.50	49.09
747.6	168.1	944.93	37.20	56.10	2.209	11.79	.464	101.82	92.67	220.69	32.03	354.95	51.47
774.4	174.1	1015.38	39.98	57.25	2.254	12.94	.509	107.01	97.38	228.84	33.19	372.36	54.00
800.1	179.9	1079.43	42.50	58.09	2.287	13.78	.542	111.71	101.66	236.42	34.29	388.27	56.31
822.1	184.8	1139.63	44.87	58.90	2.319	14.59	.575	115.94	105.51	242.92	35.23	402.57	58.38
830.7	186.7	1160.11	45.67	59.09	2.326	14.78	.582	117.41	106.85	245.45	35.59	407.62	59.11
828.2	186.2	1176.76	46.33	59.83	2.356	15.52	.611	119.13	107.50	244.71	35.49	409.78	59.43

TABLE C7-6

SPECIMEN NUMBER: SL3-459-2
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294. DEG K
SPECIMEN THICKNESS: 11.48 MM (.452 IN)
K(MAX) DURING PRECRACKING: 21.97 MPA SQRT(M) (19.99 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	FULL SECTION STRESS MPA	FULL SECTION STRESS KSI	NET SECTION STRESS MPA	NET SECTION STRESS KSI
5.41	1.22	0.00	0.00	15.80	.622	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
6.41	1.44	0.13	.01	16.46	.648	.66	.026	4.33	3.94	18.82	2.73	21.43	3.11
6.77	1.52	0.25	.01	15.92	.627	.12	.005	14.55	13.23	63.73	9.24	72.59	10.53
6.68	1.50	0.38	.01	16.12	.635	.32	.013	25.14	22.88	113.25	16.43	129.06	18.72
6.68	1.50	0.51	.02	16.64	.655	.84	.033	33.74	30.70	176.58	25.61	201.23	29.18
6.68	1.50	0.64	.03	16.92	.666	1.12	.044	37.47	34.09	181.67	26.35	207.02	30.02
6.68	1.50	0.76	.03	17.15	.675	1.35	.053	42.38	38.57	198.24	28.75	225.98	32.78
6.68	1.50	0.89	.04	17.53	.690	1.73	.068	44.93	40.89	211.02	30.60	240.55	34.89
6.68	1.50	1.02	.04	17.91	.705	2.11	.083	47.16	42.92	221.43	32.11	252.43	36.61
6.68	1.50	1.14	.04	18.09	.712	2.29	.090	48.35	44.00	227.00	32.92	258.78	37.53
6.68	1.50	1.27	.05	18.49	.728	2.69	.106	50.56	46.01	237.34	34.42	270.56	39.24
6.68	1.50	1.40	.06	18.87	.743	3.07	.121	52.61	47.87	246.99	35.82	281.57	40.84
6.68	1.50	1.52	.06	19.25	.758	3.45	.136	54.52	49.61	255.96	37.12	291.80	42.32
6.68	1.50	1.65	.06	19.63	.773	3.83	.151	56.31	51.24	264.38	38.34	301.40	43.71
6.68	1.50	1.78	.07	20.02	.788	4.22	.166	58.00	52.78	272.31	39.49	310.46	45.03
6.68	1.50	1.91	.08	20.40	.803	4.60	.181	59.59	54.23	279.74	40.57	318.96	46.26
6.68	1.50	2.03	.08	20.78	.818	4.98	.196	61.11	55.61	286.88	41.61	327.13	47.44
6.68	1.50	2.16	.09	21.16	.833	5.36	.211	62.55	56.92	293.63	42.59	334.82	48.56
6.68	1.50	2.29	.09	21.54	.848	5.74	.226	63.92	58.17	300.08	43.53	342.19	49.63
6.68	1.50	2.41	.09	21.92	.863	6.12	.241	65.23	59.36	306.23	44.42	349.23	50.65
6.68	1.50	2.54	.10	22.30	.878	6.50	.256	66.48	60.50	312.11	45.27	355.96	51.63
6.68	1.50	2.67	.11	22.68	.893	6.88	.271	67.68	61.59	317.73	46.08	362.40	52.57
6.68	1.50	2.79	.11	23.06	.908	7.26	.286	68.83	62.64	323.11	46.86	368.56	53.47
6.68	1.50	2.92	.11	23.44	.923	7.64	.301	69.94	63.65	328.27	47.61	374.46	54.32
6.68	1.50	3.05	.12	23.82	.938	8.02	.316	71.01	64.62	333.22	48.33	380.12	55.14
6.68	1.50	3.18	.13	24.20	.953	8.40	.331	72.04	65.56	337.97	49.02	385.54	55.92
6.68	1.50	3.30	.13	24.58	.968	8.78	.346	73.04	66.47	342.54	49.68	390.75	56.67
6.68	1.50	3.43	.14	24.96	.983	9.16	.361	74.01	67.34	346.93	50.32	395.76	57.39
6.68	1.50	3.56	.14	25.34	.998	9.54	.376	74.95	68.19	351.16	50.93	400.58	58.09
6.68	1.50	3.68	.14	25.72	1.013	9.92	.391	75.86	69.01	355.24	51.52	405.23	58.76
6.68	1.50	3.81	.15	26.10	1.028	10.30	.406	76.75	69.81	359.17	52.09	409.72	59.41
6.68	1.50	3.94	.16	26.48	1.043	10.68	.421	77.61	70.58	362.97	52.64	414.06	60.04
6.68	1.50	4.06	.16	26.86	1.058	11.06	.436	78.45	71.33	366.64	53.17	418.26	60.65
6.68	1.50	4.19	.17	27.24	1.073	11.44	.451	79.27	72.07	370.19	53.68	422.33	61.24
6.68	1.50	4.32	.17	27.62	1.088	11.82	.466	80.07	72.79	373.63	54.18	426.28	61.81
6.68	1.50	4.44	.17	28.00	1.103	12.20	.481	80.85	73.49	376.97	54.67	430.11	62.37
6.68	1.50	4.57	.18	28.38	1.118	12.58	.496	81.61	74.18	380.21	55.14	433.83	62.91
6.68	1.50	4.70	.19	28.76	1.133	12.96	.511	82.36	74.86	383.37	55.60	437.46	63.44
6.68	1.50	4.82	.19	29.14	1.148	13.34	.526	83.09	75.52	386.45	56.05	441.00	63.95
6.68	1.50	4.95	.19	29.52	1.163	13.72	.541	83.81	76.17	389.45	56.48	444.45	64.45
6.68	1.50	5.08	.20	29.91	1.178	14.11	.556	84.52	76.81	392.38	56.91	447.82	64.94
6.68	1.50	5.21	.21	30.35	1.197	14.55	.573	85.31	77.52	395.61	57.38	451.52	65.48
6.68	1.50	5.33	.21	30.73	1.212	14.93	.588	85.99	78.14	398.43	57.79	454.74	65.95
6.68	1.50	5.46	.22	31.11	1.227	15.31	.603	86.67	78.76	401.24	58.20	457.96	66.42
6.68	1.50	5.59	.22	31.49	1.242	15.69	.618	87.34	79.37	403.96	58.59	461.07	66.87
6.68	1.50	5.71	.23	31.87	1.257	16.07	.633	87.99	79.96	406.68	58.98	464.18	67.32
6.68	1.50	5.84	.23	32.25	1.272	16.45	.648	88.64	80.55	409.31	59.36	467.19	67.75
6.68	1.50	5.97	.24	32.63	1.287	16.83	.663	89.28	81.13	411.85	59.73	470.10	68.17
6.68	1.50	6.10	.24	33.01	1.302	17.21	.678	89.91	81.70	414.39	60.10	473.01	68.60

TABLE C7-7

SPECIMEN NUMBER: 4L5-456-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 11.43 MM (.450 IN)
K(MAX) DURING PRECRACKING: 16.57 MPA SQRT(M) (15.08 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	7.94	.312	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
150.6	33.9	2.39	.09	8.18	.322	.24	.010	7.12	6.48	44.34	6.43	46.92	6.805
298.7	67.2	45.06	1.77	8.76	.345	.82	.032	14.62	13.30	87.96	12.75	93.46	13.554
449.2	101.0	72.17	2.84	9.15	.360	1.22	.048	22.48	20.46	132.25	19.15	140.94	20.44
613.8	138.0	119.13	4.69	9.01	.355	1.08	.042	35.44	32.25	210.15	30.48	223.73	32.442
822.9	185.0	143.32	5.63	9.09	.358	1.15	.045	41.03	37.34	242.28	35.13	258.06	37.42
907.7	204.1	163.74	6.45	9.45	.360	1.22	.048	45.42	41.34	267.25	38.76	284.79	41.30
970.6	218.2	183.34	7.22	9.34	.368	1.40	.055	49.07	44.66	285.77	41.44	304.94	44.22
1021.4	229.6	200.86	7.91	9.50	.374	1.57	.062	52.09	47.40	300.71	43.61	321.25	46.59
1047.8	235.6	216.22	8.51	9.84	.388	1.91	.075	54.39	49.49	308.49	44.74	330.37	47.91
1076.6	242.1	234.65	9.24	10.24	.403	2.30	.091	57.00	51.87	316.96	45.96	340.41	49.36
1002.9	247.9	255.11	10.04	10.72	.421	2.76	.109	59.72	54.35	324.70	47.09	349.89	50.74
1029.1	253.8	276.58	10.89	11.16	.439	3.22	.127	62.44	56.83	332.43	48.21	359.41	52.12
1033.6	254.8	292.66	11.53	11.72	.462	3.79	.149	64.29	58.51	333.74	48.40	362.33	52.54
1035.4	255.2	317.27	12.49	12.65	.498	4.71	.186	66.93	60.91	334.27	48.47	365.37	52.99
1032.1	254.5	346.74	13.65	13.87	.546	5.93	.234	69.94	63.65	333.32	48.34	367.63	53.31
1032.7	254.6	419.93	16.53	16.70	.658	8.77	.345	76.98	70.05	333.47	48.36	375.70	54.48
1035.6	255.3	491.11	19.33	19.34	.762	11.40	.449	83.28	75.79	334.35	48.49	384.38	55.74
1054.1	259.9	529.82	20.86	20.26	.798	12.32	.485	86.70	78.96	339.79	49.28	393.42	57.05
1072.7	263.6	566.51	22.30	21.03	.828	13.09	.515	89.83	81.75	345.25	50.07	402.16	58.32
1095.5	268.8	625.57	24.63	22.35	.880	14.41	.568	94.58	86.07	351.98	51.04	414.29	60.08
1018.4	273.9	682.58	26.79	23.41	.922	15.47	.609	98.78	89.89	358.73	52.02	425.79	61.75
1038.9	278.5	736.61	29.08	24.32	.966	16.59	.653			364.74	52.89	436.83	63.35
1052.3	281.5	785.44	30.92	25.46	1.002	17.52	.690			368.68	53.47	444.91	64.52
1068.0	285.1	834.31	32.85	26.33	1.035	18.36	.723			373.33	54.14	453.60	65.78
1079.0	287.5	881.12	34.69	27.20	1.071	19.27	.759			376.56	54.61	460.94	66.84
1090.3	290.0	927.94	36.53	28.06	1.105	20.12	.792			379.78	55.07	468.18	67.89
1091.4	290.3	966.57	38.05	29.06	1.144	21.12	.832			380.20	55.14	472.63	68.54
1098.0	291.8	992.02	39.06	29.45	1.160	21.52	.847			382.16	55.42	476.63	69.12

TABLE C7-8

SPECIMEN NUMBER: 4L9-453-2
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.42 MM (.450 IN)
K(MAX) DURING PRECRACKING: 42.63 MPA SQRT(M) (38.80 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	56.57	2.231	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
433.3	97.4	55.98	2.20	56.83	2.240	.25	.009	59.49	54.14	127.78	18.53	207.19	30.05
483.7	108.7	635.51	25.02	57.63	2.269	.96	.038	67.02	60.99	142.62	20.68	233.24	33.81
535.3	120.3	731.22	28.79	58.53	2.304	1.86	.073	75.00	68.25	157.84	22.89	260.59	37.79
585.6	131.7	841.06	33.11	59.81	2.355	3.14	.124	83.35	75.85	172.69	25.04	289.22	41.94
621.5	139.7	931.21	36.66	61.35	2.415	4.69	.184	89.67	81.62	183.20	26.57	310.84	45.08
645.9	145.2	1015.79	39.99	62.48	2.460	5.81	.229			190.46	27.62	326.90	47.40
669.3	150.5	1100.33	43.32	63.86	2.514	7.19	.283			197.35	28.62	346.36	50.26
685.3	154.1	1182.11	46.56	65.52	2.580	8.85	.349			202.07	29.30	361.76	52.49
697.6	156.8	1254.27	49.39	67.11	2.642	10.45	.411			205.71	29.83	375.48	54.45
706.3	158.8	1325.97	52.20	68.60	2.701	11.93	.470			208.26	30.20	387.18	56.15
713.7	160.4	1407.80	55.43	70.49	2.775	13.82	.544			210.45	30.52	400.77	58.12
717.5	161.3	1498.11	58.98	72.78	2.865	16.11	.634			211.56	30.68	415.06	60.19
723.7	162.7	1592.76	62.71	74.56	2.936	17.89	.705			213.39	30.95	428.77	62.18
723.8	162.7	1658.98	65.31	76.51	3.012	19.84	.781			213.42	30.95	440.40	63.86
723.8	162.7	1743.66	68.65	78.55	3.093	21.88	.862			213.44	30.95	453.35	65.74

TABLE C7-9

SPECIMEN NUMBER: 4L6-456-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.34 MM (.447 IN)
K(MAX) DURING PRECRACKING: 36.19 MPA SQRT(M) (32.94 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	44.72	1.760	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
489.9	110.1	464.98	18.31	44.76	1.762	.05	.002	57.81	52.61	145.45	21.09	208.20	30.19
549.1	123.4	541.38	21.31	45.41	1.788	.70	.027	65.38	59.52	163.02	23.64	234.82	34.05
598.5	134.5	620.23	24.42	46.53	1.832	1.81	.071	72.36	65.85	177.69	25.77	258.76	37.52
629.4	141.5	672.08	26.46	47.15	1.856	2.43	.096	76.73	69.82	186.86	27.10	273.76	39.70
664.2	149.3	753.49	29.66	48.80	1.921	4.09	.161	82.77	75.33	197.17	28.59	293.67	42.59
685.3	154.1	814.07	31.89	49.96	1.967	5.25	.207	86.72	78.92	203.44	29.50	306.57	44.46
700.4	157.4	840.45	34.66	52.03	2.048	7.31	.288	91.03	82.85	207.92	30.15	320.02	46.41
710.4	159.7	934.96	36.81	53.50	2.110	8.89	.350			210.91	30.59	330.02	47.86
714.4	160.6	987.30	38.87	55.45	2.183	10.74	.423			212.08	30.76	338.46	49.08
717.2	161.2	1060.18	41.74	58.10	2.287	13.38	.527			212.93	30.88	349.74	50.72
719.0	161.6	1171.81	46.13	62.35	2.443	17.33	.682			213.47	30.96	366.64	53.17

TABLE C7-10

SPECIMEN NUMBER: 4L1-459-1
ALLOY: 2124-T851
ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.51 MM (.453 IN)
K(MAX) DURING PRECRACKING: 35.94 MPA SQRT(M) (32.70 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	a, HALF CRACK LENGTH MM	a, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	39.42	1.552	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
546.7	122.9	454.03	17.88	40.03	1.576	.61	.024	59.42	54.08	169.01	23.20	219.11	31.78
622.7	140.0	552.33	21.75	41.26	1.625	1.84	.073	68.93	62.73	192.27	26.43	252.48	36.61
684.0	153.8	636.61	25.06	41.95	1.652	2.53	.100	76.47	69.60	200.22	29.03	279.11	40.47
733.1	164.8	732.23	28.83	43.52	1.713	4.09	.161	83.82	76.28	214.58	31.12	303.60	44.03
772.4	173.6	822.27	32.37	44.97	1.770	5.55	.218	90.12	82.01	226.08	32.79	324.36	47.04
799.4	179.7	912.36	35.92	46.87	1.845	7.45	.293			233.99	33.93	342.01	49.60
824.0	185.2	1005.28	39.58	48.73	1.918	9.31	.366			241.19	34.98	359.09	52.07
835.1	187.7	1072.90	42.24	50.33	1.984	10.97	.432			244.43	35.45	370.09	53.67
848.6	190.7	1157.42	45.57	52.30	2.059	12.88	.507			248.40	36.02	383.59	55.63
853.6	191.8	1227.89	48.34	54.24	2.136	14.82	.584			249.86	36.23	393.78	57.11
858.6	193.0	1312.46	51.67	56.31	2.225	17.09	.673			251.31	36.44	405.86	58.86
861.1	193.6	1397.44	55.02	58.84	2.316	19.42	.764			252.05	36.55	417.61	60.56
862.4	193.8	1507.00	59.33	61.83	2.434	22.41	.882			252.44	36.61	432.73	62.75
862.5	193.9	1597.23	62.88	64.23	2.529	24.81	.977			252.47	36.61	445.38	64.54
858.9	193.1	1693.12	66.66	66.94	2.635	27.52	1.083			251.42	36.46	457.99	66.42
857.8	192.8	1791.81	70.54	69.43	2.732	29.97	1.180			251.09	36.41	471.61	68.39
853.0	191.8	1879.25	73.99	71.77	2.826	32.35	1.274			249.68	36.21	483.51	70.12
850.6	191.2	1935.65	76.21	73.20	2.882	33.78	1.330			248.98	36.11	491.30	71.25

TABLE C7-11

SPECIMEN NUMBER: 3T6-456-1
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.4 K
SPECIMEN THICKNESS: 11.59 MM (.456 IN)
K(MAX) DURING PRECRACKING: 17.47 MPA SQRT(M) (15.90 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	[illegible]	[illegible]	44.75	1.762	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
285.1	64.1	2[illegible]	9.09	45.15	1.778	.406	.016	33.11	30.13	82.84	12.01	119.05	17.26
306.9	68.9	253.[illegible]	9.96	45.73	1.800	.838	.040	35.91	32.67	89.08	12.92	128.79	18.68
328.[illegible]	73.[illegible]	273.27	10.72	45.91	1.808	1.016	.046	38.49	35.03	95.31	13.82	137.98	20.01
337.6	75.9	283.54	11.16	47.16	1.853	2.311	.091	40.26	36.64	98.16	14.23	143.71	20.84
350.6	78.8	294.32	11.60	47.35	1.872	2.794	.110	42.07	38.28	101.90	14.78	149.91	21.74
354.3	79.6	313.34	12.57	48.87	1.924	4.120	.162	43.27	39.37	102.96	14.93	153.48	22.26
354.2	79.6	336.34	13.25	50.88	2.003	6.134	.241	44.42	41.42	102.95	14.93	156.64	22.72
354.2	79.6	353.73	13.93	52.82	2.080	8.077	.318	45.54	41.44	102.95	14.93	159.91	23.19
354.2	79.6	381.57	15.02	55.52	2.186	11.007	.433	47.29	43.04	102.94	14.93	164.96	23.92
354.2	79.6	399.78	15.74	57.70	2.272	13.183	.519	48.41	44.05	102.93	14.93	168.36	24.42
354.2	79.6	428.52	16.87	60.53	2.383	15.799	.621	50.11	45.60	102.92	14.92	173.76	25.20
354.2	79.6	448.62	17.66	62.87	2.475	18.110	.713	51.01	46.43	101.84	14.77	176.63	25.61
350.4	78.8	471.32	18.83	65.75	2.589	21.000	.827	52.54	47.81	101.29	14.69	181.82	26.37
348.[illegible]	78.4	501.36	19.74	68.42	2.678	23.266	.916	53.60	48.78	100.57	14.58	185.97	26.97
346.[illegible]	77.8	531.99	21.91	70.73	2.785	25.98	1.023	54.37	49.03	99.84	14.48	190.77	27.65
343.5	77.2												

TABLE C7-12

SPECIMEN NUMBER: 5T9-453-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 11.37 MM (.448 IN)
K(MAX) DURING PRECRACKING: 18.04 MPA SQRT(M) (16.42 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	10.52	.414	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
15.9	3.6	[illegible]	[illegible]	11.60	.457	1.09	.043	.91	.82	4.73	.69	5.13	.74
112.[illegible]	25.[illegible]	[illegible]	.12	12.71	.500	2.19	.086	6.72	6.12	33.48	4.86	36.62	5.31
165.6	37.2	34.65	1.36	12.84	.506	2.32	.092	9.91	9.02	49.13	7.13	53.79	7.80
213.5	48.0	44.99	1.77	12.93	.509	2.38	.094	12.81	11.65	63.33	9.18	69.37	10.06
317.7	71.4	56.32	2.21	12.67	.499	2.16	.085	18.89	17.19	94.27	13.67	103.28	14.95
371.7	83.6	78.32	3.08	12.72	.501	2.21	.087	22.15	20.15	110.28	15.99	120.64	17.49
457.6	102.9	96.98	3.82	12.66	.499	2.15	.085	27.20	24.75	135.77	19.69	148.45	21.53
487.1	109.5	104.52	4.11	12.75	.502	2.23	.088	29.04	26.43	144.50	20.96	158.10	22.93
512.5	115.3	112.65	4.44	13.02	.513	2.50	.098	30.91	28.13	152.15	22.06	166.80	24.19
521.5	117.2	119.33	4.70	13.53	.533	3.02	.119	32.09	29.17	154.71	22.44	170.26	24.69
533.8	120.[illegible]	124.36	4.90	13.74	.541	3.23	.127	33.07	30.10	156.36	22.96	174.54	25.31
553.4	124.4	136.63	5.36	14.44	.568	3.92	.154	35.17	32.00	164.20	23.81	181.92	26.38
567.[illegible]	127.[illegible]	147.[illegible]	5.79	15.18	.598	4.66	.184	36.97	33.64	169.26	24.40	187.41	27.18
586.7	131.9	163.43	6.43	15.92	.627	5.41	.213	39.20	35.68	174.07	25.24	193.33	28.04
595.4	133.8	173.43	6.83	16.91	.666	6.39	.252	41.03	37.34	176.65	25.62	199.13	28.88
610.2	137.2	185.12	7.29	17.54	.690	7.02	.276	42.86	39.00	181.03	26.25	205.32	29.78
609.0	136.9	193.81	7.63	18.37	.723	7.85	.309	43.81	39.87	180.69	26.20	206.25	29.91

TABLE C7-13

SPECIMEN NUMBER: 3T1-459-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 11.41 MM (.449 IN)
K (MAX) DURING PRECRACKING: 14.11 MPA SQRT(M) (12.84 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	6.32	.256	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
88.4	19.9	3.27	.36	6.53	.257	.01	.001	3.74	3.40	26.10	3.78	27.30	3.96
268.9	60.4	26.44	1.12	6.52	.257	.01	.000	11.38	10.35	79.40	11.51	83.05	12.04
343.8	77.3	38.40	1.51	6.84	.269	.33	.013	14.90	13.56	101.53	14.72	106.43	15.43
455.5	102.4	50.15	1.97	6.66	.262	.14	.006	19.48	17.72	134.52	19.51	140.84	20.42
519.4	116.8	58.51	2.34	6.86	.270	.35	.014	22.55	20.52	153.39	22.24	160.82	23.32
642.2	144.4	75.04	2.95	6.85	.270	.33	.013	27.85	25.34	189.65	27.50	198.83	28.83
686.4	154.3	81.91	3.22	6.93	.273	.41	.016	29.94	27.25	202.72	29.40	212.64	30.84
727.6	163.6	88.16	3.47	6.97	.275	.46	.018	31.81	28.95	214.69	31.13	225.28	32.67
767.5	172.5	95.68	3.77	7.09	.279	.58	.023	33.88	30.83	226.67	32.87	238.05	34.52
788.4	177.2	100.19	3.94	7.19	.283	.67	.026	35.03	31.88	232.84	33.77	244.69	35.48
798.3	179.5	107.71	4.24	7.61	.300	1.10	.043	36.51	33.23	235.76	34.19	248.51	36.04
800.9	180.1	116.64	4.59	8.21	.323	1.69	.067	38.05	34.63	236.52	34.30	250.37	36.31
804.7	180.9	127.48	5.02	8.91	.351	2.40	.094	39.85	36.27	237.65	34.46	252.84	36.67
809.7	182.1	132.57	5.22	9.23	.362	2.68	.106	40.74	37.07	239.12	34.68	254.92	36.97
809.9	182.1	148.53	5.85	10.29	.405	3.77	.149	43.12	39.25	239.18	34.68	257.00	37.27
818.6	184.0	156.80	6.17	10.72	.422	4.20	.165	44.49	40.49	241.74	35.06	260.56	37.79

TABLE C7-14

SPECIMEN NUMBER: 2T2-453-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 11.36 MM (.447 IN)
K (MAX) DURING PRECRACKING: 19.18 MPA SQRT(M) (17.46 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	43.87	1.727	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
90.7	20.4	11.36	0.20	46.33	1.824	2.47	.097	10.94	9.95	26.92	3.90	39.17	5.68
134.5	30.2	121.28	4.77	46.45	1.829	2.58	.102	16.25	14.79	39.94	5.79	58.18	8.44
234.1	52.6	211.75	8.34	46.35	1.825	2.48	.098	28.24	25.70	69.50	10.08	101.12	14.66
330.2	74.2	298.67	11.76	46.06	1.811	2.14	.084	39.64	36.08	98.03	14.22	142.16	20.62
356.3	80.2	325.98	12.83	46.25	1.821	2.38	.094	42.99	39.12	105.94	15.36	153.99	22.33
374.1	84.1	344.19	13.55	46.43	1.828	2.56	.101	45.18	41.11	111.06	16.11	161.73	23.45
393.8	88.5	371.04	14.61	47.20	1.858	3.34	.131	48.06	43.74	116.93	16.96	171.58	24.88
401.2	90.2	383.65	14.99	47.42	1.867	3.56	.140	49.11	44.69	119.13	17.28	175.18	25.40
410.6	92.3	399.85	15.58	47.97	1.889	4.10	.162	50.63	46.08	121.92	17.68	180.26	26.14
411.7	92.6	412.13	16.23	49.38	1.944	5.51	.217	51.72	47.07	122.24	17.73	183.32	26.58

TABLE C7-15

SPECIMEN NUMBER: 5T1-456-1
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 11.22 MM (.442 IN)
K(MAX) DURING PRECRACKING: 16.96 MPA SQRT(M) (15.44 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	8.00	.315	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
326.5	73.4	45.13	1.82	8.02	.316	.02	.001	15.58	14.18	97.99	14.21	103.59	15.02
750.0	168.6	116.99	4.61	8.10	.319	.10	.004	35.97	32.73	225.14	32.65	238.12	34.53
772.2	173.6	123.34	4.86	8.23	.324	.23	.009	37.34	33.98	231.79	33.61	245.39	35.59
784.6	176.4	134.38	5.28	8.77	.345	.76	.030	39.16	35.64	235.51	34.15	250.28	36.29
809.2	181.9	141.54	5.57	8.90	.350	.89	.035	40.69	37.03	242.90	35.22	258.37	37.47
811.7	182.5	147.50	5.79	9.20	.362	1.20	.047	41.51	37.78	243.65	35.33	259.74	37.67
818.0	183.9	155.91	6.14	9.65	.380	1.65	.065	42.87	39.01	245.53	35.61	262.60	38.08
824.2	185.3	163.92	6.45	10.05	.396	2.04	.081	44.07	40.11	247.41	35.88	265.35	38.48
828.8	186.1	171.65	6.72	10.39	.409	2.39	.094	45.04	40.99	248.54	36.04	267.24	38.75
826.8	185.9	175.20	6.90	10.69	.421	2.69	.106	45.61	41.51	248.19	35.99	267.43	38.78

TABLE C7-16

SPECIMEN NUMBER: 3T7-459-1
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 11.64 MM (.458 IN)
K(MAX) DURING PRECRACKING: 12.77 MPA SQRT(M) (11.62 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	5.58	.219	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
800.5	180.0	81.53	3.21	6.14	.242	.57	.022	32.16	29.26	231.29	33.54	241.26	34.99
837.6	188.3	97.98	3.86	6.20	.244	.63	.025	33.81	30.77	242.02	35.10	252.55	36.62
847.6	190.5	103.17	4.06	6.43	.253	.85	.034	34.84	31.71	244.90	35.51	255.97	37.12
847.7	190.5	107.16	4.22	6.68	.263	1.10	.043	35.51	32.32	244.93	35.52	256.45	37.19
843.0	189.5	113.55	4.47	7.12	.280	1.55	.061	36.48	33.20	243.56	35.32	255.82	37.10

TABLE C7-17

SPECIMEN NUMBER: 1T7-453-3
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.1 K
SPECIMEN THICKNESS: 11.44 MM (.450 IN)
K(MAX) DURING PRECRACKING: 39.29 MPA SQRT(M) (35.76 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	46.13	1.816	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
489.4	110.0	479.31	18.87	46.21	1.819	.08	.003	58.48	53.22	144.23	20.92	209.46	30.37
520.7	117.0	534.79	21.05	47.80	1.874	1.47	.058	63.40	57.70	153.44	22.25	225.91	32.76
558.1	125.5	582.11	22.92	47.88	1.877	1.55	.061	68.03	61.91	164.48	23.85	242.36	35.15
582.1	130.9	634.39	24.98	49.99	1.929	2.86	.113	72.20	65.71	171.54	24.88	256.09	37.14
614.6	138.2	686.27	26.94	49.30	1.941	3.17	.125	76.55	69.66	181.13	26.27	271.24	39.33
631.5	142.0	736.98	27.98	49.43	1.946	3.30	.130	78.78	71.69	186.16	26.99	279.35	40.47
654.0	147.0	777.31	30.59	51.11	2.012	4.98	.196	83.41	75.90	192.75	27.95	294.31	42.64
668.2	150.2	825.92	32.52	52.38	2.062	6.25	.246	86.63	78.84	196.94	28.56	304.38	44.14
684.3	153.8	877.79	34.56	53.44	2.106	7.35	.290	90.64	81.94	201.83	29.27	315.56	45.76
694.3	156.1	916.12	36.03	54.34	2.141	8.27	.325	92.34	84.03	204.61	29.67	323.31	46.84
710.5	159.7	1006.62	39.63	56.93	2.242	10.81	.426	*	*	209.39	31.36	339.74	49.27
718.4	161.5	1066.52	41.99	58.64	2.309	12.52	.493	*	*	211.73	30.70	350.09	50.77
726.2	163.3	1146.24	45.13	60.97	2.401	14.85	.585	*	*	214.02	31.04	363.31	52.69
728.1	163.7	1202.98	47.36	62.81	2.473	16.69	.657	*	*	214.58	31.12	372.08	53.96
731.1	164.3	1273.95	50.16	64.95	2.557	18.82	.741	*	*	215.45	31.24	383.14	55.56
730.3	164.2	1344.72	52.94	67.25	2.648	21.13	.832	*	*	215.24	31.21	393.65	57.09
724.8	162.9	1406.74	55.38	69.58	2.739	23.45	.923	*	*	213.62	30.98	402.21	58.33
724.7	162.9	1539.95	60.62	73.36	2.888	27.23	1.072	*	*	213.58	30.97	422.40	61.25

TABLE C7-18

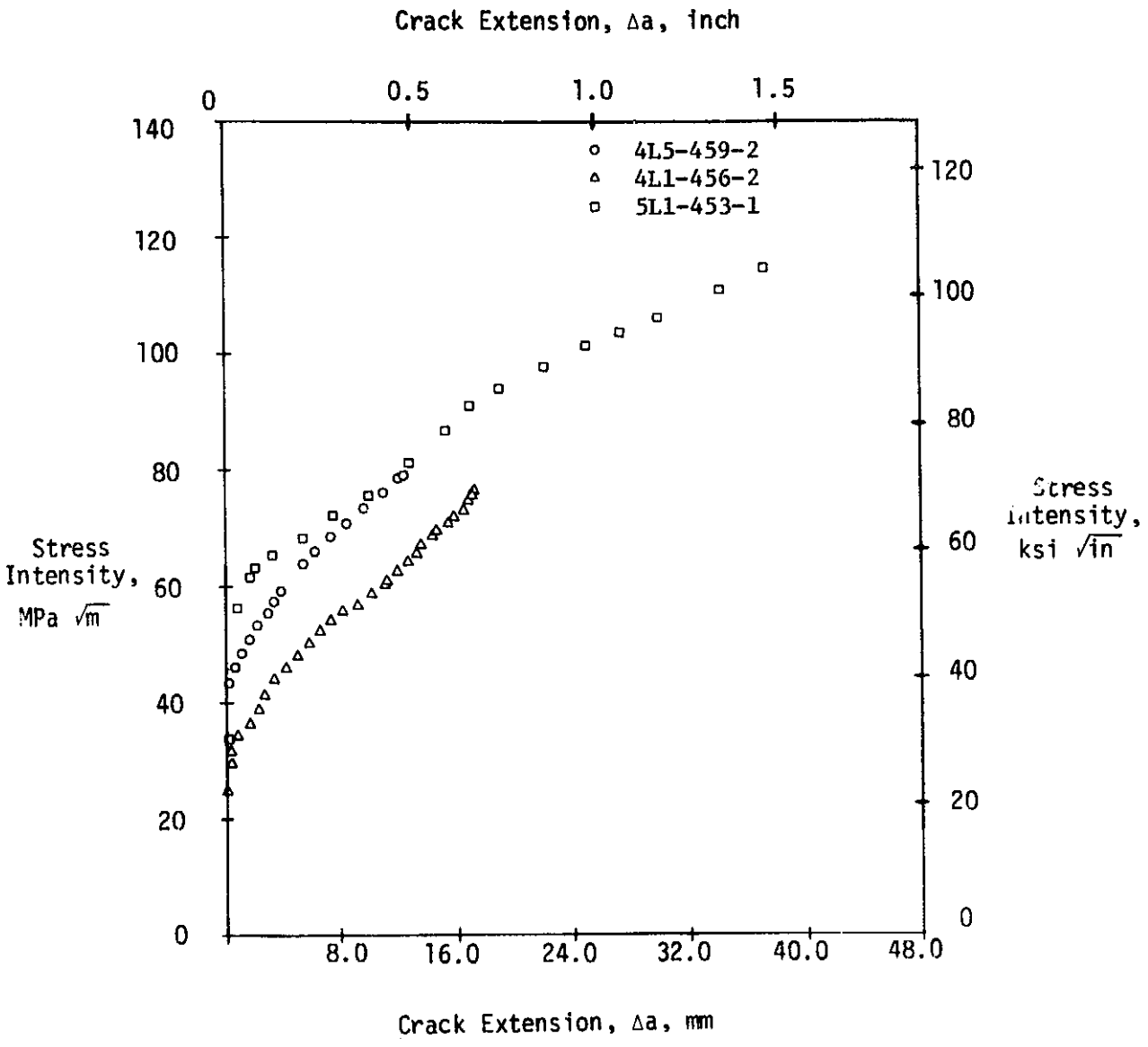
SPECIMEN NUMBER: 1T5-459-1
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.1 K
SPECIMEN THICKNESS: 11.47 MM (.452 IN)
K(MAX) DURING PRECRACKING: 32.82 MPA SQRT(M) (29.87 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	33.53	1.319	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
349.0	78.5	239.04	9.41	34.25	1.349	.75	.030	34.85	31.72	102.75	14.90	133.58	19.37
397.9	89.5	272.81	10.74	35.13	1.383	1.63	.064	40.22	36.60	116.86	16.95	153.10	22.20
442.5	99.5	315.23	12.46	35.97	1.412	2.37	.093	45.36	41.28	130.25	18.89	171.76	24.91
485.6	109.2	363.53	14.28	36.23	1.427	2.73	.108	57.16	52.02	163.18	23.66	215.88	31.31
534.6	120.2	413.23	16.28	36.60	1.441	3.10	.122	62.59	56.96	177.66	25.76	235.80	34.19
604.9	136.0	464.23	18.28	38.22	1.505	4.72	.186	68.38	62.23	189.24	27.44	254.86	36.96
644.3	144.9	529.46	20.83	38.74	1.525	5.24	.206	73.01	66.44	201.46	29.37	271.25	39.34
682.5	153.4	579.77	22.83	40.27	1.585	6.76	.266	78.08	71.06	209.51	30.38	287.50	41.69
713.4	160.4	644.62	25.38	41.47	1.633	7.96	.314	81.80	74.44	215.57	31.26	299.27	43.40
734.3	165.1	695.38	27.38	42.65	1.679	9.15	.360	86.11	78.27	222.91	32.33	312.79	45.36
759.0	170.7	754.60	29.71	44.23	1.753	11.03	.434	89.89	81.81	226.90	32.90	324.13	47.00
772.5	173.7	816.86	32.15	46.62	1.836	13.12	.517	*	*	229.80	33.32	335.03	48.58
782.4	175.9	881.57	34.71	47.60	1.874	14.10	.555	*	*	231.97	33.64	341.49	49.52
789.8	177.6	918.24	36.15	50.00	1.969	16.50	.650	*	*	232.71	33.75	350.91	50.89
792.3	178.1	983.16	38.71	52.03	2.049	18.53	.730	*	*	232.35	33.70	357.76	51.88
791.1	177.8	1033.98	40.71	52.66	2.073	19.16	.754	*	*	232.36	33.70	360.13	52.22
791.1	177.8	1050.91	41.37										

TABLE C7-19

SPECIMEN NUMBER: 5T4-456-2
ALLOY: 2124-T851
ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.37 MM (.448 IN)
K (MAX) DURING PRECRACKING: 19.71 MPA SQRT(M) (17.94 KSI SQRT(IN))

LOAD KN	LOAD KIPS	COD E-3 MM	COD E-3 IN	A, HALF CRACK LENGTH MM	A, HALF CRACK LENGTH IN	DELTA A MM	DELTA A IN	STRESS INTENSITY MPA SQRT(M)	STRESS INTENSITY KSI SQRT(IN)	STRESS FULL SECTION MPA	STRESS FULL SECTION KSI	STRESS NET SECTION MPA	STRESS NET SECTION KSI
0.0	0.0	0.00	0.00	19.39	.763	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
182.3	41.0	64.54	2.54	19.58	.771	.20	.008	13.53	12.32	53.99	7.83	62.19	9.02
288.3	64.8	104.04	4.10	19.68	.775	.30	.012	21.46	19.53	85.37	12.38	98.41	14.27
442.3	99.4	165.76	6.53	19.76	.778	.38	.015	32.99	30.02	130.99	19.00	151.09	21.91
500.3	112.5	197.68	7.78	20.44	.805	1.06	.042	37.98	34.57	148.15	21.48	171.81	24.91
608.8	136.9	248.38	9.78	20.33	.800	.95	.037	46.08	41.94	180.29	26.14	208.88	30.29
643.3	144.6	267.25	10.52	20.34	.801	.96	.038	48.72	44.34	190.51	27.63	220.75	32.01
693.5	156.0	295.30	11.63	20.33	.800	.95	.037	52.53	47.80	205.49	29.80	238.00	34.53
723.5	162.7	316.62	12.47	20.55	.809	1.17	.046	55.09	50.14	214.27	31.07	248.70	36.06
749.4	168.5	333.48	13.11	20.56	.809	1.18	.046	57.07	51.94	221.95	32.19	257.62	37.36
777.9	174.9	354.31	14.11	20.91	.823	1.53	.060	59.77	54.39	230.37	33.41	268.13	38.88
787.8	177.1	364.01	14.46	21.06	.829	1.68	.066	60.76	55.29	233.30	33.83	271.86	39.42



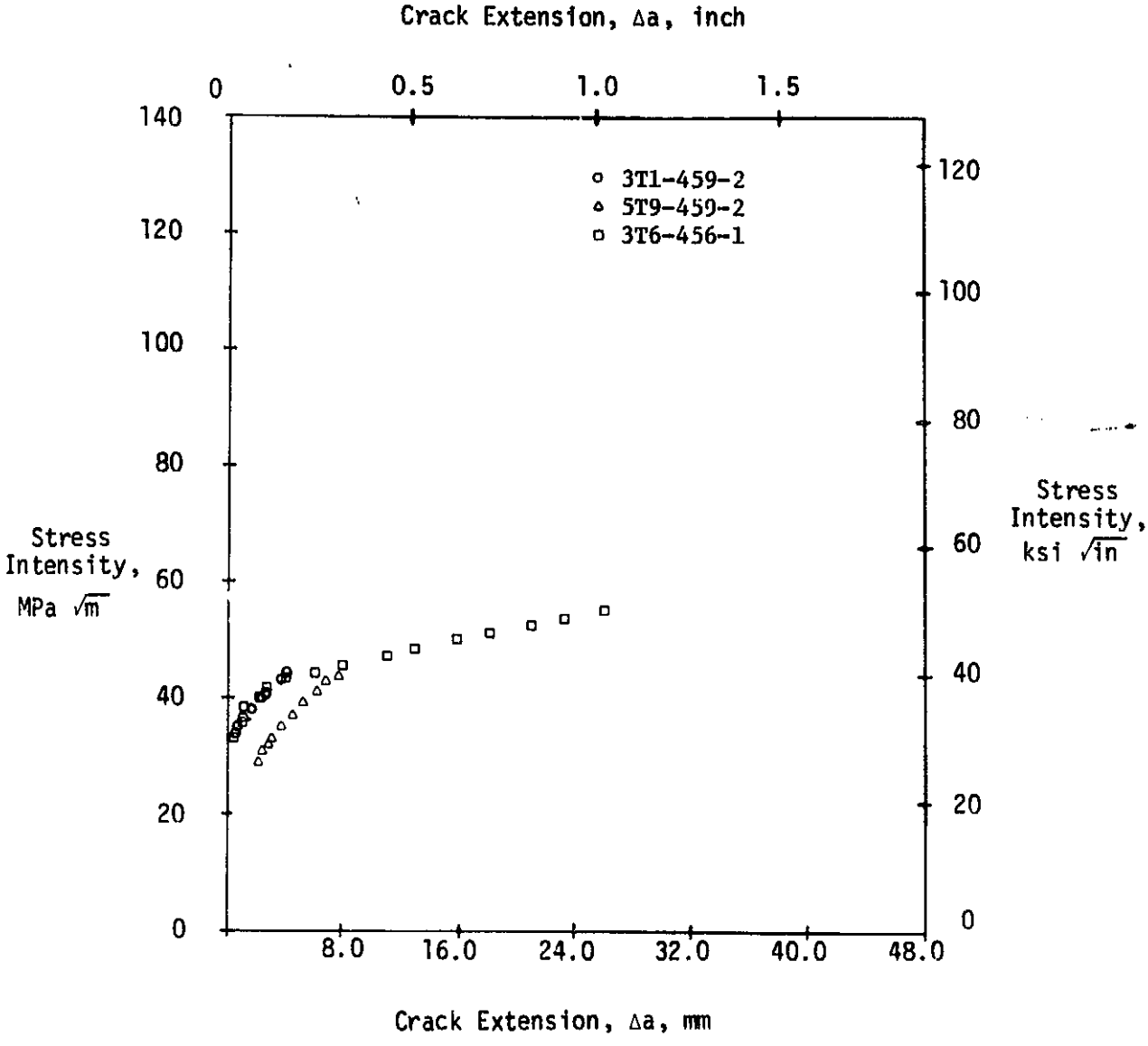
Thickness: 11.47 mm (.450 inch)

Orientation: Longitudinal

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C7-1

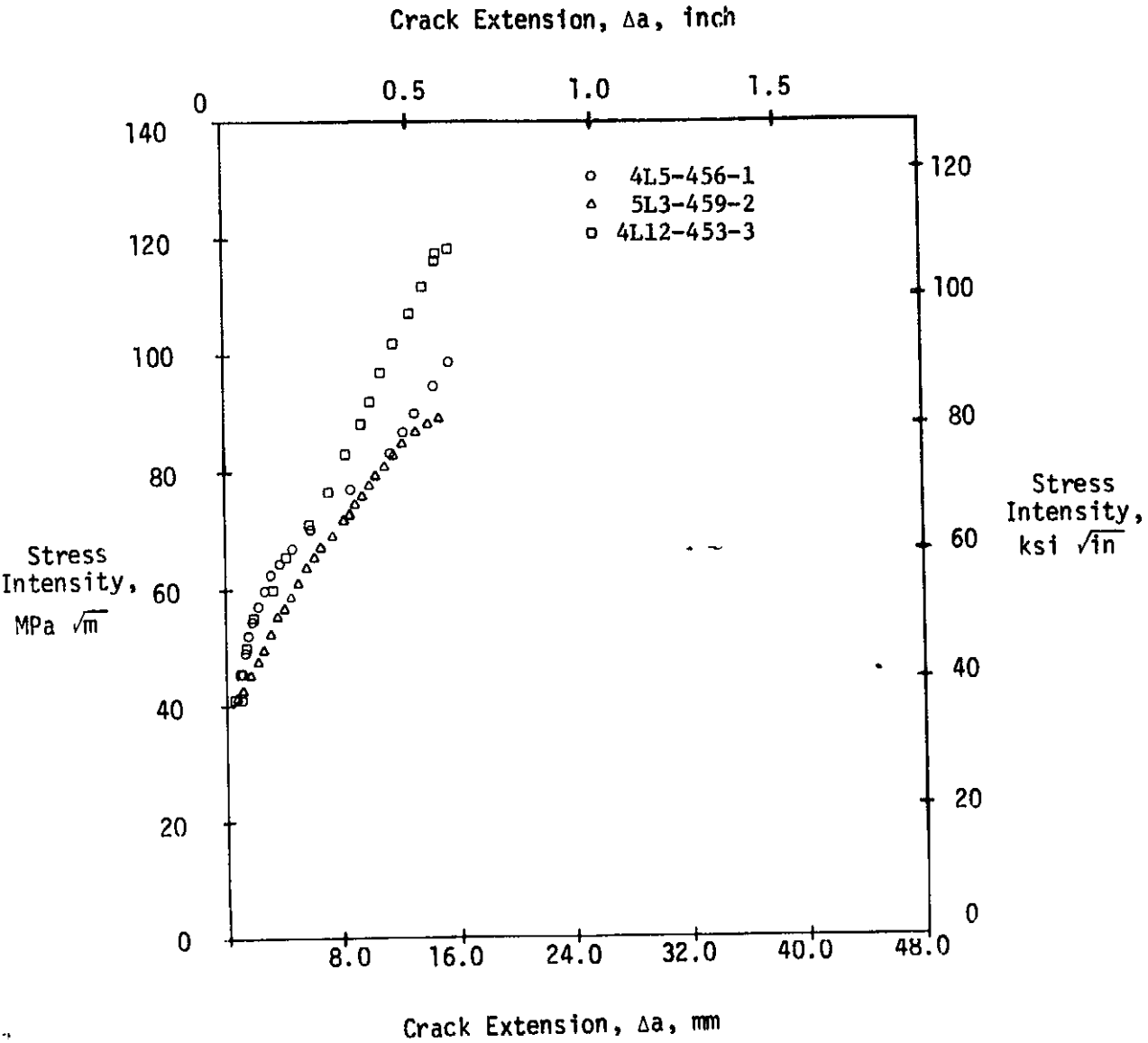


Thickness: 11.47 mm (.450 inch)

Orientation: Transverse

Temperature: 144°K (-200°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851



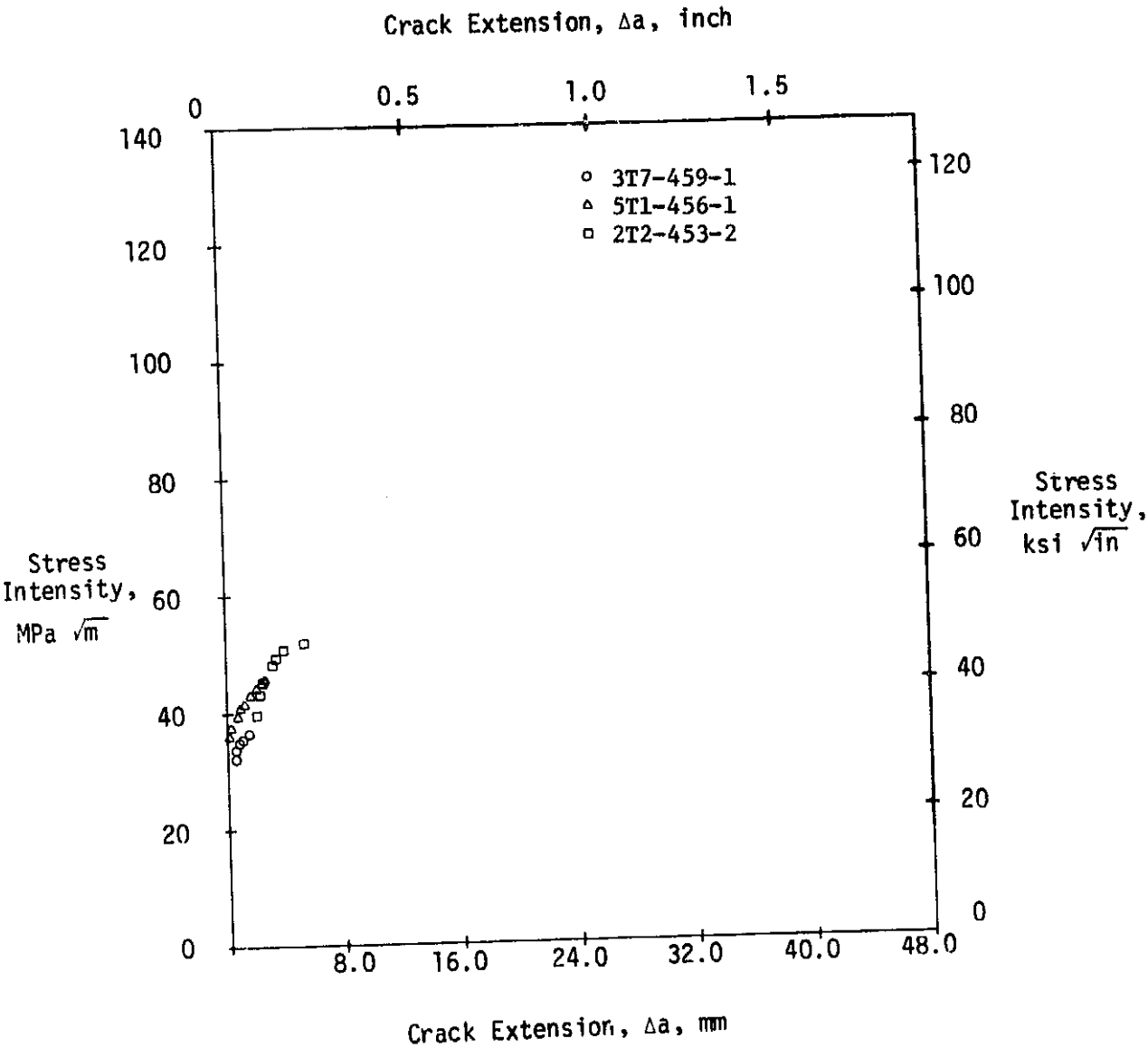
Thickness: 11.47 mm (.450 inch)

Orientation: Longitudinal

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C7-3



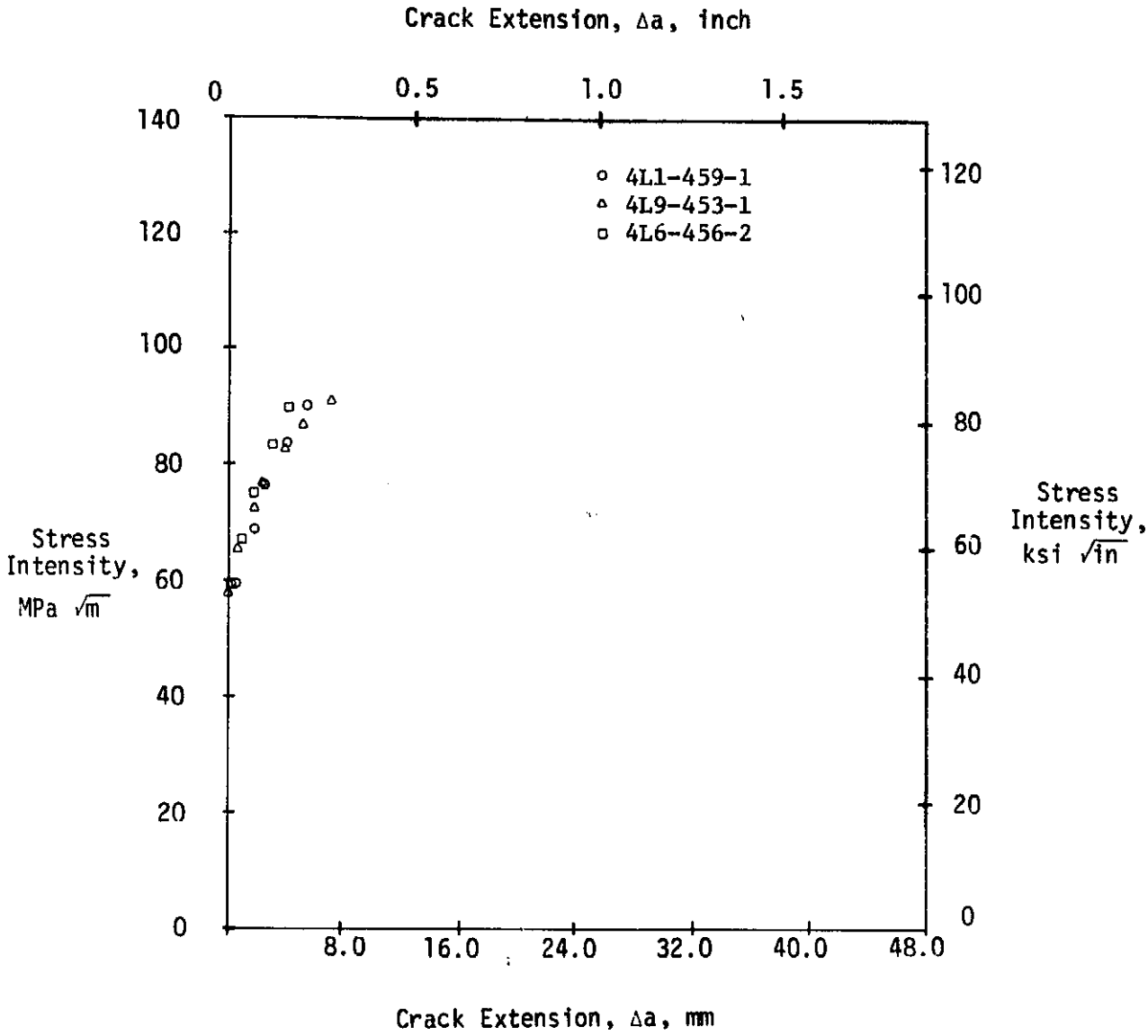
Thickness: 11.47 mm (.450 inch)

Orientation: Transverse

Temperature: 298°K (70°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

FIGURE C7-4

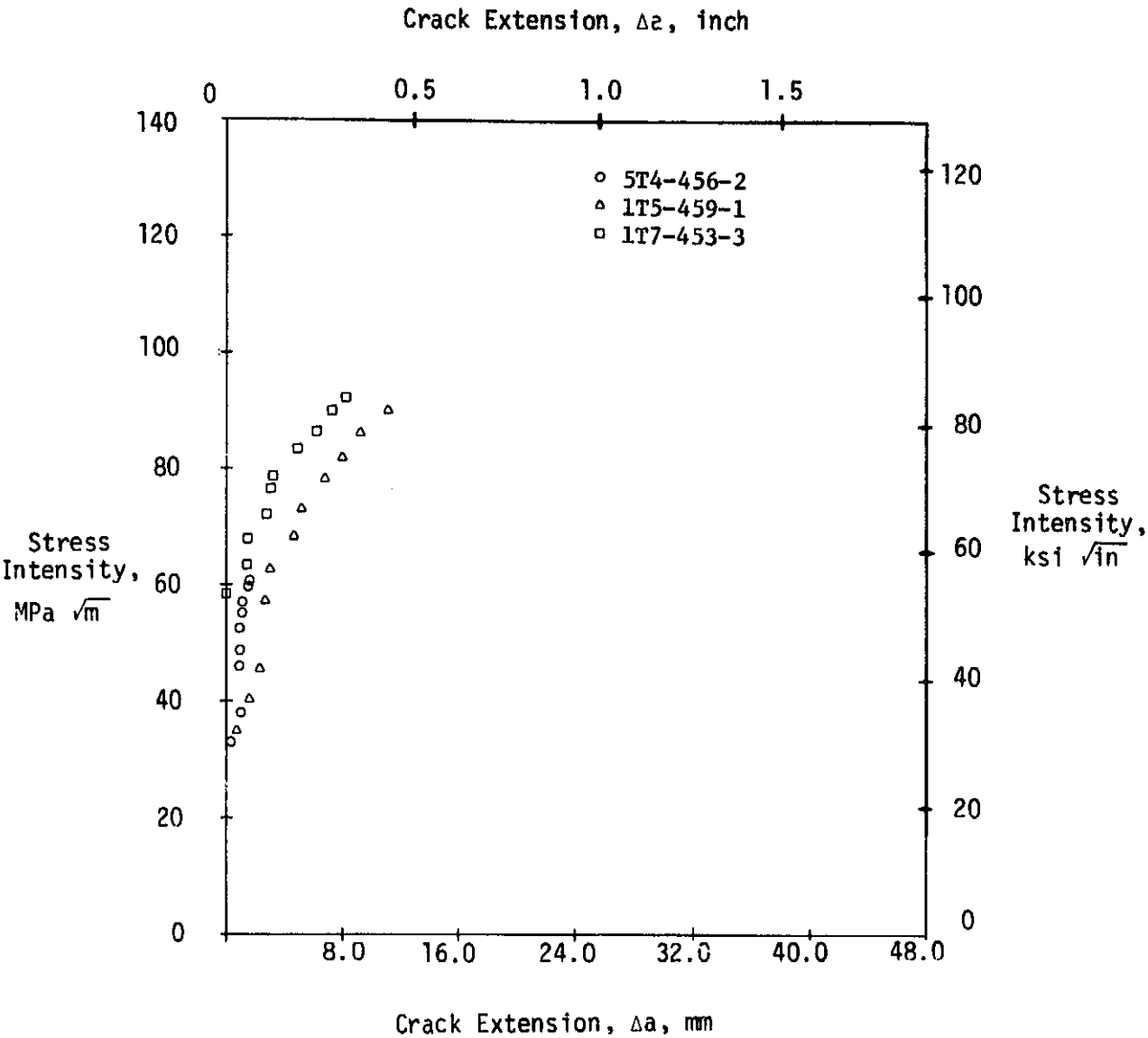


Thickness: 11.47 mm (.450 inch)

Orientation: Longitudinal

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851



Thickness: 11.47 mm (.450 inch)

Orientation: Transverse

Temperature: 450°K (350°F)

CRACK GROWTH RESISTANCE CURVE FOR 2124-T851

Appendix D

CYCLIC FLAW GROWTH TEST DATA

This appendix presents all the cyclic flaw growth test data generated under the program. Because of the great quantity of data, it is divided into sections according to alloy, specimen thickness, and test frequency as follows:

Section	Test Frequency (cpm)	Alloy	Nominal Specimen Thickness	
			mm	in
D1	200	2024-T861	1.60	.063
D2	200	2024-T861	3.18	.125
D3	200	2024-T861	6.35	.250
D4	20	2024-T861 2124-T851	6.35	.250
D5	200	2124-T851	6.35	.250
D6	200	2124-T851	11.43	.450

The data in each section is presented in both graphical and tabular format. At the beginning of each section, a summary table is provided in order to correlate the tabulated specimen data with the appropriate graph. The data tables themselves consist of printed computer output in which the flaw growth rates are reported in modified scientific notation. That is, a flaw growth rate of $.7634 \times 10^{-3}$ mm/cycle is reported as .7634 E-3 mm/cycle, etc. The flaw growth rate (da/dN) and stress intensity (ΔK) data reported in the tables were obtained using the techniques described in Section 4.2.1. The data tables also designate which crack length/cycle number readings were obtained from 16mm motion picture film measurements; such data is preceded by the letter "F".

SECTION D1 - - FLAW GROWTH RATE DATA

FOR 1.60 mm (.063 INCH) THICK 2024-T861

PRECEDING PAGE BLANK NOT FILMED

TABLE D1-1. SUMMARY OF SPECIMEN TEST CONDITIONS FOR 200 CPM TESTS OF 1.60 mm (.063 INCH) 2024-T861

Test Temperature (°K)	Stress Ratio	Constraint	Test Direction	Specimen I.D.	Data Table No.	Figure No.
144 (N_2)	.05	Stiffened	L	63-1L11	D1-2	D1-1(a)
				63-5L3	D1-3	D1-1(a)
			T	63-4T4	D1-4	D1-1(b)
				63-5T5	D-15	D1-1(b)
	.50	Stiffened	L	63-1L6	D1-6	D1-2(a)
				63-2L1	D1-7	D1-2(a)
			T	63-5T10	D1-8	D1-2(b)
				63-6T4	D1-9	D1-2(b)
	.05	Unstiffened	L	U63-5L1	D1-10	D1-3(a)
				U63-4L3	D1-11	D1-3(a)
			T	U63-5T9	D1-12	D1-3(b)
				U63-6T6	D1-13	D1-3(b)
298 (Argon)	.05	Stiffened	L	63-6L1	D1-14	D1-4(a)
				63-2L9	D1-15	D1-4(a)
				63-4L2	D1-16	D1-4(a)
			T	63-5T8	D1-17	D1-4(b)
				63-3T2	D1-18	D1-4(b)
				63-6T8	D1-19	D1-4(b)
	.50	Stiffened	L	63-2L6	D1-20	D1-5(a)
				63-1L13	D1-21	D1-5(a)
				63-2L10	D1-22	D1-5(a)
			T	63-3T7	D1-23	D1-5(b)
				63-4T1	D1-24	D1-5(b)
				63-3T11	D1-25	D1-5(b)
	.05	Unstiffened	L	U63-2L5	D1-26	D1-6(a)
				U63-2L2	D1-27	D1-6(a)
				U63-1L4	D1-28	D1-6(a)
			T	U63-4T2	D1-29	D1-6(b)
				63-5T8	D1-30	D1-6(b)
				U63-4T3	D1-31	D1-6(b)
				U63-3T5	D1-32	D1-6(b)

TABLE D1-1 (CONTINUED)

Test Temperature (°K)	Stress Ratio	Constraint	Test Direction	Specimen I.D.	Data Table No.	Figure No.
298 (Wet Air)	.05	Unstiffened	L	U63-2L12	D1-33	D1-6(a)
				U63-3L1	D1-34	D1-6(a)
				U63-2L13	D1-35	D1-6(a)
			T	U63-5T2	D1-36	D1-6(b)
				U63-5T6	D1-37	D1-6(b)
				U63-3T3	D1-38	D1-6(b)
422	.05	Stiffened	L	63-3L3	D1-39	D1-7(a)
				63-2L7	D1-40	D1-7(a)
			T	63-4T9	D1-41	D1-7(b)
				63-5T4	D1-42	D1-7(b)
	.05	Unstiffened	L	U63-4L1	D1-43	D1-9(a)
	.05	Unstiffened	T	U63-5T3	D1-44	D1-10
450	.05	Stiffened	L	63-1L15	D1-45	D1-7(a)
				63-6L4	D1-46	D1-7(a)
			T	63-3T12	D1-47	D1-7(b)
				63-1T1	D1-48	D1-7(b)
	.50	Stiffened	L	63-1L1	D1-49	D1-8(a)
				63-2L15	D1-50	D1-8(a)
			T	63-4T7	D1-51	D1-8(b)
				63-3T10	D1-52	D1-8(b)
	.05	Unstiffened	L	U63-3L4	D1-53	D1-9(a)
				U63-1L9	D1-54	D1-9(a)
			T	U63-6T3	D1-55	D1-9(b)
				U63-5T7	D1-56	D1-9(b)
478	.05	Stiffened	L	63-1L8	D1-57	D1-7(a)
				63-6L3	D1-58	D1-7(a)
			T	63-4T6	D1-59	D1-7(b)
				63-4T12	D1-60	D1-7(b)
		Unstiffened	L	U63-1L5	D1-61	D1-9(a)
			T	U63-4T8	D1-62	D1-9(b)

TABLE D1-2

SPECIMEN NUMBER: 63-1L11
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 115.5 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 5845 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 60.80 MPA SQRT(M) (55.33 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	8.32	.328	1				
	8.94	.352	886	.7634E-03	.3006E-04	18.61	16.93
	9.31	.367	1236	.9144E-03	.3600E-04	19.14	17.42
	9.99	.393	1821	.1143E-02	.4487E-04	19.65	17.89
	10.45	.411	2166	.1351E-02	.5319E-04	20.23	18.41
	11.21	.441	2662	.1751E-02	.6892E-04	20.84	18.96
	11.75	.462	2972	.1993E-02	.7833E-04	21.46	19.53
	12.51	.493	3211	.2259E-02	.8894E-04	22.07	20.09
	13.05	.514	3398	.2852E-02	.1123E-03	22.67	20.63
	13.82	.544	3661	.2832E-02	.1115E-03	23.24	21.15
	14.38	.566	3861	.4215E-02	.1659E-03	23.82	21.68
	15.11	.595	4052	.2939E-02	.1149E-03	24.38	22.19
	15.63	.615	4171	.4418E-02	.1739E-03	24.91	22.67
	16.17	.637	4317	.3969E-02	.1562E-03	25.35	23.07
	16.94	.667	4449	.5673E-02	.2234E-03	25.90	23.57
	17.48	.688	4559	.4614E-02	.1817E-03	26.42	24.04
	18.21	.717	4674	.6078E-02	.2377E-03	26.90	24.48
	19.00	.748	4789	.6449E-02	.2539E-03	27.48	25.01
	20.22	.796	4966	.7308E-02	.2877E-03	28.25	25.71
	21.38	.842	5138	.8171E-02	.3217E-03	29.14	26.51
	22.83	.899	5352	.9471E-02	.3729E-03	30.09	27.38
	24.14	.950	5542	.1356E-01	.5263E-03	31.07	28.27
	25.15	.990	5683	.1223E-01	.4813E-03	31.88	29.01
	26.47	1.042	5810	.1954E-01	.7694E-03	32.67	29.73
	27.79	1.094	5926	.2354E-01	.9269E-03	33.56	30.54
	29.14	1.147	6011	.3033E-01	.1181E-02	34.45	31.35
F	30.10	1.185	6045	.2435E-01	.1115E-02	35.21	32.04
F	31.67	1.246	6085	.3349E-01	.1200E-02	36.02	32.78
F	32.89	1.295	6125	.4231E-01	.1667E-02	36.92	33.60
F	34.04	1.340	6153	.4572E-01	.1800E-02	37.69	34.30
F	35.66	1.403	6173	.7623E-01	.3000E-02	38.94	35.37
F	36.58	1.440	6185	.6773E-01	.2667E-02	39.34	35.80
F	37.85	1.490	6195	.1270E+00	.5000E-02	40.05	36.45
F	39.62	1.560	6206	.1778E+00	.7000E-02	41.00	37.31
F	41.27	1.625	6215	.1651E+00	.6500E-02	42.07	38.28
F	42.80	1.685	6223	.3048E+00	.1200E-01	43.05	39.18
F	44.45	1.750	6230	.3302E+00	.1300E-01	44.04	40.08
F	46.46	1.829	6238	.4826E+00	.1900E-01	45.30	41.22
F	48.51	1.910	6243	.5503E+00	.2167E-01	46.56	42.37
F	49.91	1.965	6245	.6985E+00	.2750E-01	47.51	43.24
F	51.82	2.040	6247	.9525E+00	.3750E-01	48.55	44.18
F	53.97	2.125	6249	.1079E+01	.4250E-01	49.83	45.35
F	55.12	2.170	6250	.1143E+01	.4500E-01	50.89	46.31
F	56.51	2.225	6251	.1397E+01	.5500E-01	51.70	47.05
F	58.67	2.310	6252	.2159E+01	.8500E-01	52.86	48.10
F	62.48	2.460	6253	.3810E+01	.1500E+00	54.83	49.89
F	64.90	2.555	6254	.2413E+01	.9500E-01	56.93	51.81

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-3

SPECIMEN NUMBER: 63-SL1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.64 MM (.0644 IN)
MAXIMUM STRESS: 168.9 MPA (24.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3349 CYCLES
K(MAX) 179 CYCLES PRIOR TO FAILURE: 35.41 MPA SQRT(M) (32.22 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.42	.174	1	.1136E-02	.4473E-04	20.00	18.20
4.65	.183	902	.1909E-02	.7517E-04	21.81	19.85
5.29	.208	1341	.2217E-02	.8731E-04	23.30	21.20
7.13	.281	1707	.2256E-02	.8878E-04	24.90	22.29
7.69	.303	1973	.3181E-02	.1252E-03	25.76	23.44
8.05	.317	2273	.3934E-02	.1550E-03	27.03	24.59
8.32	.327	2442	.6965E-02	.2742E-03	28.02	25.50
8.94	.352	2537	.5262E-02	.2040E-03	29.00	26.39
10.68	.421	2669	.7644E-02	.3009E-03	30.06	27.35
11.51	.453	2777	.1062E-01	.4181E-03	31.21	28.40
12.32	.485	2863	.1165E-01	.4588E-03	32.30	29.40
13.19	.519	2934	.1566E-01	.6167E-03	33.22	30.24
13.84	.545	2971				

TABLE D1-4

SPECIMEN NUMBER: 63-AT4
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 2.54 MM (.100 IN)
MAXIMUM STRESS: 214.7 MPA (31.1 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3241 CYCLES
K(MAX) 168 CYCLES PRIOR TO FAILURE: 32.56 MPA SQRT(M) (29.63 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.38	.330	1	.1210E-02	.4765E-04	18.60	16.93
8.90	.350	427	.1508E-02	.5938E-04	19.29	17.56
9.68	.381	944	.2704E-02	.1065E-03	19.94	18.15
10.16	.400	1122	.2115E-02	.8325E-04	20.40	18.56
10.58	.416	1319	.1856E-02	.7306E-04	20.77	18.90
10.91	.430	1499	.1077E-02	.4241E-04	20.97	19.08
11.00	.433	1578	.1957E-02	.7703E-04	21.21	19.30
11.40	.449	1787	.4944E-02	.1947E-03	21.84	19.88
12.33	.485	1974	.5441E-02	.2142E-03	22.59	20.56
13.04	.513	2104	.3486E-02	.1372E-03	23.14	21.06
13.56	.534	2253	.7419E-02	.2921E-03	23.74	21.60
14.40	.567	2367	.8959E-02	.3527E-03	24.39	22.19
15.06	.593	2441	.1033E-01	.4065E-03	24.96	22.72
15.78	.621	2510	.5772E-02	.2272E-03	25.50	23.20
16.36	.644	2611	.8547E-02	.3366E-03	25.99	23.65
16.99	.669	2685	.9472E-02	.3729E-03	26.60	24.21
17.90	.705	2781	.9777E-02	.3849E-03	27.20	24.75
18.92	.729	2844	.1203E-01	.4736E-03	27.77	25.27
19.38	.763	2916	.1905E-01	.7501E-03	28.47	25.91
20.37	.802	2964	.2605E-01	.1026E-02	29.31	26.67
21.85	.860	3017	.2492E-01	.1135E-02	31.35	27.62
23.27	.916	3073				

TABLE D1-5

SPECIMEN NUMBER: 63-515
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 1.64 MM (.0647 IN)
MAXIMUM STRESS: 164.9 MPA (23.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1773 CYCLES
K(MAX) 42 CYCLES PRIOR TO FAILURE: 35.60 MPA SQRT(M) (32.40 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.75	.175	1				
			.1399E-02	.5509E-04	19.29	17.55
5.20	.205	541				
			.2691E-02	.1060E-03	20.99	19.87
6.17	.243	902				
			.3719E-02	.1463E-03	22.44	20.42
6.87	.270	1089				
			.5202E-02	.2048E-03	23.75	21.62
7.74	.305	1256				
			.5984E-02	.2356E-03	25.01	22.76
8.44	.332	1374				
			.8210E-02	.3232E-03	26.34	23.97
9.49	.373	1501				
			.1232E-01	.4850E-03	27.97	25.46
10.72	.422	1601				
			.1690E-01	.6655E-03	29.45	26.88
11.65	.459	1656				
			.3479E-01	.1370E-02	31.83	28.24
13.14	.517	1699				
			.4778E-01	.1881E-02	32.91	29.95
14.67	.578	1731				

TABLE D1-6

SPECIMEN NUMBER: 63-116
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 22833 CYCLES
K(MAX) 95 CYCLES PRIOR TO FAILURE: 45.28 MPA SQRT(M) (41.14 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.91	.391	1				
			.1995E-03	.7813E-05	10.68	9.72
10.42	.410	3495				
			.2977E-03	.1172E-04	11.11	10.11
11.61	.457	6788				
			.3727E-03	.1467E-04	11.55	10.52
12.43	.488	8935				
			.4702E-03	.1851E-04	11.97	11.89
13.31	.524	12877				
			.5641E-03	.2221E-04	12.49	11.29
14.27	.562	12873				
			.6113E-03	.2405E-04	12.83	11.67
15.19	.598	14875				
			.7813E-03	.3075E-04	13.26	12.07
16.25	.640	15436				
			.9508E-03	.3772E-04	13.64	12.42
16.97	.668	16199				
			.1126E-02	.4431E-04	13.98	12.72
17.83	.702	16954				
			.1511E-02	.5950E-04	14.39	13.09
18.97	.747	17727				
			.1363E-02	.5367E-04	14.98	13.63
20.79	.819	19042				
			.2136E-02	.8406E-04	15.61	14.20
22.21	.874	19727				
			.2383E-02	.9372E-04	16.23	14.77
24.09	.948	20495				
			.3098E-02	.1219E-03	16.89	15.37
25.81	1.016	21051				
			.4443E-02	.1748E-03	17.56	16.00
27.95	1.100	21633				
			.4892E-02	.1926E-03	18.26	16.62
29.72	1.169	21931				
			.7244E-02	.2852E-03	18.92	17.21
31.76	1.250	22175				
			.1024E-01	.4044E-03	19.65	17.88
34.03	1.340	22336				
			.1251E-01	.4931E-03	20.31	18.48
35.71	1.406	22511				
			.2071E-01	.8161E-03	20.91	19.02
37.44	1.474	22623				
			.3254E-01	.1285E-02	21.56	19.62
39.69	1.563	22665				
			.4142E-01	.1631E-02	22.25	20.25
41.45	1.647	22734				

TABLE D1-7

SPECIMEN NUMBER: 63-2L1
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.5 K
SPECIMEN THICKNESS: 1.43 MM (.0560 IN)
MAXIMUM STRESS: 168.9 MPA (24.5 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 10847 CYCLES
K(MAX) 200 CYCLES PRIOR TO FAILURE: 46.20 MPA SQRT(M) (42.04 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.76	.227					
			.3113E-03	.1226E-04	11.73	10.68
6.51	.256	2412				
			.4433E-03	.1744E-04	12.62	11.49
7.24	.285	5155				
			.9948E-03	.3916E-04	13.59	12.37
8.76	.345	6144				
			.9997E-03	.3936E-04	14.29	13.01
9.40	.370	6743				
			.1251E-02	.4953E-04	14.86	13.52
10.21	.432	7426				
			.1915E-02	.7540E-04	15.48	14.08
11.05	.435	7865				
			.1691E-02	.6657E-04	16.10	14.65
11.94	.470	8391				
			.2221E-02	.8744E-04	16.76	15.25
12.93	.509	8836				
			.2534E-02	.9975E-04	17.43	15.86
13.94	.549	9233				
			.1972E-02	.1409E-03	18.12	16.49
15.65	.593	9545				
			.4342E-02	.1710E-03	18.87	17.17
16.31	.642	9836				
			.5269E-02	.2074E-03	19.59	17.53
17.46	.687	10051				
			.6073E-02	.2391E-03	20.36	18.53
18.92	.745	10294				
			.1340E-01	.4093E-03	21.03	19.14
19.77	.778	10375				
			.8976E-02	.3534E-03	21.56	19.62
20.82	.820	10483				
			.1464E-01	.5763E-03	22.08	20.10
21.66	.853	10551				
			.1129E-01	.4443E-03	22.51	20.49
22.41	.882	10617				
			.2375E-01	.9350E-03	22.91	20.85
23.13	.910	10647				

TABLE D1-8

SPECIMEN NUMBER: 63-5T10
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.66 MM (.0653 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 9744 CYCLES
K(MAX) 62 CYCLES PRIOR TO FAILURE: 41.17 MPA SQRT(M) (37.47 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
10.39	.409					
			.3945E-03	.1569E-04	10.95	9.96
11.16	.439	1942				
			.6167E-03	.2428E-04	11.34	10.32
11.95	.470	3223				
			.6980E-03	.2748E-04	11.70	10.65
12.62	.497	4180				
			.1232E-02	.4852E-04	12.06	10.97
13.46	.530	4856				
			.1543E-02	.6074E-04	12.53	11.40
14.64	.577	5629				
			.1258E-02	.4951E-04	13.00	11.83
15.54	.612	6343				
			.1763E-02	.6940E-04	13.37	12.17
16.37	.644	6812				
			.2441E-02	.9613E-04	13.71	12.48
17.12	.674	7120				
			.2503E-02	.9841E-04	14.03	12.77
17.91	.705	7435				
			.2707E-02	.1066E-03	14.36	13.09
18.83	.741	7777				
			.3173E-02	.1248E-03	14.74	13.41
19.68	.775	8043				
			.4191E-02	.1650E-03	15.25	13.88
21.44	.844	8463				
			.5477E-02	.2156E-03	15.90	14.47
23.09	.909	8764				
			.6204E-02	.2443E-03	16.59	15.10
25.14	.990	9095				
			.1445E-01	.5689E-03	17.39	15.83
27.51	1.083	9259				
			.1230E-01	.4841E-03	18.22	16.58
29.87	1.176	9451				
			.1095E-01	.4310E-03	18.86	17.16
31.23	1.228	9572				
			.2719E-01	.1070E-02	19.38	17.64
32.93	1.297	9638				
			.5953E-01	.2343E-02	20.13	19.32
35.67	1.404	9682				

TABLE D1-9

SPECIMEN NUMBER	63-6T4
ALLOY TYPE	2024-T861
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	STIFFENED
ENVIRONMENT	NITROGEN
TEST TEMPERATURE	144.0 K
SPECIMEN THICKNESS	1.65 MM (.0648 IN)
MAXIMUM STRESS	164.8 MPA (23.9 KSI)
R-RATIO	.05
FREQUENCY	200 CPM
CYCLES TO FAILURE	4892 CYCLES
K(MAX) 45 CYCLES PRIOR TO FAILURE	42.22 MPA SQRT(M) (38.42 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.81	.229	1				
			.5475E-03	.2155E-04	11.95	10.51
6.68	.263	1590				
			.1399E-02	.5507E-04	12.41	11.29
7.72	.304	2343				
			.1289E-02	.5076E-04	13.35	12.15
8.92	.351	3266				
			.2228E-02	.8771E-04	14.18	12.91
9.85	.388	3685				
			.3270E-02	.1287E-03	14.83	13.50
10.66	.420	3932				
			.5353E-02	.2108E-03	15.48	14.09
11.65	.459	4118				
			.6988E-02	.2751E-03	16.29	14.82
13.02	.513	4313				
			.6047E-02	.2381E-03	17.00	15.47
13.80	.543	4443				
			.9552E-02	.3761E-03	17.63	15.96
14.70	.579	4537				
			.1468E-01	.5781E-03	18.14	16.51
15.77	.621	4610				
			.9366E-02	.3688E-03	18.76	17.07
16.75	.659	4714				
			.2554E-01	.1005E-02	19.40	17.65
17.95	.707	4761				
			.1690E-01	.6652E-03	20.07	18.27
19.11	.752	4833				
			.7627E-01	.3003E-02	20.76	18.89
20.41	.804	4847				

TABLE D1-10

SPECIMEN NUMBER	U63-5L1
ALLOY TYPE	2024-T861
SPECIMEN ORIENTATION	LONGITUDINAL
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	NITROGEN
TEST TEMPERATURE	144.0 K
SPECIMEN THICKNESS	1.65 MM (.0650 IN)
MAXIMUM STRESS	118.6 MPA (17.2 KSI)
R-RATIO	.05
FREQUENCY	200 CPM
CYCLES TO FAILURE	6315 CYCLES
K(MAX) 115 CYCLES PRIOR TO FAILURE	38.94 MPA SQRT(M) (35.43 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.43	.331	1				
			.6294E-03	.2478E-04	18.96	17.26
9.54	.376	1619				
			.1279E-02	.5035E-04	20.13	18.32
10.65	.419	2673				
			.1372E-02	.5402E-04	21.09	19.19
11.50	.453	3295				
			.2593E-02	.1023E-03	21.90	19.93
12.34	.486	3619				
			.2966E-02	.1168E-03	22.66	20.62
13.15	.518	3831				
			.2801E-02	.1103E-03	23.49	21.38
14.22	.560	4272				
			.3547E-02	.1397E-03	24.30	22.12
15.04	.592	4504				
			.3791E-02	.1493E-03	24.97	22.72
15.80	.622	4705				
			.3857E-02	.1518E-03	25.72	23.40
16.85	.664	4978				
			.5592E-02	.2202E-03	26.39	24.02
17.49	.689	5092				
			.6906E-02	.2719E-03	26.93	24.51
18.22	.717	5197				
			.6308E-02	.2483E-03	27.51	25.03
18.98	.747	5319				
			.6894E-02	.2714E-03	28.38	25.83
20.52	.808	5542				
			.8851E-02	.3485E-03	29.51	26.86
22.04	.868	5713				
			.1268E-01	.6992E-03	30.62	27.86
23.60	.929	5836				
			.1488E-01	.5860E-03	31.63	28.79
24.92	.981	5925				
			.1923E-01	.7572E-03	32.73	29.79
26.79	1.055	6022				
			.2271E-01	.8940E-03	34.06	31.00
28.88	1.137	6114				
			.3124E-01	.1230E-02	35.34	32.15
30.66	1.207	6171				
			.4183E-01	.2841E-02	36.46	33.18
32.32	1.272	6203				

TABLE D1-11

SPECIMEN NUMBER: U63-4L3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 164.9 MPA (24.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
K(MAX) 135 CYCLES PRIOR TO FAILURE: 40.83 MPA SQRT(M) (37.15 KSI SQRT(IN)) CYCLES TO FAILURE: 3620 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.33	.171	1				
			.8884E-03	.3498E-04	19.56	17.80
5.11	.201	873				
			.1337E-02	.5263E-04	21.15	19.24
5.92	.233	1481				
			.2104E-02	.8285E-04	22.96	20.90
7.07	.274	2029				
			.3118E-02	.1228E-03	24.73	22.50
7.98	.314	2321				
			.3777E-02	.1487E-03	26.26	23.90
8.99	.354	2567				
			.5357E-02	.2109E-03	27.86	25.36
10.69	.397	2793				
			.6409E-02	.2523E-03	29.54	26.88
11.33	.446	2956				
			.7295E-02	.2872E-03	31.09	28.29
12.33	.494	3113				
			.1049E-01	.4132E-03	32.34	29.43
13.37	.523	3214				
			.1284E-01	.5054E-03	33.57	33.55
14.25	.561	3284				
			.1733E-01	.6824E-03	34.87	31.73
15.41	.607	3356				
			.1817E-01	.7154E-03	36.13	32.88
16.37	.645	3404				
			.1996E-01	.7857E-03	37.40	34.03
17.63	.694	3471				
			.4363E-01	.1718E-02	38.45	34.99
18.24	.718	3446				

TABLE D1-12

SPECIMEN NUMBER: U63-5T9
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.66 MM (.0653 IN)
MAXIMUM STRESS: 164.9 MPA (23.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
K(MAX) 118 CYCLES PRIOR TO FAILURE: 32.12 MPA SQRT(M) (29.23 KSI SQRT(IN)) CYCLES TO FAILURE: 1383 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.70	.185	1				
			.1906E-02	.7505E-04	20.01	18.21
5.68	.224	516				
			.3561E-02	.1402E-03	21.84	19.88
6.68	.263	796				
			.5463E-02	.2151E-03	23.34	21.24
7.42	.292	932				
			.8943E-02	.3521E-03	24.64	22.42
8.20	.326	1028				
			.9039E-02	.3559E-03	26.18	23.83
9.44	.371	1156				
			.1778E-01	.7000E-03	27.84	25.34
10.57	.416	1220				
			.3130E-01	.1236E-02	29.59	26.93
11.99	.472	1265				

TABLE D1-13

SPECIMEN NUMBER: U63-6T6
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 1.65 MM (.0648 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3083 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 51.60 MPA SQRT(M) (46.96 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	8.47	.333	1	.1300E-02	.5116E-04	18.83	17.14
	9.25	.364	602	.2051E-02	.8076E-04	19.05	18.07
	10.41	.410	1171	.2761E-02	.1087E-03	20.94	19.05
	11.43	.450	1539	.3477E-02	.1369E-03	21.94	19.97
	12.52	.493	1852	.4393E-02	.1728E-03	22.92	20.86
	13.58	.535	2093	.6593E-02	.2595E-03	23.81	21.67
	14.55	.573	2241	.6768E-02	.2665E-03	24.70	22.48
	15.66	.617	2405	.9267E-02	.3648E-03	25.61	23.31
	16.76	.660	2523	.1157E-01	.4554E-03	26.56	24.17
	18.04	.710	2634	.1244E-01	.4896E-03	27.55	25.07
	19.30	.760	2735	.1968E-01	.7750E-03	28.30	25.75
	20.00	.788	2771	.2236E-01	.8803E-03	29.15	26.53
	21.59	.850	2842	.2165E-01	.8524E-03	30.05	27.35
F	22.48	.885	2883	.2963E-01	.1167E-02	30.66	27.92
F	23.37	.920	2913	.3556E-01	.1400E-02	31.31	28.49
F	24.26	.955	2938	.6096E-01	.2400E-02	32.15	29.25
F	25.78	1.015	2963	.3810E-01	.1500E-02	32.93	29.97
F	26.54	1.045	2983	.5715E-01	.2250E-02	33.57	30.55
F	27.69	1.090	3003	.5080E-01	.2000E-02	34.29	31.21
F	28.70	1.130	3023	.8255E-01	.3250E-02	35.17	32.01
F	30.35	1.195	3043	.1651E+00	.6500E-02	36.24	32.98
F	32.00	1.260	3053	.1524E+00	.6000E-02	37.02	33.69
F	32.77	1.290	3059	.4064E+00	.1600E-01	37.91	34.50
F	34.80	1.370	3063	.3813E+00	.1500E-01	39.16	35.63
F	36.70	1.445	3069	.7303E+00	.2875E-01	40.67	37.01
F	39.62	1.560	3072	.2540E+00	.1000E-01	41.81	38.05
F	40.39	1.590	3075	.8890E+00	.3500E-01	42.60	38.77
F	42.16	1.660	3077	.1016E+01	.4000E-01	43.07	39.56
F	43.18	1.700	3078	.2286E+01	.9000E-01	44.49	40.49
F	45.47	1.790	3079	.2032E+01	.8000E-01	45.83	41.71
F	47.50	1.870	3080	.1905E+01	.7500E-01	47.06	42.83
F	49.40	1.945	3081	.2159E+01	.8500E-01	48.34	43.99
F	51.56	2.030	3082				

TABLE D1-14

SPECIMEN NUMBER: 63-6L1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 322.0 K
SPECIMEN THICKNESS: 1.64 MM (.0645 IN)
MAXIMUM STRESS: 75.2 MPA (10.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 94999 CYCLES
K(MAX) 3 CYCLES PRIOR TO FAILURE: 56.03 MPA SQRT(M) (50.99 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.35	.289	20001				
			.9372E-04	.3690E-05	11.07	10.07
7.89	.310	25733				
			.7102E-04	.2796E-05	11.47	10.44
8.47	.334	33977				
			.1154E-03	.4544E-05	11.89	10.82
9.10	.358	39380				
			.1061E-03	.4175E-05	12.30	11.19
9.70	.382	45080				
			.1536E-03	.6047E-05	12.71	11.57
10.37	.408	49421				
			.1391E-03	.5478E-05	13.11	11.93
10.96	.431	53656				
			.1958E-03	.7708E-05	13.50	12.28
11.62	.457	57029				
			.2136E-03	.8408E-05	13.92	12.67
12.38	.487	60591				
			.2442E-03	.9698E-05	14.30	13.02
12.94	.509	62666				
			.2227E-03	.8767E-05	14.60	13.29
13.42	.528	65036				
			.3407E-03	.1341E-04	14.90	13.56
14.01	.552	66768				
			.3019E-03	.1189E-04	15.23	13.86
14.62	.576	68807				
			.3694E-03	.1454E-04	15.54	14.15
15.16	.597	70268				
			.4492E-03	.1768E-04	15.91	14.48
16.02	.631	72168				
			.6017E-03	.2369E-04	16.29	14.82
16.60	.654	73141				
			.4284E-03	.1687E-04	16.62	15.13
17.35	.683	74881				
			.6284E-03	.2474E-04	16.99	15.42
17.89	.704	75762				
			.6118E-03	.2409E-04	17.30	15.74
18.76	.739	77166				
			.7355E-03	.2895E-04	17.63	16.35
19.28	.759	77874				
			.7659E-03	.3016E-04	18.09	16.46
20.66	.813	79679				
			.9276E-03	.3652E-04	18.68	17.00
21.80	.858	80982				
			.1103E-02	.4343E-04	19.29	17.56
23.34	.919	82303				
			.1317E-02	.5187E-04	19.90	18.11
24.54	.966	83214				
			.1284E-02	.5056E-04	20.47	18.63
25.93	1.021	84295				
			.1736E-02	.6836E-04	21.04	19.16
27.26	1.073	85063				
			.1833E-02	.7216E-04	21.61	19.67
28.52	1.123	85749				
			.1985E-02	.7816E-04	22.16	20.17
29.90	1.177	86445				
			.2113E-02	.8321E-04	22.74	20.69
31.31	1.233	87112				
			.2229E-02	.8777E-04	23.28	21.18
32.61	1.281	87663				
			.2745E-02	.1081E-03	23.81	21.67
33.95	1.337	88175				
			.3084E-02	.1214E-03	24.37	22.18
35.30	1.390	88614				
			.2938E-02	.1157E-03	24.92	22.68
36.71	1.446	89093				
			.3547E-02	.1396E-03	25.42	23.13
37.81	1.488	89432				
			.3424E-02	.1348E-03	25.93	23.60
39.28	1.546	89831				
			.3111E-02	.1225E-03	26.49	24.11
40.67	1.601	90203				
			.4295E-02	.1691E-03	27.04	24.61
42.08	1.657	90607				
			.4646E-02	.1829E-03	27.60	25.12
43.49	1.712	90911				
			.4765E-02	.1876E-03	28.11	25.58
44.68	1.759	91161				
			.5199E-02	.2031E-03	28.67	26.10
45.85	1.805	91387				
			.5080E-02	.2000E-03	29.08	26.47
47.26	1.861	91666				
			.5981E-02	.2355E-03	29.65	26.98
48.70	1.918	91937				
			.5824E-02	.2293E-03	30.21	27.49
50.10	1.972	92146				
			.6425E-02	.2533E-03	30.72	27.96
51.29	2.019	92332				
			.7071E-02	.2784E-03	31.23	28.42
52.65	2.073	92524				
			.7783E-02	.3064E-03	31.72	28.87
54.74	2.116	92664				
			.7034E-02	.2769E-03	32.19	29.29
54.93	2.162	92833				
			.8516E-02	.3353E-03	32.70	29.76
56.26	2.215	92989				
			.9963E-02	.3772E-03	33.27	33.27
57.70	2.272	93140				
			.8201E-02	.3229E-03	33.84	33.80
59.05	2.325	93304				
			.8183E-02	.3221E-03	34.38	31.29
60.27	2.373	93453				
			.1033E-01	.4066E-03	34.89	31.75
61.44	2.419	93567				
			.1182E-01	.4653E-03	35.43	32.25
62.84	2.474	93685				
			.1150E-01	.4527E-03	36.01	32.77
64.13	2.525	93797				
			.1373E-01	.5406E-03	36.64	33.35
65.73	2.588	93916				
			.1247E-01	.4909E-03	37.32	33.96
67.16	2.645	94030				
			.1906E-01	.9937E-03	38.00	34.58

D1-14 (CON'T.)

	68.73	2.706	94133	.1548E-01	.6093E-03	38.67	35.20
	70.14	2.761	94224	.1453E-01	.5719E-03	39.33	35.80
	71.56	2.817	94322	.1549E-01	.6099E-03	39.93	36.34
	72.66	2.861	94393	.2171E-01	.8548E-03	40.92	36.87
	74.01	2.914	94455	.2474E-01	.9740E-03	41.16	37.46
	75.30	2.964	94507	.2504E-01	.9858E-03	42.58	38.75
F	79.63	3.135	94680	.2540E-01	.1000E-02	44.05	40.09
F	80.98	3.188	94730	.3556E-01	.1400E-02	44.88	40.84
F	82.68	3.255	94783	.3312E-01	.1300E-02	45.83	41.71
F	84.33	3.320	94830	.3302E-01	.1300E-02	46.78	42.57
F	85.98	3.385	94880	.4064E-01	.1600E-02	47.80	43.57
F	88.01	3.465	94930	.3266E-01	.1286E-02	48.85	44.46
F	89.15	3.510	94966	.1026E+00	.4038E-02	50.06	45.56
F	91.82	3.615	94991	.6032E+00	.2375E-01	51.76	47.10
F	94.23	3.710	94995	.8893E+00	.3500E-01	52.91	48.15
F	95.12	3.745	94996				

TABLE D1-15

SPECIMEN NUMBER: 63-219
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.0 K
SPECIMEN THICKNESS: 1.61 MM (.0635 IN)
MAXIMUM STRESS: 118.7 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 16328 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 66.48 MPA SQRT(M) (60.50 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.62	.221	1				
6.21	.244	1899	.3125E-03	.1230E-04	15.41	14.03
6.91	.272	3766	.3769E-03	.1484E-04	16.24	14.78
7.74	.305	5708	.4270E-03	.1681E-04	17.17	15.62
8.62	.339	7622	.6669E-03	.2626E-04	18.14	16.51
9.14	.360	7652	.8265E-03	.3254E-04	18.91	17.21
10.18	.401	8838	.8802E-03	.3465E-04	19.73	17.96
11.10	.437	9472	.1446E-02	.5702E-04	20.72	18.86
12.20	.480	10250	.1414E-02	.5566E-04	21.70	19.74
12.91	.508	10766	.1368E-02	.5388E-04	22.54	20.51
13.77	.542	11157	.2202E-02	.8673E-04	23.24	21.15
14.76	.581	11636	.2203E-02	.8675E-04	24.05	21.89
16.10	.634	12114	.2640E-02	.1039E-03	25.04	22.79
17.11	.674	12499	.2622E-02	.1032E-03	26.00	23.66
18.09	.712	12796	.3310E-02	.1303E-03	26.80	24.39
18.97	.747	13035	.4223E-02	.1663E-03	27.52	25.05
20.31	.800	13323	.4209E-02	.1657E-03	28.37	25.82
21.96	.865	13645	.5115E-02	.2014E-03	29.48	26.83
23.81	.937	13985	.5431E-02	.2138E-03	30.74	27.98
25.50	1.004	14271	.5906E-02	.2325E-03	31.98	29.11
27.35	1.077	14526	.7271E-02	.2863E-03	33.20	30.21
29.00	1.142	14719	.8574E-02	.3376E-03	34.38	31.28
30.95	1.218	14935	.8884E-02	.3498E-03	35.56	32.36
32.66	1.286	15084	.1167E-01	.4601E-03	36.75	33.44
34.02	1.339	15231	.1144E-01	.4581E-03	37.74	34.34
35.75	1.407	15318	.1441E-01	.5829E-03	38.72	35.24
37.65	1.482	15473	.1248E-01	.4914E-03	39.66	36.28
39.32	1.548	15576	.1574E-01	.6198E-03	40.98	37.30
41.10	1.618	15684	.2023E-01	.7966E-03	42.06	38.28
42.49	1.673	15742	.1781E-01	.7011E-03	43.05	39.17
44.07	1.735	15808	.2398E-01	.9439E-03	43.97	40.02
45.97	1.810	15874	.2721E-01	.1071E-02	45.06	41.02
47.12	1.855	15948	.2359E-01	.9286E-03	46.14	42.01
48.62	1.914	16008	.2328E-01	.9167E-03	47.12	42.90
50.93	2.005	16058	.3813E-01	.1500E-02	48.15	43.82
52.83	2.080	16138	.1813E-01	.1503E-02	49.36	44.92

D1-15 (CON'T.)

F	54.10	2.130	16148	.3175E-01	.1250E-02	50.37	45.84
F	55.37	2.180	16183	.3629E-01	.1429E-02	51.18	46.58
F	57.28	2.255	16208	.7623E-01	.3001E-02	52.21	47.51
F	58.67	2.310	16233	.5588E-01	.2200E-02	53.29	48.49
F	60.58	2.385	16253	.9525E-01	.3750E-02	54.38	49.49
F	61.85	2.435	16268	.8467E-01	.3333E-02	55.44	50.49
F	63.12	2.485	16287	.8467E-01	.3333E-02	56.30	51.23
F	64.64	2.545	16293	.1524E+00	.6000E-02	57.25	52.10
F	66.80	2.630	16305	.1799E+00	.7083E-02	58.54	53.27
F	68.45	2.695	16314	.1834E+00	.7222E-02	59.89	54.50
F	69.98	2.755	16321	.2177E+00	.8571E-02	61.03	55.54
F	72.26	2.845	16327	.3619E+00	.1500E-01	62.44	56.82

TABLE D1-16

SPECIMEN NUMBER:	63-4L2
ALLOY TYPE:	2124-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	STIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	313.7 K
SPECIMEN THICKNESS:	1.52 MM (.0600 IN)
MAXIMUM STRESS:	244.4 MPA (35.4 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	1637 CYCLES

K(MAX) 214 CYCLES PRIOR TO FAILURE: 48.15 MPA SQRT(M) (43.77 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.62	.143	1				
			.1931E-02	.7603E-04	25.94	23.61
4.33	.170	366				
			.3298E-02	.1298E-03	28.00	25.48
4.93	.194	549				
			.4624E-02	.1821E-03	30.03	27.33
5.72	.225	719				
			.3401E-02	.1339E-03	31.80	28.94
6.21	.245	869				
			.6094E-02	.2399E-03	33.36	31.36
6.91	.272	979				
			.6604E-02	.2600E-03	35.09	31.93
7.60	.299	1084				
			.1179E-01	.4349E-03	36.81	33.32
8.19	.322	1137				
			.9917E-02	.3904E-03	38.29	34.84
9.07	.357	1226				
			.9852E-02	.3883E-03	39.95	36.35
9.70	.382	1295				
			.1527E-01	.6010E-03	41.42	37.69
10.46	.412	1340				
			.1937E-01	.9933E-03	43.00	39.13
11.24	.443	1392				
			.3191E-01	.1256E-02	44.75	41.72
12.24	.482	1423				

TABLE D1-17

SPECIMEN NUMBER: 63-5T8
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 303.2 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 66606 CYCLES
K(MAX) 51 CYCLES PRIOR TO FAILURE: 41.03 MPA SQRT(M) (37.34 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.49	.295	1				
			.7077E-04	.2786E-05	11.10	10.10
8.12	.320	8956				
			.1153E-03	.4529E-05	11.73	10.65
9.19	.362	18274				
			.1050E-03	.4136E-05	12.41	11.29
10.26	.404	28454				
			.2966E-03	.1168E-04	12.92	11.76
10.81	.426	30308				
			.1506E-03	.5930E-05	13.27	12.07
11.40	.449	34229				
			.2243E-03	.8832E-05	13.63	12.41
12.04	.474	37049				
			.3029E-03	.1192E-04	14.04	12.77
12.79	.503	39919				
			.2162E-03	.8511E-05	14.45	13.15
13.50	.531	42797				
			.3370E-03	.1327E-04	14.87	13.54
14.32	.564	45284				
			.3815E-03	.1502E-04	15.33	13.95
15.17	.597	47468				
			.4078E-03	.1606E-04	15.71	14.29
15.77	.621	48944				
			.4823E-03	.1899E-04	16.03	14.59
16.43	.647	50316				
			.5281E-03	.2079E-04	16.40	14.92
17.21	.677	51783				
			.5712E-03	.2249E-04	16.82	15.30
18.11	.713	53366				
			.7931E-03	.3122E-04	17.21	15.66
18.83	.741	54274				
			.8065E-03	.3175E-04	17.76	16.16
20.41	.804	56233				
			.1092E-02	.4300E-04	18.43	16.78
21.71	.855	57426				
			.1114E-02	.4385E-04	19.03	17.32
23.09	.909	58622				
			.1564E-02	.6156E-04	19.66	17.89
24.54	.966	59678				
			.1727E-02	.6801E-04	20.30	18.48
26.03	1.024	60422				
			.1880E-02	.7402E-04	20.92	19.04
27.44	1.080	61198				
			.2192E-02	.8629E-04	21.56	19.62
29.05	1.144	61923				
			.2777E-02	.1093E-03	22.18	20.19
30.43	1.198	62422				
			.3279E-02	.1291E-03	22.79	20.74
32.02	1.261	62905				
			.3688E-02	.1452E-03	23.43	21.32
33.63	1.324	63341				
			.4754E-02	.1872E-03	24.09	21.93
35.33	1.391	63699				
			.3759E-02	.1480E-03	24.71	22.49
36.74	1.447	64076				
			.6473E-02	.2548E-03	25.29	23.02
38.23	1.507	64314				
			.5743E-02	.2261E-03	25.90	23.57
39.84	1.568	64584				
			.6929E-02	.2728E-03	26.51	24.12
41.43	1.630	64813				
			.6814E-02	.2683E-03	27.07	24.64
42.74	1.683	65007				
			.7711E-02	.3036E-03	27.61	25.12
44.14	1.738	65189				
			.9757E-02	.3841E-03	28.11	25.58
45.34	1.785	65311				
			.8375E-02	.3297E-03	28.63	26.06
46.41	1.843	65486				
			.1171E-01	.4609E-03	29.18	26.56
48.15	1.896	65601				
			.9479E-02	.3732E-03	29.75	27.08
49.71	1.957	65765				
			.1253E-01	.4934E-03	30.33	27.58
51.45	2.026	65864				
			.1939E-01	.6058E-03	30.97	28.19
53.09	2.090	66003				
			.2163E-01	.8515E-03	31.68	28.83
54.49	2.145	66068				
			.2209E-01	.8699E-03	32.31	29.42
56.31	2.218	66151				
			.1909E-01	.7517E-03	32.94	29.97
57.47	2.263	66211				
			.2484E-01	.9779E-03	33.62	30.60
59.16	2.329	66279				
			.2434E-01	.9582E-03	34.34	31.27
60.60	2.386	66334				
			.3686E-01	.1451E-02	34.75	31.62
62.05	2.443	66376				
			.3446E-01	.1357E-02	35.36	32.18
63.36	2.494	66414				
			.4956E-01	.1951E-02	36.16	32.91
65.74	2.588	66463				
			.6772E-01	.2669E-02	37.01	33.68
67.21	2.646	66484				
			.4667E-01	.1837E-02	37.70	34.31
68.89	2.712	66520				
			.5884E-01	.2317E-02	38.28	34.83
69.77	2.747	66539				
			.5194E-01	.2045E-02	38.66	35.13
70.29	2.767	66545				
			.5512E-01	.2170E-02	38.85	35.15
71.84	2.749	66565				

TABLE D1-18

SPECIMEN NUMBER: 63-3T2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.6 K
SPECIMEN THICKNESS: 1.63 MM (.0643 IN)
MAXIMUM STRESS: 116.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 10236 CYCLES
K(MAX) 296 CYCLES PRIOR TO FAILURE: 36.96 MPA SQRT(M) (33.64 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.60	.221	1				
			.5078E-03	.1999E-04	15.44	14.05
6.33	.249	1429				
			.5888E-03	.2318E-04	16.33	14.86
7.03	.277	2611				
			.7304E-03	.2875E-04	17.49	15.92
8.28	.326	4329				
			.8318E-03	.3275E-04	18.70	17.02
9.28	.362	5439				
			.1003E-02	.3950E-04	19.71	17.93
10.19	.401	6420				
			.1609E-02	.6336E-04	20.80	18.93
11.39	.448	7165				
			.2579E-02	.1015E-03	21.85	19.89
12.39	.488	7554				
			.2430E-02	.9567E-04	22.65	20.61
13.12	.517	7854				
			.2800E-02	.1102E-03	23.24	21.15
13.72	.540	8069				
			.3875E-02	.1526E-03	23.90	21.75
14.63	.576	8303				
			.3394E-02	.1336E-03	24.78	22.48
15.60	.614	8590				
			.5949E-02	.2342E-03	25.61	23.30
16.83	.663	8796				
			.4333E-02	.1706E-03	26.47	24.09
17.76	.699	9012				
			.7524E-02	.2962E-03	27.23	24.78
18.76	.738	9144				
			.8935E-02	.3518E-03	27.99	25.47
19.77	.778	9257				
			.9744E-02	.3836E-03	29.00	26.39
21.46	.845	9431				
			.9907E-02	.3901E-03	30.27	27.55
23.25	.916	9612				
			.1636E-01	.6440E-03	31.43	28.61
24.76	.975	9704				
			.1743E-01	.6861E-03	32.43	29.51
26.14	1.029	9783				
			.1935E-01	.7617E-03	33.49	30.47
27.88	1.098	9873				
			.2368E-01	.9321E-03	34.59	31.48
29.46	1.160	9940				

TABLE D1-19

SPECIMEN NUMBER: 63-6T8
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 314.3 K
SPECIMEN THICKNESS: 1.69 MM (.0650 IN)
MAXIMUM STRESS: 138.7 MPA (20.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1245 CYCLES
K(MAX) 60 CYCLES PRIOR TO FAILURE: 37.79 MPA SQRT(M) (34.39 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.69	.145	1				
			.2035E-02	.7893E-04	21.03	19.14
4.21	.166	262				
			.3395E-02	.1337E-03	22.37	20.36
4.73	.186	415				
			.4132E-02	.1627E-03	23.72	21.59
5.31	.209	557				
			.4815E-02	.1895E-03	24.98	22.74
5.82	.229	662				
			.4474E-02	.1761E-03	26.29	23.92
6.53	.256	815				
			.9419E-02	.3708E-03	27.71	25.22
7.19	.283	887				
			.7562E-02	.2977E-03	28.89	26.29
7.44	.292	951				
			.3458E-02	.1361E-03	30.05	27.35
8.40	.331	1029				
			.1246E-01	.4905E-03	31.38	28.56
9.12	.359	1087				
			.1867E-01	.7273E-03	32.96	29.63
9.73	.383	1123				
			.2438E-01	.9600E-03	33.92	30.87
10.71	.422	1162				
			.2998E-01	.1144E-02	35.32	32.14
11.44	.450	1185				

TABLE D1-20

SPECIMEN NUMBER: 63-2L6
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 303.2 K
SPECIMEN THICKNESS: 1.64 MM (.0645 IN)
MAXIMUM STRESS: 75.2 MPA (11.9 KSI)
R-RATIO: .05
FREQUENCY: 20. CPM
CYCLES TO FAILURE: 269784 CYCLES
K(MAX) 161 CYCLES PRIOR TO FAILURE: 81.41 MPA SQRT(M) (99.89 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.34	.368	1				
			.2493E-04	.9817E-06	6.57	5.98
10.01	.394	26975				
			.3703E-04	.1457E-05	6.79	6.17
10.64	.419	44135				
			.2717E-04	.1070E-05	6.97	6.34
11.14	.438	62317				
			.4015E-04	.1581E-05	7.21	6.57
12.17	.479	88133				
			.4819E-04	.1897E-05	7.51	6.83
13.62	.512	105654				
			.5542E-04	.2182E-05	7.73	7.04
13.69	.539	117799				
			.5555E-04	.2187E-05	7.92	7.21
14.30	.563	128796				
			.5796E-04	.2282E-05	8.11	7.38
15.05	.592	141679				
			.7347E-04	.2892E-05	8.29	7.55
15.58	.614	148974				
			.7673E-04	.3021E-05	8.47	7.70
16.29	.642	156243				
			.8099E-04	.3189E-05	8.66	7.88
16.99	.669	166883				
			.1008E-03	.3969E-05	8.82	8.03
17.56	.691	172439				
			.9573E-04	.3768E-05	8.98	8.17
18.18	.716	179021				
			.8594E-04	.3384E-05	9.14	8.31
18.76	.739	185730				
			.1317E-03	.5185E-05	9.33	8.49
19.68	.775	192693				
			.1238E-03	.4746E-05	9.62	8.76
21.12	.832	204692				
			.1827E-03	.7192E-05	9.98	9.08
22.61	.890	212847				
			.2224E-03	.8755E-05	10.31	9.38
23.87	.940	218495				
			.2811E-03	.1107E-04	10.68	9.72
25.41	1.000	225380				
			.2749E-03	.1082E-04	11.01	10.02
26.82	1.056	229029				
			.3822E-03	.1505E-04	11.31	10.30
28.49	1.122	233385				
			.4022E-03	.1583E-04	11.64	10.59
29.78	1.172	236595				
			.5111E-03	.2012E-04	11.94	10.87
31.25	1.230	239475				
			.5593E-03	.2202E-04	12.28	11.17
32.90	1.295	242432				
			.7330E-03	.2886E-04	12.62	11.48
34.26	1.349	244279				
			.7214E-03	.2840E-04	12.91	11.75
35.83	1.410	246455				
			.6405E-03	.2521E-04	13.22	12.03
37.24	1.466	248666				
			.9099E-03	.3582E-04	13.50	12.28
38.49	1.515	250038				
			.8894E-03	.3502E-04	13.79	12.55
40.01	1.575	251750				
			.1143E-02	.4499E-04	14.08	12.81
41.32	1.627	252897				
			.1174E-02	.4622E-04	14.39	13.09
42.99	1.692	254312				
			.1256E-02	.4945E-04	14.69	13.37
44.24	1.742	255308				
			.1392E-02	.5482E-04	14.95	13.61
45.52	1.792	256232				
			.1357E-02	.5341E-04	15.21	13.84
46.76	1.841	257142				
			.1564E-02	.6156E-04	15.49	14.10
48.25	1.899	258062				
			.1531E-02	.6011E-04	15.79	14.37
49.60	1.953	258999				
			.1815E-02	.7144E-04	16.07	14.63
50.95	2.006	259940				
			.2215E-02	.8721E-04	16.34	14.87
52.13	2.051	260261				
			.2103E-02	.8278E-04	16.60	15.11
53.46	2.104	260896				
			.2096E-02	.8251E-04	16.87	15.36
54.69	2.153	261494				
			.2583E-02	.1017E-03	17.14	15.60
55.92	2.201	261968				
			.2307E-02	.9081E-04	17.44	15.87
57.47	2.263	262641				
			.2540E-02	.1000E-03	17.76	16.16
58.85	2.317	263183				
			.2809E-02	.1106E-03	18.06	16.44
60.25	2.372	263684				
			.3116E-02	.1226E-03	18.36	16.71
61.51	2.421	264086				
			.3813E-02	.1500E-03	18.60	16.93
62.41	2.456	264328				
			.3994E-02	.1574E-03	18.86	17.17
63.84	2.513	264680				
			.4162E-02	.1639E-03	19.19	17.46
65.23	2.568	265016				
			.4899E-02	.1929E-03	19.48	17.82
67.19	2.645	265419				
			.4300E-02	.1693E-03	19.99	18.19
68.71	2.705	265773				
			.4694E-02	.1848E-03	20.38	18.55
70.46	2.774	266142				
			.5219E-02	.2055E-03	20.80	18.93
72.08	2.838	266451				
			.4787E-02	.1885E-03	21.21	19.31
73.78	2.905	266808				
			.6134E-02	.2415E-03	21.61	19.67
75.19	2.960	267037				
			.1193E-01	.4696E-03	22.11	20.12
77.60	3.055	267239				
			.9169E-02	.2035E-03	22.92	20.86

D1-20 (CON'T.)

81.15	3.195	267927	.8467E-02	.3333E-03	24.04	21.88
85.34	3.361	268422	.1012E-01	.3982E-03	25.03	22.78
87.63	3.450	268648	.1129E-01	.4444E-03	25.72	23.41
89.66	3.530	268828	.1192E-01	.4694E-03	26.56	24.17
92.58	3.645	269073	.1531E-01	.6027E-03	27.70	25.21
96.01	3.780	269297	.1972E-01	.7764E-03	28.97	26.37
99.19	3.905	269458	.1490E-01	.5864E-03	30.14	27.43
101.60	4.000	269620				

TABLE D1-21

SPECIMEN NUMBER: 63-1113
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.6 K
SPECIMEN THICKNESS: 1.64 MM (.0645 IN)
MAXIMUM STRESS: 118.7 MPA (17.2 KSI)
R-RATIO: .50
FREQUENCY: 210 CPM
CYCLES TO FAILURE: 417758 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.32	.288	1	.1397E-03	.5501E-05	9.20	8.37
7.92	.312	4309	.1277E-03	.5028E-05	9.54	8.68
8.47	.334	8609	.1401E-03	.5515E-05	9.82	8.94
8.91	.351	11760	.1986E-03	.7820E-05	10.19	9.27
9.77	.384	16044	.2955E-03	.1163E-04	10.56	9.61
10.35	.405	17845	.3968E-03	.1562E-04	10.92	9.94
11.13	.438	19938	.4268E-03	.1672E-04	11.29	10.27
11.76	.463	21415	.5422E-03	.2135E-04	11.62	10.57
12.45	.490	22731	.6152E-03	.2422E-04	12.04	10.96
13.52	.532	24429	.6670E-03	.2626E-04	12.52	11.39
14.51	.571	25916	.9116E-03	.3589E-04	12.95	11.78
15.43	.608	26930	.1016E-02	.4001E-04	13.32	12.12
16.20	.638	27640	.1157E-02	.4555E-04	13.64	12.41
16.95	.667	28331	.1005E-02	.3959E-04	13.97	12.72
17.77	.700	29152	.1362E-02	.5361E-04	14.27	12.98
18.38	.724	29595	.1341E-02	.5278E-04	14.55	13.24
19.15	.754	30171	.1444E-02	.5684E-04	14.96	13.61
20.44	.805	31063	.1752E-02	.6899E-04	15.48	14.09
21.86	.861	31874	.1887E-02	.7430E-04	16.08	14.63
23.55	.927	32771	.2592E-02	.1020E-03	16.71	15.20
25.27	.995	33435	.2399E-02	.9446E-04	17.26	15.71
26.62	1.048	33995	.3417E-02	.1345E-03	17.77	16.17
28.13	1.107	34438	.3813E-02	.1503E-03	18.23	16.59
29.24	1.151	34730	.4199E-02	.1653E-03	18.69	17.10
30.78	1.212	35096	.4035E-02	.1588E-03	19.15	17.43
31.96	1.258	35390	.4197E-02	.1652E-03	19.59	17.83
33.37	1.314	35725	.6264E-02	.2466E-03	20.07	18.27
34.85	1.372	35961	.6889E-02	.2712E-03	20.65	18.80
36.86	1.451	36251	.6273E-02	.2469E-03	21.23	19.32
38.36	1.510	36492	.8582E-02	.3378E-03	21.80	19.84
40.29	1.586	36717	.8780E-02	.3457E-03	22.31	20.30
41.51	1.634	36856	.1044E-01	.4127E-03	22.85	20.79
43.57	1.716	37053	.1491E-01	.5871E-03	23.39	21.29
44.84	1.765	37134	.1193E-01	.4696E-03	23.95	21.79
46.98	1.849	37316	.2129E-01	.8384E-03	24.54	22.34
48.49	1.909	37384	.3044E-01	.1198E-02	25.23	22.96
51.14	2.013	37475	.4509E-01	.1775E-02	25.83	23.51
52.13	2.052	37497	.8902E-01	.3505E-02	26.99	24.56
56.01	2.204	37561	.1333E+00	.5247E-02	28.33	25.79
60.40	2.378	37578				

TABLE D1-22

SPECIMEN NUMBER:	63-2L10
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	STIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	304.3 K
SPECIMEN THICKNESS:	1.63 MM (.2643 IN)
MAXIMUM STRESS:	225.5 MPA (32.7 KSI)
R-RATIO:	.50
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	3655 CYCLES
K(MAX) 15 CYCLES PRIOR TO FAILURE:	67.80 MPA SQRT(M) (61.70 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.29	.208	1				
			.9038E-03	.3558E-04	14.95	13.60
5.89	.232	660				
			.1429E-02	.5628E-04	15.80	14.38
6.59	.259	1154				
			.2236E-02	.8804E-04	16.90	15.38
7.66	.302	1639				
			.2836E-02	.1117E-03	18.12	16.49
8.72	.343	2008				
			.4017E-02	.1581E-03	19.17	17.45
9.61	.378	2229				
			.4399E-02	.1732E-03	19.98	18.18
10.27	.404	2380				
			.4703E-02	.1852E-03	20.59	18.73
10.83	.426	2498				
			.5337E-02	.2101E-03	21.09	19.19
11.30	.445	2587				
			.6469E-02	.2547E-03	21.68	19.73
12.06	.475	2704				
			.6340E-02	.2496E-03	22.40	20.39
12.87	.507	2831				
			.9407E-02	.3704E-03	22.99	20.93
13.37	.527	2885				
			.9306E-02	.3664E-03	23.46	21.35
13.91	.548	2943				
			.1150E-01	.4526E-03	24.08	21.92
14.61	.583	3021				
			.1044E-01	.4110E-03	24.84	22.61
15.71	.618	3107				
			.9954E-02	.3919E-03	25.52	23.22
16.45	.647	3181				
			.1420E-01	.5590E-03	26.10	23.75
17.16	.675	3231				
			.1420E-01	.5591E-03	26.66	24.26
17.85	.703	3283				
			.1958E-01	.7750E-03	27.21	24.76
18.56	.731	3316				
			.1720E-01	.6770E-03	28.14	25.61
20.28	.798	3416				
			.1945E-01	.7658E-03	29.33	26.69
21.76	.857	3492				
			.3172E-01	.1249E-02	30.40	27.67
23.25	.915	3539				
			.2847E-01	.1121E-02	31.51	28.67
24.90	.980	3597				
			.4883E-01	.1922E-02	32.97	29.64
26.32	1.036	3626				
			.9017E-01	.3550E-02	33.47	30.46
27.58	1.086	3648				

TABLE D1-23

SPECIMEN NUMBER:	63-3Y7
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	TRANSVERSE
CONSTRAINT:	STEPPED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	388.9 K
SPECIMEN THICKNESS:	1.63 MM (.0640 IN)
MAXIMUM STRESS:	74.4 MPA (10.8 KSI)
R-RATIO:	.58
FREQUENCY:	289 CPM
CYCLES TO FAILURE:	108498 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
10.94	.431	1				
			.3944E-04	.1553E-05	7.01	6.38
11.52	.453	14683				
			.2856E-04	.1124E-05	7.19	6.54
12.08	.475	34340				
			.5406E-04	.2128E-05	7.37	6.71
12.67	.499	45334				
			.4758E-04	.1873E-05	7.56	6.88
13.37	.526	59981				
			.6922E-04	.2725E-05	7.73	7.04
13.84	.545	66823				
			.7839E-04	.3086E-05	7.88	7.17
14.39	.566	73741				
			.7938E-04	.3125E-05	8.07	7.34
15.20	.598	83965				
			.8388E-04	.3303E-05	8.31	7.56
16.13	.635	95108				
			.9624E-04	.3789E-05	8.52	7.76
16.78	.661	101851				
			.8163E-04	.3214E-05	8.70	7.91
17.42	.686	109692				
			.1880E-03	.7400E-05	8.86	8.06
18.02	.709	112861				
			.1434E-03	.5647E-05	9.02	8.21
18.67	.735	117414				
			.1778E-03	.6999E-05	9.20	8.37
19.43	.765	121672				
			.1907E-03	.7508E-05	9.45	8.60
20.76	.817	128645				
			.2587E-03	.1019E-04	9.80	8.92
22.29	.878	134585				
			.3325E-03	.1309E-04	10.12	9.21
23.46	.924	138087				
			.4051E-03	.1595E-04	10.44	9.50
25.03	.986	141978				
			.4697E-03	.1849E-04	10.81	9.84
26.72	1.052	145569				
			.4909E-03	.1933E-04	11.13	10.12
27.15	1.096	147869				
			.7829E-03	.3082E-04	11.48	10.45
29.97	1.180	150573				
			.8433E-03	.3320E-04	11.87	10.80
31.45	1.238	152335				
			.8495E-03	.3344E-04	12.19	11.10
33.10	1.299	154159				
			.1180E-02	.4647E-04	12.52	11.40
34.51	1.361	155493				
			.1586E-02	.6246E-04	12.84	11.68
36.02	1.418	156401				
			.1327E-02	.5224E-04	13.13	11.95
37.41	1.473	157449				
			.1543E-02	.6073E-04	13.44	12.23
39.01	1.536	158484				
			.1857E-02	.7312E-04	13.78	12.54
40.71	1.603	159405				
			.2335E-02	.9194E-04	14.13	12.86
42.38	1.668	160110				
			.2251E-02	.8863E-04	14.49	13.19
44.28	1.743	160962				
			.2327E-02	.9160E-04	14.84	13.51
45.82	1.804	161623				
			.3392E-02	.1336E-03	15.15	13.79
47.30	1.862	162061				
			.4327E-02	.1703E-03	15.56	14.16
49.74	1.958	162624				
			.3917E-02	.1542E-03	15.96	14.53
51.22	2.017	163003				
			.5525E-02	.2175E-03	16.26	14.80
52.61	2.071	163254				
			.3962E-02	.1536E-03	16.57	15.08
54.17	2.133	163654				
			.3256E-02	.1282E-03	16.87	15.35
55.43	2.182	164039				
			.7963E-02	.3135E-03	17.15	15.61
56.81	2.237	164213				
			.4440E-02	.1764E-03	17.45	15.88
58.23	2.291	164522				
			.5627E-02	.2215E-03	17.80	16.19
60.02	2.363	164847				
			.8097E-02	.3188E-03	18.19	16.56
61.81	2.434	165068				
			.1316E-01	.5179E-03	18.55	16.88
63.21	2.488	165174				
			.6962E-02	.2741E-03	18.88	17.18
64.75	2.549	165396				
			.1113E-01	.4382E-03	19.21	17.48
66.12	2.601	165519				
			.9887E-02	.3893E-03	19.53	17.77
67.46	2.656	165654				
			.1392E-01	.5480E-03	19.88	18.09
69.16	2.723	165776				
			.1348E-01	.5306E-03	20.25	18.42
70.48	2.775	165874				

TABLE D1-24

SPECIMEN NUMBER: 63-4T1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 394.3 K
SPECIMEN THICKNESS: 1.68 MM (.0662 IN)
MAXIMUM STRESS: 110.6 MPA (16.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 22086 CYCLES
K(MAX) 116 CYCLES PRIOR TO FAILURE: 42.75 MPA SQRT(M) (38.91 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.90	.311	1				
			.1916E-03	.7543E-05	9.69	8.82
9.05	.356	9967				
			.2423E-03	.9539E-05	10.25	9.33
9.98	.393	9484				
			.3989E-03	.1571E-04	10.72	9.76
10.80	.425	11730				
			.6788E-03	.2638E-04	11.43	10.40
12.67	.499	14530				
			.8314E-03	.3273E-04	12.13	11.04
13.73	.540	15804				
			.9849E-03	.3877E-04	12.68	11.46
14.68	.578	16779				
			.1426E-02	.5615E-04	12.93	11.77
15.23	.600	17157				
			.1725E-02	.6790E-04	13.25	12.06
16.13	.635	17682				
			.9568E-03	.3767E-04	13.54	12.32
16.55	.652	18128				
			.2283E-02	.8990E-04	13.81	12.57
17.43	.686	18586				
			.1827E-02	.7192E-04	14.19	12.88
18.16	.716	18912				
			.2273E-02	.8949E-04	14.45	13.15
18.89	.744	19226				
			.2671E-02	.1052E-03	14.89	13.55
20.42	.804	19797				
			.2948E-02	.1161E-03	15.54	14.14
22.22	.875	20410				
			.3167E-02	.1247E-03	16.13	14.68
23.91	.926	20817				
			.3298E-02	.1298E-03	16.65	15.15
25.04	.986	21281				
			.5470E-02	.2154E-03	17.21	15.66
26.62	1.048	21578				
			.6886E-02	.2711E-03	17.77	16.17
28.17	1.109	21795				
			.8356E-02	.3290E-03	18.27	16.62
29.49	1.161	21952				
			.6648E-02	.2617E-03	18.78	17.09
31.13	1.225	22199				
			.9164E-02	.3608E-03	19.41	17.66
33.21	1.307	22428				
			.1648E-01	.6490E-03	20.26	18.38
35.82	1.410	22585				
			.2119E-01	.8341E-03	21.80	19.11
38.08	1.499	22692				

TABLE D1-25

SPECIMEN NUMBER: 63-3T11
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 394.3 K
SPECIMEN THICKNESS: 1.63 MM (.0640 IN)
MAXIMUM STRESS: 198.6 MPA (28.8 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1492 CYCLES
K(MAX) 11 CYCLES PRIOR TO FAILURE: 45.86 MPA SQRT(M) (41.73 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.29	.208	1				
			.1451E-02	.5722E-04	13.35	12.15
6.21	.244	631				
			.2529E-02	.9998E-04	14.37	13.08
7.11	.280	984				
			.4384E-02	.1726E-03	15.16	13.80
7.73	.303	1123				
			.5254E-02	.2068E-03	15.83	14.41
8.43	.332	1262				
			.4203E-02	.1688E-03	16.61	15.11
9.31	.366	1466				
			.6016E-02	.2369E-03	17.34	15.78
10.02	.394	1584				
			.1084E-01	.4266E-03	18.18	16.47
11.11	.434	1676				
			.1287E-01	.5065E-03	19.07	17.35
12.38	.484	1776				
			.1773E-01	.6982E-03	19.99	18.19
13.27	.523	1871				
			.5246E-01	.2066E-02	20.96	19.07
14.80	.583	1960				
			.9144E-01	.3600E-02	22.24	20.24
16.72	.658	1981				

TABLE D1-26

SPECIMEN NUMBER: U63-2LS
ALLOY TYPE: 2.24-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 311.5 K
SPECIMEN THICKNESS: 1.51 MM (.0636 IN)
MAXIMUM STRESS: 75.2 MPA (10.9 KSI)
R-RATIO: .05
FREQUENCY: 20
CYCLES TO FAILURE: 89365 CYCLES
K(MAX) 125 CYCLES PRIOR TO FAILURE: 40.67 MPA SQRT(M) (36.92 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.99	.275	1	.7166E-04	.2742E-05	11.95	10.86
7.20	.283	17148	.7711E-04	.3036E-05	11.78	10.70
9.39	.353	27211	.1224E-03	.4825E-05	12.22	11.12
9.67	.377	32491	.1146E-03	.4517E-05	12.65	11.51
10.29	.405	38345	.1467E-03	.5774E-05	13.07	11.90
10.91	.429	42536	.1941E-03	.7649E-05	13.52	12.30
11.74	.462	47647	.1717E-03	.6759E-05	13.94	12.69
12.71	.486	52524	.2303E-03	.9069E-05	14.33	13.04
13.46	.514	57839	.2491E-03	.9807E-05	14.78	13.37
13.81	.537	66129	.2811E-03	.1107E-04	15.07	13.72
14.42	.568	70881	.2667E-03	.1050E-04	15.45	14.06
15.12	.591	71696	.3349E-03	.1319E-04	15.75	14.34
15.66	.613	82719	.2326E-03	.1192E-04	16.07	14.59
16.17	.633	84441	.5320E-03	.2291E-04	16.32	14.86
16.72	.658	85732	.4412E-03	.1737E-04	16.61	15.12
17.21	.677	86869	.5750E-03	.2267E-04	16.90	15.38
17.44	.733	87791	.4749E-03	.1869E-04	17.23	15.68
18.13	.736	89231	.5713E-03	.2249E-04	17.59	16.01
18.42	.751	90617	.7334E-03	.2888E-04	18.07	16.45
20.56	.819	92237	.7959E-03	.3132E-04	18.76	17.07
22.26	.877	94441	.9763E-03	.3844E-04	19.49	17.73
23.75	.935	95961	.1206E-02	.4749E-04	20.13	18.32
25.17	.991	97119	.1211E-02	.4766E-04	20.78	18.91
26.72	1.052	98422	.1492E-02	.5876E-04	21.44	19.51
28.25	1.112	99444	.1397E-02	.5498E-04	22.37	20.34
29.91	1.142	99717	.1997E-02	.7863E-04	22.62	20.57
31.12	1.221	99921	.1981E-02	.7922E-04	23.17	21.08
32.39	1.271	99996	.2943E-02	.1159E-03	23.72	21.59
33.73	1.328	92258	.2614E-02	.1029E-03	24.23	22.05
34.81	1.371	92692	.2758E-02	.1086E-03	24.75	22.52
36.33	1.430	93244	.2503E-02	.9854E-04	25.27	23.00
37.45	1.474	93649	.3241E-02	.1276E-03	25.91	23.49
39.04	1.537	94179	.3561E-02	.1402E-03	26.37	23.99
40.26	1.585	94621	.3931E-02	.1548E-03	26.87	24.46
41.03	1.615	94847	.4154E-02	.1636E-03	27.36	24.90
42.76	1.683	95140	.4384E-02	.1727E-03	27.92	25.41
44.45	1.750	95424	.4757E-02	.1873E-03	28.52	25.96
45.41	1.804	95617	.5212E-02	.2052E-03	29.11	26.49
47.41	1.867	95822	.5975E-02	.2351E-03	29.63	26.96
49.45	1.938	96094	.5188E-02	.2042E-03	30.10	27.39
51.12	2.013	96317	.7434E-02	.2927E-03	30.61	27.85
52.91	2.083	96579	.7284E-02	.2868E-03	31.23	28.42
54.93	2.163	97119	.7213E-02	.2840E-03	31.92	29.05
56.92	2.217	97427	.7694E-02	.3031E-03	32.50	29.58
58.91	2.319	97947	.1103E-01	.3904E-03	33.53	30.51
59.99	2.337	97764	.1257E-01	.4949E-03	34.27	31.19
62.2	2.442	97962	.1551E-01	.6105E-03	34.93	31.78
63.25	2.491	97979	.1621E-01	.6382E-03	35.66	32.44
65.62	2.584	98149	.1943E-01	.7727E-03	36.41	33.15
66.81	2.632	98142	.2292E-01	.9023E-03	37.17	33.83
69.15	2.722	98240	.2394E-01	.1021E-02	37.36	34.55

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-27

SPECIMEN NUMBER: U63-2L2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 332.8 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 16942 CYCLES
K(MAX) 702 CYCLES PRIOR TO FAILURE: 43.64 MPA SQRT(M) (39.72 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.41	.252	1				
			.2105E-03	.8286E-05	15.02	13.67
		2333				
			.2982E-03	.1172E-04	15.74	14.34
		4554				
			.4699E-03	.1846E-04	16.48	15.00
		3675				
			.5017E-03	.1963E-04	17.27	15.72
		7274				
			.6499E-03	.2558E-04	18.11	16.48
		83.6				
			.9543E-03	.3364E-04	18.94	17.24
		9291				
			.1035E-02	.4313E-04	19.78	18.00
		9987				
			.1222E-02	.4811E-04	20.63	18.68
		11594				
			.1134E-02	.4345E-04	21.21	19.32
		11144				
			.1656E-02	.6516E-04	21.93	19.96
		11715				
			.2149E-02	.8654E-04	22.74	20.69
		12121				
			.2141E-02	.8430E-04	23.48	21.37
		12483				
			.2671E-02	.1016E-03	24.23	22.05
		12847				
			.2740E-02	.1095E-03	24.97	22.72
		13139				
			.2618E-02	.1027E-03	25.62	23.32
		13483				
			.3642E-02	.1433E-03	26.28	23.91
		13673				
			.4345E-02	.1594E-03	27.02	24.59
		13931				
			.4141E-02	.1633E-03	27.77	25.27
		14144				
			.4674E-02	.1843E-03	28.73	26.15
		14543				
			.6315E-02	.2494E-03	29.96	27.26
		14791				
			.5933E-02	.2336E-03	31.14	28.34
		15059				
			.7813E-02	.3075E-03	32.38	29.47
		15247				
			.9674E-02	.3823E-03	33.58	33.55
		15434				
			.1139E-01	.4485E-03	34.65	31.46
		15631				
			.1162E-01	.4574E-03	35.67	32.37
		15794				
			.1143E-01	.4644E-03	36.60	33.31
		15869				
			.1411E-01	.5342E-03	37.60	34.22
		15965				
			.1671E-01	.6824E-03	38.62	35.14
		16064				
			.1746E-01	.7423E-03	39.76	36.19
		16174				
			.2461E-01	.9839E-03	40.94	37.29
		16238				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-28

SPECIMEN NUMBER:	UA3-1L4
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	296.3 K
SPECIMEN THICKNESS:	1.65 MM (.0650 IN)
MAXIMUM STRESS:	217.6 MPA (31.6 KSI)
R-RATIO:	.05
FREQUENCY:	288 CPM
CYCLES TO FAILURE:	1170 CYCLES
K(MAX) 12 CYCLES PRIOR TO FAILURE:	57.18 MPA SQRT(M) (52.03 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.12	.162	1				
			.3458E-02	.1358E-03	24.87	22.63
5.09	.200	283				
			.4674E-02	.1840E-03	27.02	24.59
5.77	.227	427				
			.8476E-02	.3337E-03	28.79	26.20
6.55	.258	519				
			.6798E-02	.2676E-03	30.86	28.08
7.60	.299	675				
			.9873E-02	.3887E-03	32.95	29.98
8.52	.335	769				
			.1143E-01	.4893E-03	34.77	31.64
9.41	.373	854				
			.1230E-01	.4842E-03	36.51	33.23
10.34	.407	930				
			.1985E-01	.7816E-03	38.26	34.82
11.32	.446	979				
			.2253E-01	.8871E-03	39.88	36.22
12.11	.477	1014				
			.3212E-01	.1265E-02	41.32	37.60
13.10	.516	1049				
			.3321E-01	.1307E-02	42.87	39.31
14.00	.551	1072				
			.4916E-01	.1935E-02	44.25	40.27
14.83	.584	1089				
			.5193E-01	.2044E-02	45.62	41.52
15.77	.621	1117				
			.4932E-01	.1942E-02	47.08	42.77
16.66	.656	1125				
			.5623E-01	.2214E-02	48.48	44.34
17.67	.696	1141				
			.1708E+00	.6725E-02	50.11	45.60
19.03	.749	1151				
			.1498E+00	.5898E-02	52.71	47.97
21.42	.843	1166				

TABLE D1-29

SPECIMEN NUMBER:
SPECIMEN ORIENTATION:
TEST
SPECIMEN
MAXIMUM
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

K(MAX) 378 CYCLES PRIOR TO FAILURE: 35.20 MPA SQRT(M) (32.04 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.94	.313	1				
			.1916E-03	.7544E-05	11.48	10.46
8.76	.345	4276				
			.1971E-03	.7759E-05	12.00	10.92
9.47	.373	7859				
			.2326E-03	.9156E-05	12.43	11.31
10.09	.397	10513				
			.3389E-03	.1333E-04	12.86	11.71
10.65	.427	12764				
			.3227E-03	.1271E-04	13.33	12.13
11.61	.457	15137				
			.3893E-03	.1533E-04	13.77	12.53
12.32	.485	16941				
			.4454E-03	.1754E-04	14.25	12.97
13.29	.523	19128				
			.2858E-03	.1125E-04	14.68	13.36
13.86	.546	21123				
			.4779E-03	.1882E-04	15.07	13.72
14.73	.580	22946				
			.3468E-03	.1365E-04	15.52	14.12
15.53	.611	29256				
			.6279E-03	.2472E-04	15.49	14.48
16.26	.640	26417				
			.4961E-03	.1953E-04	16.31	14.84
17.06	.672	28835				
			.5992E-03	.2359E-04	16.85	15.33
18.45	.726	30343				
			.1084E-02	.3953E-04	17.44	15.87
19.49	.767	[illegible]				
			.9745E-03	.3836E-04	18.14	16.51
21.42	.843	[illegible]				
			.9797E-03	.3857E-04	18.96	17.26
22.82	.898	34795				
			.1552E-02	.6110E-04	19.53	17.77
24.22	.954	35696				
			.1588E-02	.6228E-04	20.19	18.38
25.88	1.019	36749				
			.2872E-02	.8159E-04	20.85	18.98
27.31	1.075	37436				
			.2811E-02	.7918E-04	21.44	19.51
28.66	1.128	38166				
			.2843E-02	.1119E-03	22.12	20.13
30.60	1.205	38789				
			.3038E-02	.1196E-03	22.88	20.82
32.38	1.275	39375				
			.2922E-02	.1150E-03	23.55	21.43
33.96	1.337	39917				
			.4151E-02	.1634E-03	24.21	22.04
35.69	1.405	40334				
			.9838E-02	.1972E-03	24.92	22.68
37.56	1.479	40706				
			.4871E-02	.1918E-03	25.54	23.24
38.83	1.529	40967				
			.5478E-02	.2153E-03	26.15	23.80
40.64	1.632	41326				
			.6406E-02	.2522E-03	26.79	24.38
42.12	1.658	41531				
			.6747E-02	.2656E-03	27.42	24.95
43.89	1.728	41793				
			.9277E-02	.3653E-03	28.08	25.56
45.53	1.793	41970				
			.1037E-01	.4084E-03	28.77	26.19
47.44	1.868	42154				
			.8821E-02	.3473E-03	29.40	26.76
48.75	1.919	42302				
			.1105E-01	.4352E-03	29.99	27.30
50.46	1.987	42457				
			.1258E-01	.4952E-03	30.62	27.86
51.89	2.043	42571				
			.1195E-01	.4703E-03	31.19	28.39
53.36	2.101	42694				
			.1588E-01	.6250E-03	31.80	28.94
54.92	2.162	42792				
			.1426E-01	.5616E-03	32.47	29.55
56.70	2.232	42917				
			.2071E-01	.8153E-03	33.14	30.16
58.19	2.291	42995				

TABLE D[illegible]

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

K(MAX) 91 CYCLES PRIOR TO FAILURE: 41.03 MPA SQRT(M) (37.34 KSI SQRT(INCH)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.49	.295	1				
			.7077E-04	.2786E-05	11.18	10.18
8.12	.320	8956	.1158E-03	.4829E-05	11.78	10.65
9.19	.362	18274	.1058E-03	.4136E-05	12.41	11.29
10.26	.404	28454	.2066E-03	.1168E-04	12.92	11.76
10.81	.426	30788	.1588E-03	.9938E-05	13.27	12.07
11.48	.449	34228	.2243E-03	.8832E-05	13.63	12.41
12.04	.474	37845	.3829E-03	.1192E-04	14.04	12.77
12.79	.503	39519	.2162E-03	.8511E-05	14.45	13.15
13.98	.531	42797	.3378E-03	.1327E-04	14.87	13.54
14.32	.564	45254	.3815E-03	.1502E-04	15.33	13.95
15.17	.597	47468	.4878E-03	.1686E-04	15.71	14.29
15.77	.621	48944	.4023E-03	.1899E-04	16.03	14.59
16.43	.647	50316	.9201E-03	.2879E-04	16.48	14.92
17.21	.677	51783	.5712E-03	.2249E-04	16.82	15.30
18.11	.713	53366	.7931E-03	.3122E-04	17.21	15.66
18.83	.741	54274	.8065E-03	.3175E-04	17.76	16.16
20.41	.804	56233	.1092E-02	.4388E-04	18.43	16.78
21.71	.855	57426	.1114E-02	.4385E-04	19.03	17.32
23.05	.907	58622	.1504E-02	.6156E-04	19.66	17.89
24.54	.966	59576	.1727E-02	.6801E-04	20.38	18.48
26.08	1.026	60422	.1888E-02	.7402E-04	20.92	19.04
27.44	1.080	61193	.2192E-02	.8629E-04	21.96	19.62
29.05	1.144	61923	.2777E-02	.1093E-03	22.18	20.19
30.43	1.198	62422	.3279E-02	.1291E-03	22.79	20.74
32.02	1.261	62985	.3888E-02	.1492E-03	23.43	21.32
33.63	1.324	63341	.4754E-02	.1872E-03	24.89	21.93
35.33	1.391	63699	.3759E-02	.1480E-03	24.71	22.49
36.74	1.447	64076	.6473E-02	.2548E-03	25.29	23.02
38.29	1.507	64314	.5743E-02	.2261E-03	25.90	23.57
39.84	1.568	64584	.6929E-02	.2728E-03	26.91	24.12
41.48	1.633	64810	.6614E-02	.2603E-03	27.07	24.64
42.74	1.683	65007	.7711E-02	.3036E-03	27.61	25.12
44.14	1.738	65188	.9797E-02	.3841E-03	28.11	25.58
45.34	1.785	65311	.8375E-02	.3297E-03	28.63	26.06
46.81	1.843	65486	.1171E-01	.4609E-03	29.18	26.56
48.15	1.896	65601	.9479E-02	.3732E-03	29.75	27.08
49.71	1.957	65765	.1253E-01	.4934E-03	30.38	27.66
50.95	2.006	65864	.1939E-01	.8058E-03	30.97	28.19
53.09	2.090	66003	.2163E-01	.8519E-03	31.66	28.83
54.49	2.145	66080	.2269E-01	.8699E-03	32.33	29.42
56.33	2.218	66191	.1909E-01	.7517E-03	32.94	29.97
57.47	2.263	66211	.2484E-01	.9779E-03	33.52	30.50
59.16	2.329	66279	.2434E-01	.9582E-03	34.14	31.07
60.50	2.382	66334	.3888E-01	.1491E-02	34.75	31.62
62.85	2.443	66376	.3448E-01	.1357E-02	35.36	32.18
63.36	2.494	66414	.4996E-01	.1951E-02	36.16	32.91
65.78	2.590	66463	.6779E-01	.2669E-02	37.01	33.68
67.21	2.646	66484	.4667E-01	.1837E-02	37.78	34.31
68.69	2.712	66528	.5884E-01	.2317E-02	38.28	34.84
69.77	2.747	66535	.5194E-01	.2045E-02	38.68	35.15
70.29	2.767	66545	.5512E-01	.2170E-02	38.85	35.35
71.84	2.769	66555				

TABLE D1-31

SPECIMEN NUMBER: US3-4T3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.0 K
SPECIMEN THICKNESS: 1.60 MM (.063 IN)
MAXIMUM STRESS: 101.1 MPA (14.7 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 18226 CYCLES
K(MAX) 375 CYCLES PRIOR TO FAILURE: 31.67 MPA SQRT(M) (28.82 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.29	.208					
			.3121E-03	.1229E-04	12.86	11.70
6.10	.240	2597				
			.4212E-03	.1658E-04	13.76	12.52
6.93	.273	4568				
			.7283E-03	.2836E-04	14.65	13.34
7.85	.309	5833				
			.8791E-03	.3449E-04	15.52	14.13
8.72	.343	6833				
			.1118E-02	.4378E-04	16.26	14.79
9.44	.372	7476				
			.1356E-02	.5338E-04	16.94	15.42
10.28	.405	8097				
			.1637E-02	.6447E-04	17.69	16.10
11.18	.440	8650				
			.1625E-02	.6398E-04	18.48	16.74
12.01	.473	9150				
			.2564E-02	.1009E-03	19.18	17.38
12.96	.510	9529				
			.2587E-02	.9878E-04	19.88	18.02
13.83	.544	9874				
			.2914E-02	.1147E-03	20.67	18.63
14.78	.582	10288				
			.3829E-02	.1507E-03	21.89	19.28
15.59	.612	10482				
			.4595E-02	.1809E-03	21.81	19.67
16.25	.640	10554				
			.4519E-02	.1777E-03	22.15	20.16
17.11	.674	10745				
			.7995E-02	.3148E-03	22.77	20.73
18.09	.712	10867				
			.6128E-02	.2413E-03	23.40	21.30
19.00	.748	11016				
			.8781E-02	.3426E-03	24.17	21.99
20.46	.806	11184				
			.6182E-02	.3198E-03	25.15	22.89
22.11	.870	11387				
			.1426E-01	.5613E-03	26.19	23.80
23.75	.935	11582				
			.1319E-01	.5193E-03	27.18	24.74
25.55	1.006	11639				
			.1928E-01	.7591E-03	28.12	25.59
26.97	1.062	11713				
			.1613E-01	.6351E-03	28.93	26.33
28.38	1.117	11808				
			.2755E-01	.1085E-02	29.71	27.04
29.73	1.170	11849				

TABLE D1-32

SPECIMEN NUMBER: US3-2T5
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.1 K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
MAXIMUM STRESS: 198.7 MPA (28.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 758 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 53.81 MPA SQRT(M) (48.25 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.83	.190					
			.4764E-02	.1868E-03	24.47	22.27
5.66	.231	228				
			.5470E-02	.2154E-03	26.54	24.16
6.78	.266	373				
			.1888E-01	.4283E-03	28.18	25.64
7.45	.293	442				
			.1356E-01	.5340E-03	29.58	26.91
8.13	.320	492				
			.1498E-01	.5898E-03	31.20	28.46
9.28	.365	569				
			.4638E-01	.1826E-02	33.47	30.46
10.63	.418	598				
			.2228E-01	.8771E-03	35.66	32.49
11.94	.470	657				
			.4544E-01	.1789E-02	37.91	34.13
12.99	.511	686				
			.1118E+00	.4369E-02	39.37	39.83
14.43	.568	693				
			.1092E+00	.4300E-02	41.19	37.49
15.82	.611	703				
			.2658E+00	.1043E-01	43.58	39.66
17.91	.705	712				
			.6924E+00	.2726E-01	47.82	43.52
22.88	.869	713				

TABLE D1-33

SPECIMEN NUMBER:	U63-2L12
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	WET AIR
TEST TEMPERATURE:	388.9 K
SPECIMEN THICKNESS:	1.61 MM (.0635 IN)
MAXIMUM STRESS:	75.2 MPA (10.9 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	46497 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	52.68 MPA SQRT(M) (47.94 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.65	.270	1				
			.2331E-03	.7997E-05	10.88	9.90
7.84	.302	3102				
			.2368E-03	.9402E-05	11.36	10.34
8.37	.329	5073				
			.2469E-03	.9685E-05	11.84	13.78
9.05	.356	8431				
			.2638E-03	.1039E-04	12.31	11.20
9.76	.384	11493				
			.2916E-03	.1148E-04	12.81	11.65
10.59	.417	14364				
			.3136E-03	.1235E-04	13.26	12.17
11.20	.441	16332				
			.3631E-03	.1430E-04	13.87	12.44
11.96	.470	18364				
			.3594E-03	.1415E-04	14.10	12.93
12.67	.499	21356				
			.4564E-03	.1791E-04	14.52	13.22
13.40	.528	21969				
			.4528E-03	.1783E-04	14.92	13.58
14.18	.554	23479				
			.6397E-03	.2125E-04	15.35	13.97
14.98	.590	25137				
			.5565E-03	.2191E-04	15.76	14.34
15.80	.614	26262				
			.6011E-03	.2366E-04	16.15	14.70
16.47	.648	27731				
			.7248E-03	.2854E-04	16.60	15.11
17.36	.684	28933				
			.7278E-03	.2865E-04	16.99	15.47
18.15	.711	29877				
			.8453E-03	.3330E-04	17.39	15.82
18.95	.746	30969				
			.9211E-03	.3626E-04	17.94	16.32
2..33	.781	32465				
			.1096E-02	.4314E-04	18.57	16.90
21.65	.852	33647				
			.1125E-02	.4429E-04	19.19	17.46
23.04	.907	34841				
			.1224E-02	.4817E-04	19.79	18.01
24.72	.957	35921				
			.1434E-02	.5661E-04	20.37	18.54
26.63	1.011	36976				
			.1844E-02	.7427E-04	20.96	19.08
27.17	1.044	37543				
			.1987E-02	.7825E-04	21.57	19.63
28.56	1.125	34353				
			.2246E-02	.8843E-04	22.14	20.15
29.74	1.171	34936				
			.2263E-02	.8674E-04	22.64	20.60
1..97	1.211	37436				
			.2724E-02	.1073E-03	23.15	21.07
1..62	1.269	39951				
			.2882E-02	.1096E-03	23.69	21.56
37.64	1.324	42471				
			.2898E-02	.1042E-03	24.23	22.05
1..88	1.373	43942				
			.3193E-02	.1203E-03	24.84	22.61
39.71	1.446	41553				
			.3424E-02	.1348E-03	25.51	23.23
1..32	1.524	42034				
			.3871E-02	.1525E-03	26.14	23.79
43.81	1.567	42342				
			.4121E-02	.1622E-03	26.71	24.31
41.23	1.623	42734				
			.4464E-02	.1757E-03	27.33	24.87
1..95	1.691	431.6				
			.4993E-02	.1952E-03	27.97	25.46
44.5.	1.742	43427				
			.5461E-02	.2279E-03	28.54	25.97
45.87	1.4.6	43854				
			.5644E-02	.2222E-03	29.02	26.41
46.94	1.848	44457				
			.5913E-02	.2157E-03	29.51	26.85
42.32	1.911	44014				
			.6792E-02	.2291E-03	30.07	27.37
43.79	1.962	44353				
			.7199E-02	.2834E-03	30.69	27.93
41.39	2..21	44574				
			.8155E-02	.4154E-03	31.64	28.81
F 46.81	2.115	44893				
			.8253E-02	.3251E-03	32.64	29.7.
F 44.24	2.215	45243				
			.7672E-02	.3003E-03	33.61	

D1-33 (CON'T.)

F	29.91	2.735	46443	.1116E-01	.4802E-03	34.67	31.55
F	31.34	2.815	46569	.1143E-01	.4900E-03	35.35	32.17
F	32.48	2.862	46743	.1905E-01	.7900E-03	36.60	32.76
F	34.39	2.935	46869	.1397E-01	.5902E-03	36.72	33.42
F	36.79	2.992	46993	.1524E-01	.6000E-03	37.37	34.01
F	37.31	2.965	46983	.2544E-01	.1102E-02	38.29	34.85
F	39.85	3.251	46193	.3556E-01	.1480E-02	39.29	35.76
F	41.43	3.423	46233	.2246E-01	.9302E-03	39.98	36.39
F	42.77	3.465	46283	.2794E-01	.1100E-02	40.59	36.94
F	44.17	3.572	46333	.4319E-01	.1703E-02	41.47	37.74
F	46.33	3.655	46383	.1169E+00	.4600E-02	42.76	38.91
F	49.25	3.125	46443	.1219E+00	.4802E-02	44.36	41.35
F	42.71	3.746	46437	.1778E+00	.7000E-02	49.67	41.96
F	44.27	3.811	46441	.3810E+00	.1502E-01	46.73	42.52
F	45.98	3.785	46448	.5397E+00	.2129E-01	47.91	43.62
F	49.14	3.871	46452	.5715E+00	.2250E-01	49.31	44.87
F	51.42	3.966	46456				

TABLE D1-34

SPECIMEN NUMBER: U63-3L1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 303.9 K
SPECIMEN THICKNESS: 1.63 MM (.0648 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 7313 CYCLES
K(MAX) & CYCLES PRIOR TO FAILURE: 57.81 MPA SQRT(M) (51.88 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.62	.316	1				
9.09	.358	1663	.6487E-03	.2523E-04	18.56	16.84
9.96	.391	2378	.1193E-02	.4687E-04	19.52	17.77
10.42	.414	2736	.1621E-02	.6383E-04	20.25	18.43
11.28	.444	3103	.2483E-02	.9231E-04	20.91	19.03
11.85	.466	3453	.1612E-02	.6346E-04	21.96	19.81
12.65	.498	3771	.2514E-02	.9904E-04	22.19	20.20
13.26	.526	4027	.2748E-02	.1082E-03	22.88	20.82
14.30	.563	4366	.2787E-02	.1097E-03	23.61	21.48
15.75	.624	4631	.3964E-02	.1563E-03	24.46	22.26
16.27	.640	4948	.2994E-02	.1163E-03	25.28	23.01
17.35	.683	5153	.5986E-02	.2682E-03	26.69	23.76
18.52	.729	5416	.4447E-02	.1751E-03	26.98	24.55
19.68	.767	5633	.5547E-02	.2184E-03	27.80	25.30
20.62	.804	5799	.5571E-02	.2193E-03	28.52	25.95
21.81	.859	5972	.6499E-02	.2558E-03	29.38	26.74
23.54	.924	62.3	.7473E-02	.2941E-03	30.52	27.77
24.87	.979	6306	.9372E-02	.3690E-03	31.99	28.79
			.1104E-01	.4346E-03	32.64	29.71

D1-34 (CON'T.)

	26.64	1.049	6536	.1505E-01	.5929E-03	33.92	30.86
	28.04	1.127	6639	.1352E-01	.5325E-03	35.09	31.93
	30.19	1.188	6753	.1[illegible]E-01	.5959E-03	36.13	32.88
	31.84	1.254	6863	.1062E-01	.7332E-03	37.26	33.91
	33.71	1.327	6963	.2211E-01	.8703E-03	38.53	35.06
	35.83	1.411	7059	.2063E-01	.1135E-02	39.63	36.06
	37.19	1.464	7136	.3508E-01	.1381E-02	40.44	36.82
F	38.48	1.515	7184	.3332E-01	.1302E-02	41.37	37.65
F	40.19	1.583	7193	.3813E-01	.1500E-02	42.36	38.55
F	41.86	1.649	7233	.5927E-01	.2333E-02	43.36	39.48
F	43.43	1.711	7267	.6773E-01	.2667E-02	44.57	40.56
F	45.47	1.791	7291	.1778E+00	.7003E-02	45.47	41.38
F	46.36	1.826	7298	.2543E+00	.1001E-01	46.14	41.99
F	47.82	1.883	7313	.6396E+00	.2480E-01	47.49	43.22
F	49.67	1.956	7319	.1691E+01	.6503E-01	49.49	45.04
F	51.97	2.125	7313	.1774E+01	.7030E-01	51.11	46.51
F	54.76	2.156	7311	.3413E+01	.1430E+00	52.91	48.15
F	59.56	2.746	7312				

TABLE D1-35

SPECIMEN NUMBER:	U63-2L13
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	WET AIR
TEST TEMPERATURE:	302.8 K
SPECIMEN THICKNESS:	1.63 MM (.0640 IN)
MAXIMUM STRESS:	225.5 MPA (32.7 KSI)
R-RATIO:	.05
FREQUENCY:	288 CPM
CYCLES TO FAILURE:	654 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	69.30 MPA SQRT(M) (63.06 KSI SQRT(IN))

	CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	KSI SQRT(IN)
	6.90	.272	1	.8999E-02	.3541E-03	33.33	30.33
	4.47	.313	179	.9034E-02	.3556E-03	35.80	32.58
	9.74	.364	261	.1392E-01	.5323E-03	37.45	34.09
	10.12	.399	325	.1494E-01	.5883E-03	38.66	35.18
	10.43	.413	351	.2756E-01	.1084E-02	39.76	36.18
	11.29	.445	383	.1919E-01	.7123E-03	41.24	37.53
	12.12	.477	424	.1519E-01	.6037E-03	42.47	38.74
	12.86	.506	473	.2413E-01	.9503E-03	44.07	40.11
	13.69	.547	515	.5827E-01	.2215E-02	46.18	42.02
	14.35	.486	561	.6293E-01	.2464E-02	48.84	43.72
	16.23	.639	555	.3711E-01	.1469E-02	49.86	45.38
	17.72	.698	595	.8122E-01	.3198E-02	53.71	48.88
	21.46	.845	841	.2476E+00	.1172E-01	57.96	52.58
F	23.24	.915	847	.2032E+00	.8888E-02	59.44	54.39
F	24.26	.955	852	.4445E+01	.1750E+00	63.81	57.34
F	28.78	1.130	893				

TABLE D1-36

SPECIMEN NUMBER: U63-S72
ALLOY TYPE: 2024-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 297.0 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 48236 CYCLES
K(MAX) 529 CYCLES PRIOR TO FAILURE: 31.79 MPA SQRT(M) (28.93 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.82	.269	1				
			.1021E-03	.7166E-05	10.59	9.63
7.38	.291	3078				
			.2914E-03	.9899E-05	11.88	10.69
8.17	.322	6235				
			.1672E-03	.6583E-05	11.59	10.54
8.82	.347	10086				
			.2811E-03	.1107E-04	12.88	10.99
9.63	.379	12991				
			.3077E-03	.1211E-04	12.97	11.44
10.33	.407	15249				
			.3614E-03	.1423E-04	13.01	11.84
11.05	.435	17238				
			.3281E-03	.1292E-04	13.42	12.22
11.69	.460	19193				
			.4376E-03	.1723E-04	13.81	12.56
12.34	.486	20673				
			.4799E-03	.1889E-04	14.20	12.93
13.07	.515	22286				
			.4938E-03	.1944E-04	14.58	13.27
13.68	.539	23440				
			.4866E-03	.1916E-04	14.98	13.56
14.24	.560	24978				
			.7056E-03	.2778E-04	15.34	13.96
15.31	.603	26899				
			.6569E-03	.2586E-04	15.83	14.40
16.09	.633	27290				
			.6831E-03	.2689E-04	16.19	14.73
16.72	.658	28214				
			.9503E-03	.3741E-04	16.52	15.04
17.41	.685	28933				
			.8832E-03	.3477E-04	16.85	15.33
18.03	.710	29639				
			.9534E-03	.3754E-04	17.24	15.69
19.02	.749	30682				
			.1255E-02	.4942E-04	17.81	16.21
20.43	.804	31806				
			.1256E-02	.4944E-04	18.46	16.80
21.78	.858	32881				
			.1536E-02	.6046E-04	19.15	17.43
23.49	.925	33995				
			.1834E-02	.7219E-04	19.91	18.12
25.24	.994	34948				
			.2313E-02	.9108E-04	20.62	18.78
26.75	1.053	35598				
			.2924E-02	.1151E-03	21.27	19.36
28.33	1.115	36140				
			.2807E-02	.1105E-03	21.96	19.98
30.05	1.183	36754				
			.3592E-02	.1414E-03	22.67	20.63
31.79	1.252	37238				
			.3894E-02	.1494E-03	23.29	21.19
33.12	1.304	37598				
			.4809E-02	.1893E-03	23.88	21.66
34.36	1.353	37856				
			.4793E-02	.1887E-03	24.37	22.18
35.97	1.416	38192				
			.5099E-02	.2008E-03	24.99	22.71
37.32	1.469	38455				
			.7161E-02	.2819E-03	25.94	23.24
38.94	1.533	38682				
			.9295E-02	.3659E-03	26.23	23.87
40.84	1.608	38886				
			.8706E-02	.3427E-03	26.93	24.51
42.58	1.676	39046				
			.7934E-02	.3124E-03	27.96	25.48
44.82	1.765	39268				
			.1309E-01	.5155E-03	28.28	25.68
45.88	1.806	39413				
			.1240E-01	.4882E-03	28.86	26.26
47.41	1.866	39533				
			.1519E-01	.5981E-03	29.39	26.75
48.61	1.914	39612				
			.1569E-01	.6177E-03	29.91	27.22
50.07	1.971	39719				

TABLE D1-37

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

K(MAX) 350 CYCLES PRIOR TO FAILURE: 33.96 MPA SQRT(M) (30.90 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
8.19	.319	1				
			.1491E-02	.5854E-04	18.63	16.96
9.22	.363	753				
			.1753E-02	.6908E-04	19.66	17.89
10.85	.396	1224				
			.2998E-02	.1186E-03	20.59	18.66
10.89	.429	1589				
			.2488E-02	.9763E-04	21.24	19.33
11.97	.456	1779				
			.3678E-02	.1445E-03	21.91	19.94
12.38	.484	1978				
			.3485E-02	.1368E-03	22.58	20.55
13.63	.513	2191				
			.4441E-02	.1827E-03	23.23	21.14
13.76	.542	2398				
			.5664E-02	.2230E-03	23.98	21.79
14.54	.572	2487				
			.6615E-02	.2604E-03	24.57	22.36
15.33	.604	2687				
			.6288E-02	.2444E-03	25.22	22.95
16.11	.634	2732				
			.6840E-02	.2696E-03	25.98	23.57
17.01	.669	2862				
			.1055E-01	.4152E-03	26.54	24.16
17.73	.698	2931				
			.1113E-01	.4382E-03	27.16	24.72
18.57	.731	3007				
			.1260E-01	.4961E-03	27.88	25.38
19.38	.763	3071				
			.1232E-01	.4852E-03	28.56	25.99
20.59	.811	3169				
			.1342E-01	.5282E-03	29.58	26.85
21.94	.864	3278				
			.1826E-01	.7188E-03	30.91	27.77
23.48	.921	3353				
			.2359E-01	.9287E-03	31.85	28.68
25.17	.991	3429				

TABLE D1-38

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

K(MAX) 13 CYCLES PRIOR TO FAILURE: 45.46 MPA SQRT(M) (41.37 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
6.74	.265	1				
			.1193E-01	.4538E-03	28.43	25.88
7.67	.302	81				
			.1939E-01	.6868E-03	29.99	27.26
8.31	.327	123				
			.1862E-01	.7329E-03	31.28	28.48
9.02	.355	161				
			.2489E-01	.9783E-03	32.58	29.57
9.77	.384	191				
			.3211E-01	.1264E-02	33.82	30.78
10.57	.416	210				
			.4788E-01	.1882E-02	35.47	32.28
11.76	.463	241				
			.4688E-01	.1846E-02	37.29	33.94
12.69	.507	265				
			.1261E+00	.4966E-02	40.73	37.07
14.42	.646	293				

TABLE D1-39

SPECIMEN NUMBER: 63-3L3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.61 MM (.0634 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 30686 CYCLES

K(MAX) AT CYCLES PRIOR TO FAILURE: 69.35 MPA SQRT(M) (63.12 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.98	.117		.1195E-03	.4706E-05	11.59	10.54
	3.91	.154	7821	.2195E-03	.8642E-05	12.98	11.81
	4.73	.186	11541	.3008E-03	.1184E-04	14.06	12.79
	5.40	.213	13787	.3470E-03	.1366E-04	14.95	13.60
	6.05	.238	15646	.4395E-03	.1731E-04	15.76	14.35
	6.68	.263	17082	.5903E-03	.2324E-04	16.50	15.02
	7.26	.286	18063	.6857E-03	.2700E-04	17.23	15.68
	7.91	.312	19039	.7369E-03	.2901E-04	17.93	16.32
	8.52	.335	19837	.8173E-03	.3218E-04	18.61	16.94
	9.19	.362	20659	.9100E-03	.3583E-04	19.37	17.63
	9.98	.393	21534	.1664E-02	.6551E-04	20.17	18.36
	11.78	.424	22011	.1123E-02	.4420E-04	20.85	18.98
	11.40	.449	22563	.1647E-02	.6483E-04	21.51	19.58
	12.19	.479	23035	.1683E-02	.6628E-04	22.10	20.11
	12.65	.499	23336	.1591E-02	.6264E-04	22.64	20.60
	13.34	.527	23775	.2313E-02	.9108E-04	23.22	21.13
	14.00	.551	24044	.2069E-02	.8143E-04	23.73	21.60
	14.58	.574	24324	.2527E-02	.9950E-04	24.29	22.11
	15.34	.604	24625	.2851E-02	.1123E-03	24.91	22.67
	16.28	.633	24882	.2658E-02	.1046E-03	25.52	23.22
	16.85	.663	25173	.3651E-02	.1437E-03	26.18	23.75
	17.55	.691	25365	.2593E-02	.1020E-03	26.65	24.26
	18.28	.720	25646	.3040E-02	.1197E-03	27.16	24.71
	18.86	.743	25839				
	19.47	.767	26021	.3342E-02	.1316E-03	27.61	25.13
	20.82	.820	26327	.4403E-02	.1734E-03	28.33	25.79
	22.13	.871	26614	.4466E-02	.1766E-03	29.30	26.66
	23.44	.923	26866	.5295E-02	.2085E-03	30.23	27.51
	24.80	.976	27099	.5832E-02	.2296E-03	31.10	28.35
	26.19	1.031	27339	.5784E-02	.2277E-03	32.09	29.21
	27.61	1.087	27574	.6042E-02	.2379E-03	33.04	30.06
	28.84	1.135	27769	.6317E-02	.2495E-03	33.91	30.86
	30.05	1.183	27949	.6724E-02	.2647E-03	34.71	31.59
	31.30	1.232	28128	.6953E-02	.2737E-03	35.50	32.31
	32.60	1.283	28298	.8122E-02	.3197E-03	36.31	33.05
	33.98	1.338	28452	.8929E-02	.3516E-03	37.16	33.82
	35.28	1.389	28591	.9365E-02	.3687E-03	38.00	34.58
	36.69	1.445	28741	.9423E-02	.3710E-03	38.85	35.35
	37.95	1.494	28859	.1197E-01	.4595E-03	39.68	36.11
F	48.64	1.600	29856	.1304E-01	.5133E-03	40.89	37.22
F	42.67	1.680	29206	.1395E-01	.5333E-03	42.34	38.53
F	46.86	1.845	29506	.1397E-01	.5500E-03	44.25	40.27
F	48.64	1.915	29606	.1778E-01	.7000E-03	46.08	41.94
F	49.78	1.960	29706	.1143E-01	.4500E-03	46.99	42.78
F	51.31	2.020	29836	.1524E-01	.6000E-03	47.81	43.51
F	52.83	2.080	29936	.1524E-01	.6000E-03	48.76	44.38
F	55.24	2.175	30006	.2413E-01	.9500E-03	50.00	45.50
F	57.53	2.265	30136	.2286E-01	.9000E-03	51.49	46.86
F	60.45	2.380	30181	.3895E-01	.1533E-02	53.17	48.39
F	64.26	2.530	30331	.2540E-01	.1000E-02	55.48	50.41
F	66.93	2.635	30426	.3556E-01	.1400E-02	57.60	52.42
F	72.64	2.860	30501	.6016E-01	.2368E-02	60.96	55.11
F	76.83	3.025	30546	.9313E-01	.3667E-02	64.25	58.47

TABLE D1-40

SPECIMEN NUMBER: 63-247
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.64 MM (.0647 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 3803 CYCLES
KMAX) 2 CYCLES PRIOR TO FAILURE: 78.17 MPA SQRT(M) (71.14 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.65	.104	1				
			.6415E-03	.2603E-04	17.81	16.21
3.18	.125	783				
			.1503E-02	.5919E-04	19.56	17.80
3.85	.152	1226				
			.1562E-02	.6143E-04	21.29	19.37
4.47	.176	1624				
			.2119E-02	.8329E-04	22.96	21.09
5.21	.205	1971				
			.2564E-02	.1010E-03	24.57	22.36
5.84	.231	2231				
			.2879E-02	.1133E-03	25.93	23.60
6.47	.255	2437				
			.4023E-02	.1584E-03	27.18	24.74
7.19	.279	2592				
			.4434E-02	.1748E-03	28.29	25.74
7.98	.309	2713				
			.8021E-02	.3150E-03	29.59	26.93
8.46	.333	2813				
			.7235E-02	.2848E-03	30.97	28.19
9.11	.359	2912				
			.7463E-02	.2937E-03	32.15	29.26
9.82	.386	2997				
			.9642E-02	.3796E-03	33.95	33.88
11.32	.442	3144				
			.1439E-01	.5667E-03	35.68	32.47
12.11	.473	3199				
			.1035E-01	.4074E-03	36.65	33.36
12.50	.492	3245				
			.1536E-01	.6049E-03	37.65	34.27
13.34	.525	3311				
			.1658E-01	.6529E-03	38.90	35.40
14.21	.559	3352				
			.2416E-01	.9513E-03	40.17	36.55
15.12	.595	3391				
			.1671E-01	.6577E-03	41.11	37.41
15.56	.612	3416				
			.2413E-01	.9500E-03	42.07	38.29
16.55	.651	3457				
			.2264E-01	.8912E-03	43.25	39.36
17.32	.682	3491				
			.3043E-01	.1197E-02	44.85	40.09
17.77	.731	3526				
			.3641E-01	.1433E-02	44.90	40.87
18.64	.734	3553				
			.3305E-01	.1301E-02	46.29	42.13
19.97	.786	3593				
			.3476E-01	.1369E-02	47.86	43.56
21.15	.832	3625				
			.3864E-01	.1523E-02	49.29	44.86
22.34	.880	3655				
			.5268E-01	.2074E-02	50.94	46.36
23.99	.944	3686				
			.7510E-01	.2963E-02	53.22	48.43
26.31	1.036	3727				
			.9118E-01	.3590E-02	56.75	51.64
28.32	1.114	3761				
			.1147E+00	.4517E-02	60.39	54.96
33.17	1.332	3765				
			.1926E+00	.7582E-02	62.96	57.30
35.19	1.385	3776				
			.2233E+00	.8792E-02	64.77	58.94
36.53	1.438	3782				
			.3414E+00	.1344E-01	66.35	60.38
38.24	1.505	3787				
			.4181E+00	.1646E-01	69.09	61.96
39.91	1.571	3791				
			.5042E+00	.2001E-01	70.91	64.17
42.96	1.691	3797				
			.5350E+00	.2106E-01	73.17	66.58
45.13	1.776	3801				

TABLE D1-41

SPECIMEN NUMBER: 83-479
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: T-L
CONSTRAINT: STRAIGHT
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.65 MM (.1437 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 22489 CYCLES
K(MAX) 19 CYCLES PRIOR TO FAILURE: 71.98 MPA SQRT(M) (65.50 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.84	.128	1				
				.1337E-03	.5264E-05	11.43	10.40
	3.87	.144	4693	.2943E-03	.1158E-04	12.94	11.41
	4.48	.173	7179	.3854E-03	.1282E-04	13.47	12.26
	4.91	.193	8859	.4688E-03	.1846E-04	14.24	12.96
	5.49	.216	10897	.3878E-03	.1523E-04	15.02	13.67
	6.07	.239	11987	.6278E-03	.2469E-04	15.88	14.38
	6.72	.264	12622	.7169E-03	.2822E-04	16.59	15.10
	7.38	.290	13545	.8119E-03	.3196E-04	17.36	15.88
	8.04	.316	14368	.9187E-03	.3617E-04	18.09	16.47
	8.70	.343	15063	.1218E-02	.4797E-04	18.88	17.11
	9.36	.369	15[illegible]9	.1302E-02	.5126E-04	19.49	17.73
	10.03	.395	16139	.1488E-02	.5544E-04	20.18	18.37
	10.76	.424	16654	.1973E-02	.7766E-04	20.86	18.98
	11.42	.450	16992	.2058E-02	.8101E-04	21.58	19.57
	12.13	.478	17337	.1648E-02	.6488E-04	22.85	20.87
	12.63	.497	17638	.2931E-02	.1154E-03	22.55	20.52
	13.25	.522	17867	.2694E-02	.1061E-03	23.19	21.11
	14.09	.555	18161	.2691E-02	.1059E-03	23.88	21.73
	14.84	.584	18439	.3426E-02	.1349E-03	24.96	22.35
	15.73	.619	18700	.3147E-02	.1239E-03	25.19	22.92
	16.37	.645	18903	.3948E-02	.1551E-03	25.84	23.52
	17.37	.684	19157	.4156E-02	.1636E-03	26.52	24.13
	18.11	.713	19333	.4349E-02	.1712E-03	27.09	24.65
	18.85	.742	19535	.5059E-02	.1992E-03	27.83	25.33
	20.88	.790	19747	.5779E-02	.2275E-03	28.88	26.21
	21.50	.847	19994	.5747E-02	.2263E-03	29.72	27.05
	22.63	.891	20189	.7851E-02	.2776E-03	30.59	27.84
	23.98	.944	20381	.7994E-02	.3147E-03	31.48	28.65
	25.20	.992	20534	.7988E-02	.3145E-03	32.37	29.46
	26.61	1.048	20710	.8459E-02	.3330E-03	33.28	30.29
	27.93	1.100	20866	.1189E-01	.4679E-03	34.17	31.10
	29.32	1.154	20983	.9689E-02	.3815E-03	35.07	31.92
	30.71	1.209	21126	.9351E-02	.3681E-03	35.92	32.69
	31.97	1.259	21261	.1038E-01	.4054E-03	36.75	33.44
	33.30	1.311	21390	.1328E-01	.5227E-03	37.56	34.20
	34.61	1.363	21489	.1438E-01	.5661E-03	38.53	35.07
	36.35	1.431	21618	.1280E-01	.5040E-03	39.46	35.92
	37.64	1.482	21711	.1761E-01	.6934E-03	40.41	36.77
F	39.37	1.550	21809	.2159E-01	.8500E-03	41.68	37.86
F	41.53	1.635	21909	.1909E-01	.7500E-03	42.85	38.99
F	43.41	1.710	22009	.1909E-01	.7500E-03	44.02	40.06
F	45.34	1.785	22109	.2413E-01	.9500E-03	45.34	41.26
F	47.75	1.880	22209	.3302E-01	.1300E-02	4 ..[illegible]	42.87
F	51.05	2.010	22389	.3175E-01	.1250E-02	49.12	44.70
F	54.23	2.135	22489	.2540E-01	.1000E-02	50.93	46.35
F	56.77	2.235	22589	.2794E-01	.1100E-02	52.19	47.50
F	58.17	2.290	22659	.5842E-01	.2300E-02	53.59	48.77
F	61.09	2.405	22689	.6318E-01	.1780E-02	55.27	50.30
F	63.25	2.490	22759	.8346E-01	.3284E-02	56.99	51.87
F	66.17	2.605	22694	.8128E-01	.3200E-02	58.71	53.43
F	68.20	2.685	22719	.9144E-01	.3600E-02	60.25	54.83
F	70.48	2.775	22744	.1689E+00	.6333E-02	61.96	56.39
F	72.90	2.870	22759	.2413E+00	.9500E-02	64.71	58.89
F	77.72	3.060	22779	.1963E+00	.7727E-02	67.49	61.42
F	79.88	3.145	22793				

TABLE D1-42

SPECIMEN NUMBER: 63-87A
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.64 MM (.0646 IN)
MAXIMUM STRESS: 193.0 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 20 CPS
CYCLES TO FAILURE: 1975 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 58.37 MPA SQRT(M) (53.12 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.14	.124	1				
			.1441E-02	.5675E-04	19.47	17.72
3.83	.151	475				
			.2687E-02	.1027E-03	21.31	19.39
4.52	.178	739				
			.2810E-02	.1110E-03	22.09	20.03
5.11	.201	949				
			.5866E-02	.2286E-03	24.46	22.26
5.88	.231	1082				
			.4428E-02	.1819E-03	26.09	23.78
6.62	.261	1242				
			.7874E-02	.3108E-03	27.88	25.38
7.56	.298	1362				
			.8363E-02	.3293E-03	29.46	26.81
8.35	.329	1456				
			.1810E-01	.3978E-03	30.88	28.03
9.03	.355	1523				
			.1455E-01	.5727E-03	31.82	28.95
9.51	.374	1556				
			.1129E-01	.4427E-03	32.76	29.81
10.13	.399	1611				
			.1546E-01	.6086E-03	33.64	30.62
10.57	.416	1640				
			.1811E-01	.7129E-03	34.46	31.36
11.14	.438	1671				
			.1687E-01	.6326E-03	35.58	32.38
11.87	.468	1717				
			.2668E-01	.1047E-02	36.76	33.46
12.78	.503	1751				
			.1621E-01	.6380E-03	37.74	34.35
13.18	.519	1776				
			.2381E-01	.9375E-03	38.93	35.44
13.85	.545	1804				
			.2439E-01	.9598E-03	39.68	36.04
14.68	.578	1838				
			.2841E-01	.1118E-02	40.78	37.11
15.53	.611	1868				
			.4366E-01	.1719E-02	41.84	38.08
16.23	.639	1884				
			.9347E-01	.2185E-02	42.67	38.83
16.76	.660	1894				
			.6178E-01	.2432E-02	43.72	39.78
17.81	.701	1911				
			.7632E-01	.3005E-02	44.94	40.90
18.65	.734	1922				
			.9665E-01	.3805E-02	46.68	42.48
20.59	.810	1942				
			.1071E+00	.4217E-02	48.65	44.27
21.87	.861	1954				
			.1761E+00	.6931E-02	50.29	45.73
23.26	.917	1962				
			.3173E+00	.1249E-01	52.18	47.49
25.18	.991	1968				
			.3896E+00	.1534E-01	54.36	49.47
27.13	1.068	1973				

TABLE D1-43

SPECIMEN NUMBER:	U63-6L1
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	LAB AIR
TEST TEMPERATURE:	422.0 K
SPECIMEN THICKNESS:	1.65 MM (.0650 IN)
MAXIMUM STRESS:	114.4 MPA (16.6 KSI)
R-RATIO:	.05
FREQUENCY:	286 CPM
CYCLES TO FAILURE:	9829 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	66.83 MPA SQRT(M) (60.89 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.69	.340	1				
			.9565E-03	.3766E-04	18.25	16.61
9.24	.364	637				
			.1125E-02	.4429E-04	18.90	17.20
9.42	.391	1241				
			.1235E-02	.4864E-04	19.66	17.89
10.78	.425	1940				
			.1163E-02	.4578E-04	20.35	18.52
11.39	.448	2461				
			.1298E-02	.5111E-04	20.84	18.97
11.86	.467	2821				
			.1993E-02	.7847E-04	21.37	19.45
12.56	.495	3174				
			.1491E-02	.5897E-04	21.96	19.96
13.15	.518	3564				
			.2212E-02	.8710E-04	22.61	20.49
13.90	.547	3905				
			.1994E-02	.7850E-04	23.17	21.08
14.71	.579	4312				
			.2297E-02	.9042E-04	23.84	21.69
15.54	.612	4672				
			.2224E-02	.8757E-04	24.33	22.14
15.94	.628	4893				
			.3195E-02	.1258E-03	24.80	22.57
16.74	.659	5103				
			.2674E-02	.1053E-03	25.41	23.12
17.[illegible]	.689	5388				
			.3516E-02	.1384E-03	26.07	23.73
18.49	.728	5639				
			.2464E-02	.9701E-04	26.61	24.22
18.94	.746	5853				
			.4236E-02	.1668E-03	27.15	24.71
19.97	.786	6237				
			.4331E-02	.1704E-03	28.09	25.51
21.40	.842	6626				
			.4484E-02	.1766E-03	29.04	26.43
22.84	.899	6979				
			.4961E-02	.1945E-03	30.00	27.30
24.19	.953	7282				
			.6272E-02	.2393E-03	30.90	28.12
25.62	1.009	7591				
			.6145E-02	.2419E-03	31.75	28.90
26.78	1.054	7845				
			.6823E-02	.2689E-03	32.55	29.62
27.97	1.101	8093				
			.6941E-02	.2736E-03	33.38	33.38
29.34	1.155	8381				
			.6444E-02	.2695E-03	34.11	31.04
30.28	1.192	8584				
			.7687E-02	.2987E-03	34.96	31.80
32.13	1.265	8944				
			.9231E-02	.3659E-03	36.37	33.10
34.05	1.340	9311				
			.1314E-01	.5175E-03	37.58	34.20
36.99	1.417	9576				
			.1067E-01	.4199E-03	38.29	34.85
37.25	1.466	9636				
			.1211E-01	.4764E-03	38.96	35.45
38.02	1.496	9773				
			.1121E-01	.4412E-03	39.65	36.08
38.54	1.517	9837				
			.1778E-01	.6547E-03	40.36	36.73
40.59	1.598	9955				
			.1543E-01	.6295E-03	41.10	37.40
42.61	1.677	9983				
			.1446E-01	.5691E-03	41.91	38.14
43.28	1.704	9992				
			.1716E-01	.7370E-03	42.91	39.05
45.35	1.785	9997				
			.1511E-01	.6978E-03	43.85	39.91
46.46	1.828	9998				
			.1061E-01	.7327E-03	44.63	40.62
47.04	1.851	9999				
			.2241E-01	.8980E-03	45.46	41.31
48.04	1.891	9999				
			.2341E-01	.9414E-03	46.27	42.11
50.04	1.970	9999				
			.3875E-01	.1447E-02	47.14	42.93
51.98	2.046	9999				
			.4434E-01	.1746E-02	48.14	43.91
F 53.97	2.125	9999				
			.2543E-01	.1000E-02	49.14	44.72
F 55.24	2.175	9999				

				.5719E-01	.2293E-02	50.24	45.72
F	57.51	2.765	9843	.6393E-01	.2503E-02	51.56	46.92
F	58.44	2.740	9713	.8382E-01	.3182E-02	53.60	48.77
F	61.84	2.615	9774	.9525E-01	.3753E-02	55.69	50.60
F	65.79	2.648	9794	.1439E+00	.5667E-02	57.06	51.93
F	67.94	2.675	9803	.1778E+00	.7003E-02	58.42	53.16
F	69.72	2.745	9813	.2762E+00	.1083E-01	59.62	54.26
F	71.37	2.811	9825	.6353E+00	.2500E-01	60.67	55.21
F	72.84	2.461	9827	.2153E+01	.8500E-01	61.93	56.36
F	74.82	2.945	9824				

TABLE D1-44

SPECIMEN NUMBER:
SPECIMEN ORIENTATION:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MATERIAL STRENGTH:
CYCLES TO FAILURE:

K(MAX) 2 CYCLES PRIOR TO FAILURE: 58.78 MPA SQRT(M) (53.48 KSI SQRT(IN)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	8.65	.333	1	.1031E-02	.4059E-04	9.53	8.68
	9.72	.383	1220	.1261E-02	.4963E-04	10.04	9.13
	10.48	.413	1773	.1443E-02	.5682E-04	10.45	9.51
	11.38	.448	2447	.2869E-02	.7969E-04	10.88	9.90
	12.21	.481	2863	.2357E-02	.9279E-04	11.38	10.28
	13.19	.519	3279	.2171E-02	.8547E-04	11.78	10.68
	14.02	.552	3681	.3839E-02	.1197E-03	12.13	11.03
	15.16	.597	4935	.3599E-02	.1417E-03	12.97	11.44
	16.13	.635	4388	.3166E-02	.1246E-03	12.99	11.82
	17.21	.678	4647	.9316E-02	.2093E-03	13.43	12.22
	17.17	.721	4862	.4579E-02	.1803E-03	13.43	12.59
	17.11	.74	5.74	.6409E-02	.2523E-03	14.48	13.18
	21.19	.843	5793	.8542E-02	.3363E-03	15.16	13.78
	23.93	.929	5961	.8534E-02	.3360E-03	15.35	14....
	25.87	1.018	5919	.1058E-01	.4167E-03	16.75	15.24
	28.19	1.110	6139	.1373E-01	.5406E-03	17.43	15.86
	29.95	1.179	6287	.1439E-01	.5665E-03	18.02	16.48
	31.86	1.254	6488	.1836E-01	.7222E-03	18.84	16.97
	33.81	1.331	6586	.2059E-01	.8109E-03	19.23	17.98
	35.58	1.401	6592	.2218E-01	.8733E-03	19.82	18.84
	37.93	1.478	6688	.2888E-01	.1102E-02	20.41	18.98
	39.36	1.550	6746	.2911E-01	.1146E-02	21.08	19.11
	41.27	1.625	6811	.2789E-01	.1098E-02	21.53	19.59
	42.81	1.685	6864	.2350E-01	.9250E-03	21.91	19.94
	43.75	1.722	6906	.6868E-01	.2701E-02	22.68	20.97
F	47.24	1.868	6957	.4318E-01	.1700E-02	23.48	21.37
F	48.48	1.969	7007	.7197E-01	.2833E-02	24.15	21.98
F	51.96	2.838	7037	.4011E-01	.1579E-02	24.81	22.48
F	52.32	2.888	7056	.1123E+00	.4423E-02	25.28	22.93
F	55.24	2.175	7082	.1350E+00	.4167E-02	25.87	23.54
F	56.51	2.225	7094	.1397E+00	.5500E-02	26.38	23.94
F	57.91	2.280	7104	.9529E+00	.3750E-01	26.44	24.42
F	59.82	2.355	7106	.2286E+01	.9000E-01	27.94	25.06
F	62.18	2.445	7107				

TABLE D1-45

SPECIMEN NUMBER: 62-9115
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: CAN AIR
TEST TEMPERATURE: 450. F
SPECIMEN THICKNESS: 3.94 MM (.1545 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 24231 CYCLES
K(MAX) 1917 CYCLES PRIOR TO FAILURE: 41.41 MPA SQRT(M) (37.68 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.71	.107	1				
			.1228E-03	.4835E-05	10.09	9.91
3.38	.133	5454	.2226E-03	.8762E-05	11.99	10.92
4.00	.158	8273	.3367E-03	.1326E-04	13.84	11.87
4.72	.186	10309	.3988E-03	.1567E-04	14.86	12.79
5.42	.213	12144	.5882E-03	.2316E-04	15.87	13.71
6.22	.245	13513	.5849E-03	.2317E-04	16.88	14.56
6.89	.271	14646	.7728E-03	.3042E-04	16.76	15.25
7.49	.295	15425	.7132E-03	.2808E-04	17.47	15.98
8.13	.320	16326	.1093E-02	.4304E-04	18.49	16.83
9.36	.368	17446	.1517E-02	.5971E-04	19.41	17.66
9.89	.389	17796	.1278E-02	.5358E-04	20.02	18.22
10.57	.416	18333	.1149E-02	.4522E-04	20.54	18.69
10.96	.432	18675	.1398E-02	.5498E-04	21.05	19.16
11.63	.458	19157	.2013E-02	.7919E-04	21.62	19.68
12.18	.480	19428	.1839E-02	.7239E-04	22.18	20.18
12.65	.498	19792	.2229E-02	.8774E-04	22.73	20.68
13.42	.528	20049	.2178E-02	.8842E-04	23.30	21.21
14.17	.558	20392	.2351E-02	.9257E-04	23.87	21.72
14.75	.581	20641	.3183E-02	.1253E-03	24.34	22.15
15.29	.602	20889	.2745E-02	.1081E-03	24.86	22.63
16.02	.631	21076	.3172E-02	.1249E-03	25.48	23.11
16.61	.654	21261	.2841E-02	.1118E-03	25.82	23.50
17.18	.673	21434	.3367E-02	.1333E-03	26.28	23.92
17.78	.700	21635				
			.3379E-02	.1330E-03	26.76	24.37
18.37	.723	21839	.4081E-02	.1575E-03	27.44	24.97
19.53	.769	22181	.4213E-02	.1659E-03	28.34	25.79
20.78	.818	22397	.4209E-02	.1687E-03	29.25	26.62
22.04	.868	22691	.4889E-02	.1893E-03	30.11	27.48
23.19	.913	22933	.5614E-02	.2210E-03	31.34	28.52
25.59	1.008	23358	.6675E-02	.2628E-03	32.63	29.69
26.97	1.062	23549	.6952E-02	.2737E-03	33.49	30.47
28.18	1.109	23738	.7483E-02	.2946E-03	34.22	31.14
29.22	1.150	23877	.8365E-02	.3293E-03	34.97	31.82
31.47	1.238	24027	.8717E-02	.3432E-03	35.74	32.52
31.67	1.246	24159	.8881E-02	.3150E-03	36.44	33.16
32.66	1.286	24204	.8658E-02	.3408E-03	37.11	33.77
33.76	1.329	24416	.1017E-01	.4005E-03	37.78	34.38
34.78	1.369	24516	.1104E-01	.4345E-03	38.44	34.98
35.88	1.413	24616	.9123E-02	.3592E-03	39.06	35.55
36.78	1.448	24714				

TABLE D1-46

SPECIMEN NUMBER: 63-6L4
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 298.0 K
SPECIMEN THICKNESS: 1.63 MM (.0640 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .15
FREQUENCY: 20 CPM
K(MAX) 2 CYCLES PRIOR TO FAILURE: 93.72 MPA SQRT(M) (85.29 KSI SQRT(IN))
CYCLES TO FAILURE: 3461 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.75	.108	1				
			.1284E-02	.4742E-04	10.62	16.40
3.22	.127	384				
			.1497E-02	.5853E-04	19.67	17.90
3.90	.153	845				
			.1939E-02	.7633E-04	21.44	19.51
4.55	.179	1183				
			.2688E-02	.1058E-03	23.18	21.09
5.32	.209	1467				
			.3354E-02	.1320E-03	24.74	22.51
5.92	.233	1646				
			.3799E-02	.1492E-03	26.13	23.78
6.61	.260	1829				
			.4591E-02	.1807E-03	27.48	24.94
7.17	.282	1951				
			.4571E-02	.1799E-03	28.65	26.07
7.89	.311	2114				
			.5829E-02	.2295E-03	29.96	27.27
8.57	.337	2225				
			.6469E-02	.2547E-03	31.20	28.39
9.24	.364	2332				
			.7666E-02	.3018E-03	32.53	29.60
10.11	.398	2442				
			.7704E-02	.3034E-03	33.89	30.84
10.90	.429	2545				
			.8702E-02	.3426E-03	35.14	31.98
11.66	.459	2638				
			.9034E-02	.3576E-03	36.34	33.07
12.44	.490	2718				
			.1013E-01	.3987E-03	37.50	34.13
13.21	.520	2794				
			.1304E-01	.5134E-03	38.71	35.23
14.03	.554	2861				
			.1478E-01	.5821E-03	39.90	36.31
14.86	.585	2914				
			.1854E-01	.7316E-03	41.09	37.38
15.77	.621	2963				
			.1743E-01	.7021E-03	42.26	38.47
16.62	.655	3011				
			.2145E-01	.8444E-03	43.36	39.46
17.41	.685	3047				
			.2317E-01	.9043E-03	44.40	40.41
18.23	.718	3083				
			.2701E-01	.1065E-02	45.47	41.38
19.07	.751	3113				
			.2726E-01	.1073E-02	47.04	42.81
19.76	.817	3175				
			.1569E-01	.6178E-03	48.91	44.14
21.46	.845	3221				
			.7147E-01	.2790E-02	50.19	45.68
23.59	.929	3251				
			.6213E-01	.2446E-02	52.33	47.62
25.14	.991	3275				
			.4636E-01	.1814E-02	54.18	49.31
26.85	1.057	3312				
			.6658E-01	.2621E-02	56.09	51.04
28.58	1.125	3334				
			.7116E-01	.2832E-02	58.24	53.00
30.78	1.212	3369				
			.9366E-01	.3687E-02	60.82	54.62
31.91	1.256	3381				
			.5315E+00	.2892E-01	61.18	55.68
32.97	1.298	3393				
			.1423E+01	.5604E-02	62.72	57.10
34.82	1.371	3336				
			.2148E+00	.8458E-02	64.36	58.57
36.11	1.422	3412				
			.2411E+00	.9492E-02	65.78	59.86
37.54	1.479	3418				
			.2508E+01	.9875E-02	67.30	61.25
39.06	1.538	3414				
			.2114E+00	.8322E-02	69.05	62.84
40.96	1.613	3423				
			.2[illegible]E+00	.1037E-01	70.84	64.46
42.64	1.679	3429				
			.4216E+00	.1659E-01	72.72	66.18
44.65	1.758	3434				
			.3429E+00	.1350E-01	74.68	67.96
46.27	1.825	3439				
			.3973E+00	.1564E-01	76.79	69.88
48.75	1.919	3445				
			.5344E+00	.2104E-01	79.48	72.26
51.42	2.025	3453				
			.7544E+00	.2970E-01	82.37	74.96
54.44	2.143	3454				
			.9402E+00	.3703E-01	86.48	78.78
59.18	2.733	3459				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-47

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

K(MAX) 638 CYCLES PRIOR TO FAILURE: 44.86 MPA SQRT(M) (40.18 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.13	.123	1				
			.1484E-03	.5842E-05	11.56	10.92
3.73	.147	4832				
			.1329E-03	.5234E-05	12.39	11.28
4.15	.163	7213				
			.3508E-03	.1381E-04	13.29	12.10
4.91	.193	9385				
			.2699E-03	.1062E-04	14.25	12.97
5.50	.217	11578				
			.4739E-03	.1866E-04	15.12	13.76
6.21	.244	13069				
			.6087E-03	.2365E-04	15.97	14.54
6.86	.270	14153				
			.6881E-03	.2709E-04	16.82	15.31
7.62	.300	15253				
			.7456E-03	.2933E-04	17.63	16.05
8.29	.326	16148				
			.1053E-02	.4144E-04	18.3.	16.67
8.86	.349	16897				
			.1048E-02	.4124E-04	18.99	17.28
9.56	.377	17365				
			.1548E-02	.6093E-04	19.71	17.94
10.28	.405	17827				
			.1343E-02	.5249E-04	20.34	18.51
10.84	.427	18242				
			.2019E-02	.7947E-04	20.96	19.07
11.56	.455	18688				
			.1841E-02	.7246E-04	21.64	19.69
12.28	.484	18994				
			.2184E-02	.8598E-04	22.32	20.31
13.05	.514	19347				
			.3159E-02	.1244E-03	22.88	20.82
13.55	.534	19585				
			.2619E-02	.1030E-03	23.42	21.31
14.30	.563	19791				
			.3091E-02	.1217E-03	24.03	21.87
15.00	.591	20017				
			.2941E-02	.1158E-03	24.61	22.39
15.68	.617	20248				
			.3477E-02	.1369E-03	25.23	22.96
16.53	.651	20492				
			.3602E-02	.1418E-03	25.93	23.59
17.43	.686	20742				
			.4272E-02	.1682E-03	26.61	24.21
18.27	.719	20940				
			.4263E-02	.1678E-03	27.23	24.78
19.06	.751	21125				
			.5624E-02	.2214E-03	28.04	25.52
20.43	.804	21368				
			.5540E-02	.2181E-03	28.96	26.36
21.58	.849	21579				
			.5637E-02	.2219E-03	29.98	27.21
23.05	.908	21837				
			.7593E-02	.2989E-03	30.91	28.13
24.47	.963	22023				
			.7776E-02	.3061E-03	31.96	29.08
26.11	1.028	22235				
			.8893E-02	.3500E-03	33.58	30.56
29.31	1.154	22595				
			.1114E-01	.4386E-03	35.12	31.96
30.83	1.214	22731				
			.1281E-01	.5045E-03	36.18	32.85
32.39	1.275	22853				
			.1355E-01	.5333E-03	37.11	33.77
34.02	1.339	22973				
			1474E-01	.5804E-03	38.25	34.81
36.01	1.418	23108				
			.1559E-01	.6137E-03	39.32	35.79
37.49	1.476	23203				
			.1726E-01	.6797E-03	40.27	36.65
39.06	1.538	23294				
			.1457E-01	.7389E-03	41.31	37.59
40.86	1.609	23391				

TABLE D1-48

SPECIMEN NUMBER: 63-1T1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: SYMMETRIC
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 297. K
SPECIMEN THICKNESS: 1.63 MM (.0640 IN)
MAXIMUM STRESS: 165.8 MPA (24.4 KSI)
R-RATIO: .10
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 2817 CYCLES
K(MAX) 4 CYCLES PRIOR TO FAILURE: 68.98 MPA SQRT(M) (59.49 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.21	.126	1				
			.2321E-02	.9136E-04	19.85	18.06
4.03	.159	354				
			.3999E-02	.1574E-03	21.83	19.87
4.73	.186	529				
			.4244E-02	.1671E-03	23.91	21.48
5.43	.214	693				
			.5786E-02	.2278E-03	25.22	22.96
6.26	.246	837				
			.7274E-02	.2864E-03	26.94	24.51
7.06	.278	967				
			.6437E-02	.2534E-03	28.84	26.24
8.19	.323	1123				
			.7801E-02	.2993E-03	30.36	27.63
8.78	.343	1198				
			.1869E-01	.3973E-03	32.13	29.24
10.21	.402	1339				
			.1893E-01	.4384E-03	34.67	31.55
11.77	.463	1482				
			.2148E-01	.8456E-03	36.47	33.19
12.58	.492	1916				
			.1488E-01	.5935E-03	37.47	34.10
13.18	.516	1959				
			.1719E-01	.6769E-03	38.41	34.96
13.77	.542	1998				
			.1822E-01	.7175E-03	39.42	35.87
14.58	.571	1638				
			.1889E-01	.7436E-03	40.45	36.81
15.24	.600	1677				
			.2078E-01	.8150E-03	41.53	37.80
16.07	.633	1717				
			.2216E-01	.8726E-03	42.95	38.73
16.76	.660	1748				
			.2578E-01	.1015E-02	43.97	39.65
17.61	.693	1781				
			.6587E-01	.2592E-02	45.88	40.96
18.97	.747	1882				
			.2281E-01	.8979E-03	46.21	42.06
19.52	.769	1826				
			.2499E-01	.9837E-03	47.17	42.92
20.52	.808	1866				
			.3371E-01	.1327E-02	48.58	44.14
21.78	.858	1901				
			.4678E-01	.1839E-02	50.07	45.57
23.15	.911	1932				
			.5234E-01	.2061E-02	51.77	47.11
24.61	.969	1960				
			.7874E-01	.3100E-02	53.55	48.73
26.27	1.034	1991				
			.9932E-01	.3910E-02	55.49	50.50
28.88	1.105	2888				
			.1828E+00	.4815E-02	57.21	52.06
29.48	1.150	2813				

TABLE D1-49

SPECIMEN NUMBER: 63-211
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.54 MM (.0606 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 20
CYCLES TO FAILURE: 78970 CYCLES
K(MAX) 10 CYCLES PRIOR TO FAILURE: 68.15 MPA SQRT(M) (72.94 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.16	.124	1				
			.6368E-04	.2507E-05	6.10	5.62
3.98	.156	11660				
			.8209E-04	.3264E-05	6.81	6.28
4.68	.184	21629				
			.1184E-03	.4661E-05	7.36	6.72
5.41	.213	27136				
			.1225E-03	.4822E-05	7.88	7.17
6.07	.239	32567				
			.1542E-03	.6069E-05	8.30	7.55
6.67	.263	36485				
			.1839E-03	.7241E-05	8.72	7.93
7.37	.290	40283				
			.1984E-03	.7811E-05	9.11	8.29
7.98	.314	43333				
			.2149E-03	.8459E-05	9.45	8.60
8.53	.336	45987				
			.2517E-03	.9908E-05	9.86	8.97
9.41	.370	49399				
			.2963E-03	.1167E-04	10.29	9.36
10.11	.398	51752				
			.3829E-03	.1507E-04	10.71	9.74
11.01	.434	54117				
			.4215E-03	.1660E-04	11.14	10.13
11.81	.465	56015				
			.4433E-03	.1745E-04	11.49	10.45
12.45	.490	57456				
			.4955E-03	.1951E-04	11.88	10.74
13.14	.518	58859				
			.5597E-03	.2204E-04	12.13	11.04
13.84	.545	60186				
			.7696E-03	.3030E-04	12.44	11.32
14.54	.572	61647				
			.6421E-03	.2528E-04	12.74	11.59
15.16	.597	62046				
			.8191E-03	.3225E-04	13.02	11.85
15.82	.623	62787				
			.8923E-03	.3512E-04	13.28	12.09
16.42	.646	63453				
			.8961E-03	.3528E-04	13.53	12.31
16.99	.669	64094				
			.1228E-02	.4836E-04	13.79	12.55
17.66	.695	64641				
			.1153E-02	.4929E-04	14.05	12.79
18.27	.719	65174				
			.1383E-02	.4263E-04	14.25	12.97
18.65	.734	65527				
			.1178E-02	.4637E-04	14.60	13.28
20.02	.788	66684				
			.1314E-02	.5172E-04	15.21	13.84
21.81	.859	68053				
			.1427E-02	.5619E-04	15.81	14.39
23.21	.914	69029				
			.2033E-02	.8006E-04	16.32	14.85
24.60	.969	69715				
			.1961E-02	.7722E-04	16.83	15.31
26.02	1.024	70435				
			.1989E-02	.7829E-04	17.30	15.74
27.25	1.073	71059				
			.2443E-02	.9617E-04	17.79	16.19
28.62	1.127	71619				
			.2696E-02	.1061E-03	18.21	16.57
29.94	1.179	72139				
			.2709E-02	.1066E-03	18.67	16.99
31.35	1.234	72628				
			.3266E-02	.1286E-03	19.18	17.45
32.93	1.296	73111				
			.2947E-02	.1160E-03	19.67	17.90
34.34	1.352	73591				
			.3348E-02	.1318E-03	20.14	18.33
35.75	1.408	74312				
			.4135E-02	.1628E-03	20.59	18.74
37.09	1.460	74336				
			.4173E-02	.1643E-03	21.01	19.12
38.36	1.510	74643				
			.4153E-02	.1635E-03	21.45	19.52
39.76	1.565	74981				
			.4926E-02	.1938E-03	21.98	19.93
41.14	1.620	75257				
			.4837E-02	.1904E-03	22.31	20.31
42.35	1.667	75514				
			.5938E-02	.2338E-03	22.79	20.71
43.85	1.727	75761				
			.5012E-02	.1973E-03	23.18	21.09
44.98	1.771	75986				
			.6967E-02	.2743E-03	23.56	21.44
46.21	1.819	76163				
			.5855E-02	.2305E-03	23.94	21.78
47.33	1.863	76353				
F 49.40	1.945	76579	.9229E-02	.3633E-03	24.45	22.25
F 50.93	2.005	76929	.4354E-02	.1714E-03	25.04	22.79
F 53.09	2.090	77178	.6636E-02	.2612E-03	25.69	23.36
F 56.26	2.215	77428	.1270E-01	.5000E-03	26.93	24.14
F 58.04	2.285	77628	.8898E-02	.3503E-03	27.36	24.90
F 61.72	2.430	77828	.1842E-01	.7250E-03	28.38	25.75
F 64.39	2.535	78028	.1333E-01	.5250E-03	29.41	26.76
F 65.91	2.595	78178	.1016E-01	.4000E-03	30.16	27.45
F 67.18	2.645	78278	.1270E-01	.5000E-03	30.67	27.91
F 69.09	2.720	78378	.1905E-01	.7500E-03	31.26	28.44
F 71.25	2.805	78468	.3084E-01	.1214E-02	32.82	29.14
			.1009E-01	.4266E-03	32.99	29.66

D1-49 (CON'T.)

F	72.81	2.839	78918	.1996E-01	.7857E-03	33.61	30.04
F	73.41	2.890	78988	.3266E-01	.1286E-02	33.75	30.71
F	75.69	2.980	78650	.3179E-01	.1250E-02	34.61	31.49
F	77.68	3.055	78718	.2328E-01	.9167E-03	35.38	32.18
F	78.99	3.110	78778	.9334E-01	.2188E-02	36.19	32.93
F	81.66	3.215	78828	.2794E-01	.1100E-02	37.18	33.76
F	83.06	3.270	78878	.2286E-01	.9000E-03	37.69	34.30
F	84.28	3.319	78928	.7620E-01	.3000E-02	38.23	34.79
F	85.34	3.360	78963	.6985E-01	.2750E-02	38.84	35.34
F	86.74	3.415	78963	.3998E+00	.1406E-01	39.62	36.06
F	88.52	3.485	78968				

TABLE D1-50

SPECIMEN NUMBER:
SPECIMEN [illegible]:
[illegible]:
TEST [illegible]:
SPECIMEN [illegible]:
[illegible]:
[illegible]:
[illegible]:
CYCLES TO FAILURE:

[illegible]:
LOW [illegible]:
[illegible]:
[illegible]:
[illegible]:
[illegible]:
[illegible]:
[illegible]:
[illegible]:

K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.0 PSI) 12738 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.13	.123	1				
			.3218E-03	.1266E-04	10.10	9.27
3.76	.148	1964				
			.3727E-03	.1467E-04	11.11	10.11
4.44	.175	3794				
			.5374E-03	.2116E-04	11.98	10.88
5.08	.199	5426				
			.6784E-03	.2671E-04	12.90	11.74
5.98	.235	6382				
			.8431E-03	.3319E-04	13.77	12.53
6.99	.259	7019				
			.1085E-02	.4272E-04	14.69	13.19
7.32	.288	7699				
			.1962E-02	.7726E-04	15.14	13.77
7.85	.309	7965				
			.2193E-02	.8621E-04	15.72	14.31
8.51	.335	8266				
			.2379E-02	.9368E-04	16.32	14.85
9.11	.359	8519				
			.2538E-02	.9974E-04	16.96	15.43
9.96	.396	8858				
			.2538E-02	.9984E-04	17.66	16.07
10.70	.421	9174				
			.1964F-02	.7733E-04	18.25	16.61
11.25	.444	9474				
			.4768E-02	.1869E-03	18.84	17.14
12.18	.477	9846				
			.4257E-02	.1670E-03	19.42	17.67
12.72	.501	9791				
			.4988E-02	.1956E-03	19.94	18.15
13.45	.530	9938				
			.3863E-02	.1419E-03	20.45	18.61
14.09	.555	10134				
			.4487E-02	.1739E-03	20.96	19.07
14.79	.582	10272				
			.4869E-02	.1915E-03	21.45	19.52
15.39	.606	12395				
			.4393E-02	.1730E-03	21.88	19.91
15.98	.629	10938				
			.7324E-02	.2884E-03	22.39	20.38
16.83	.663	11046				
			.6218E-02	.2449E-03	22.98	20.92
17.68	.696	10782				
			.4929E-02	.1939E-03	23.46	21.35
18.24	.718	10897				
			.4420E-02	.2938E-03	23.87	21.72
19.86	.743	16997				

TABLE D1-11

SPECIMEN NUMBER: U63-4L3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.4 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 168.9 MPA (24.5 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 3620 CYCLES
K(MAX) 135 CYCLES PRIOR TO FAILURE: 40.83 MPA SQRT(M) (37.15 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.33	.171	1				
			.8884E-03	.3498E-04	19.56	17.80
5.11	.201	873				
			.1337E-02	.5263E-04	21.15	19.24
5.92	.233	1481				
			.2104E-02	.8285E-04	22.96	20.90
7.07	.279	2029				
			.3118E-02	.1228E-03	24.73	22.50
7.98	.314	2321				
			.3777E-02	.1487E-03	26.26	23.90
8.99	.354	2587				
			.5357E-02	.2109E-03	27.86	25.36
10.09	.397	2793				
			.6409E-02	.2523E-03	29.54	26.88
11.33	.446	2986				
			.7295E-02	.2872E-03	31.05	28.25
12.33	.484	3119				
			.1049E-01	.4132E-03	32.34	29.43
13.35	.523	3214				
			.1284E-01	.5054E-03	33.57	30.55
14.25	.561	3288				
			.1733E-01	.6824E-03	34.87	31.73
15.43	.607	3356				
			.1817E-01	.7154E-03	36.13	32.88
16.37	.645	3408				
			.1995E-01	.7857E-03	37.40	34.03
17.63	.694	3471				
			.4363E-01	.1718E-02	38.45	34.99
18.24	.718	3485				

TABLE D1-12

SPECIMEN NUMBER: U63-5T9
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.4 K
SPECIMEN THICKNESS: 1.66 MM (.0653 IN)
MAXIMUM STRESS: 164.9 MPA (23.9 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 1383 CYCLES
K(MAX) 118 CYCLES PRIOR TO FAILURE: 32.12 MPA SQRT(M) (29.23 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.70	.185	1				
			.1906E-02	.7505E-04	20.81	18.21
5.68	.224	516				
			.3561E-02	.1402E-03	21.84	19.88
6.68	.263	796				
			.5463E-02	.2151E-03	23.34	21.24
7.42	.292	932				
			.8963E-02	.3529E-03	24.64	22.42
8.28	.326	1828				
			.9039E-02	.3559E-03	26.18	23.83
9.44	.371	1156				
			.1778E-01	.7000E-03	27.84	25.34
10.57	.416	1220				
			.3138E-01	.1236E-02	29.59	26.93
11.99	.472	1265				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-13

SPECIMEN NUMBER: W83-6T6
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.4 K
SPECIMEN THICKNESS: 1.65 MM (.0648 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 3083 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 51.68 MPA SQRT(M) (46.96 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	8.47	.333	1				
	9.25	.364	602	.1300E-02	.5116E-04	18.83	17.14
	10.41	.410	1171	.2851E-02	.6876E-04	19.85	18.07
	11.43	.450	1539	.2761E-02	.1087E-03	20.94	19.05
	12.52	.493	1892	.3471E-02	.1369E-03	21.94	19.97
	13.58	.535	2093	.4390E-02	.1728E-03	22.92	20.86
	14.55	.573	2241	.6591E-02	.2595E-03	23.81	21.67
	15.66	.617	2405	.6768E-02	.2665E-03	24.78	22.48
	16.76	.660	2523	.9267E-02	.3648E-03	25.61	23.31
	18.04	.710	2634	.1157E-01	.4554E-03	26.56	24.17
	19.30	.760	2735	.1244E-01	.4896E-03	27.55	25.07
	20.00	.788	2771	.1966E-01	.7758E-03	28.30	25.75
	21.59	.850	2842	.2236E-01	.8803E-03	29.15	26.53
F	22.48	.885	2881	.2165E-01	.8524E-03	30.85	27.35
F	23.37	.920	2913	.2963E-01	.1167E-02	30.68	27.92
F	24.26	.955	2938	.3556E-01	.1400E-02	31.31	28.49
F	25.78	1.015	2963	.6096E-01	.2400E-02	32.15	29.25
F	26.54	1.045	2983	.3810E-01	.1500E-02	32.93	29.97
F	27.69	1.090	3003	.5715E-01	.2250E-02	33.57	30.55
F	28.70	1.130	3023	.5080E-01	.2000E-02	34.29	31.21
F	30.35	1.195	3043	.8255E-01	.3250E-02	35.17	32.01
F	32.00	1.260	3053	.1651E+00	.6500E-02	36.24	32.98
F	32.77	1.290	3058	.1524E+00	.6000E-02	37.02	33.69
F	34.80	1.370	3063	.4064E+00	.1600E-01	37.91	34.50
F	36.70	1.445	3068	.3813E+00	.1500E-01	39.16	35.63
F	39.62	1.560	3072	.7303E+00	.2875E-01	40.67	37.01
F	40.39	1.590	3075	.2540E+00	.1000E-01	41.81	38.05
F	42.16	1.660	3077	.8890E+00	.3500E-01	42.60	38.77
F	43.18	1.700	3078	.1016E+01	.4000E-01	43.47	39.56
F	45.47	1.790	3079	.2286E+01	.9000E-01	44.49	40.49
F	47.50	1.870	3080	.2032E+01	.8000E-01	45.83	41.71
F	49.40	1.945	3081	.1905E+01	.7500E-01	47.06	42.83
F	51.56	2.030	3082	.2159E+01	.8500E-01	48.34	43.99

TABLE D1-14

SPECIMEN NUMBER: 63-6L1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 322.0 K
SPECIMEN THICKNESS: 1.64 MM (.0645 IN)
MAXIMUM STRESS: 75.2 MPA (10.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 94999 CYCLES
K(MAX) 3 CYCLES PRIOR TO FAILURE: 56.03 MPA SQRT(M) (50.99 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.35	.289	20001				
			.9372E-04	.3690E-05	11.07	10.07
7.89	.310	25733				
			.7102E-04	.2796E-05	11.47	13.44
8.47	.334	33977				
			.1154E-03	.4544E-05	11.89	10.82
9.10	.358	39380				
			.1861E-03	.4175E-05	12.30	11.19
9.70	.382	45083				
			.1536E-03	.6047E-05	12.71	11.57
10.37	.408	49421				
			.1391E-03	.5478E-05	13.11	11.93
10.96	.431	53656				
			.1958E-03	.7708E-05	13.50	12.28
11.62	.457	57029				
			.2136E-03	.8408E-05	13.92	12.67
12.38	.487	60591				
			.2440E-03	.9608E-05	14.30	13.02
12.94	.509	62886				
			.2227E-03	.8767E-05	14.60	13.29
13.42	.528	65036				
			.3407E-03	.1341E-04	14.90	13.56
14.01	.552	66788				
			.3819E-03	.1189E-04	15.23	13.86
14.62	.576	68807				
			.3694E-03	.1454E-04	15.54	14.15
15.16	.597	70268				
			.4492E-03	.1768E-04	15.91	14.48
16.02	.631	72168				
			.6017E-03	.2369E-04	16.29	14.82
16.60	.654	73141				
			.4284E-03	.1687E-04	16.62	15.13
17.35	.683	74881				
			.6284E-03	.2474E-04	16.95	15.42
17.89	.704	75742				
			.6118E-03	.2409E-04	17.30	15.74
18.76	.739	77166				
			.7355E-03	.2895E-04	17.63	16.05
19.28	.759	77874				
			.7659E-03	.3016E-04	18.09	16.46
20.66	.813	79678				
			.9276E-03	.3652E-04	18.66	17.00
21.80	.858	80982				
			.1103E-02	.4343E-04	19.29	17.56
23.34	.919	82303				
			.1317E-02	.5187E-04	19.90	18.11
24.54	.966	83214				
			.1284E-02	.5056E-04	20.47	18.63
25.93	1.021	84295				
			.1736E-02	.6836E-04	21.04	19.16
27.26	1.073	85063				
			.1833E-02	.7216E-04	21.61	19.67
28.52	1.123	85749				
			.1985E-02	.7815E-04	22.16	20.17
29.90	1.177	86445				
			.2113E-02	.8321E-04	22.74	20.69
31.31	1.233	87112				
			.2229E-02	.8777E-04	23.28	21.18
32.51	1.281	87663				
			.2745E-02	.1081E-03	23.81	21.67
33.95	1.337	88175				
			.3084E-02	.1214E-03	24.37	22.18
35.30	1.390	88614				
			.2938E-02	.1157E-03	24.92	22.68
36.71	1.445	89093				
			.3547E-02	.1396E-03	25.42	23.13
37.81	1.488	89402				
			.3424E-02	.1348E-03	25.93	23.60
39.28	1.546	89833				
			.3111E-02	.1225E-03	26.49	24.11
40.67	1.601	90280				
			.4295E-02	.1691E-03	27.04	24.61
42.08	1.657	90607				
			.4646E-02	.1829E-03	27.60	25.12
43.49	1.712	90911				
			.4765E-02	.1876E-03	28.11	25.58
44.68	1.759	91161				
			.5149E-02	.2031E-03	28.57	26.00
45.85	1.805	91387				
			.5080E-02	.2000E-03	29.08	26.47
47.26	1.861	91666				
			.5981E-02	.2355E-03	29.65	26.98
48.70	1.918	91907				
			.5824E-02	.2293E-03	30.21	27.49
50.10	1.972	92146				
			.6425E-02	.2530E-03	30.72	27.96
51.29	2.019	92332				
			.7071E-02	.2784E-03	31.23	28.42
52.65	2.073	92524				
			.7783E-02	.3064E-03	31.72	28.87
53.74	2.116	92664				
			.7034E-02	.2769E-03	32.19	29.29
54.93	2.162	92833				
			.8516E-02	.3353E-03	32.70	29.76
56.26	2.215	92989				
			.9583E-02	.3772E-03	33.27	30.27
57.70	2.272	93140				
			.8201E-02	.3229E-03	33.84	33.80
59.05	2.325	93304				
			.8183E-02	.3221E-03	34.38	31.29
60.27	2.373	93453				
			.1033E-01	.4066E-03	34.89	31.75
61.44	2.419	93567				
			.1182E-01	.4653E-03	35.43	32.25
62.84	2.474	93685				
			.1150E-01	.4527E-03	36.01	32.77
64.13	2.525	93797				
			.1373E-01	.5406E-03	36.64	33.35
65.73	2.588	93914				
			.1247E-01	.4909E-03	37.32	33.96
67.18	2.645	94038				
			.1506E-01	.5937E-03	38.00	34.58

D1-14 (CON'T.)

	68.73	2.706	94133	.1548E-01	.6893E-03	38.67	35.20
	70.14	2.761	94224	.1453E-01	.5719E-03	39.33	35.80
	71.56	2.817	94322	.1549E-01	.6099E-03	39.93	36.34
	72.66	2.861	94393	.2171E-01	.8548E-03	40.92	36.87
	74.01	2.914	94455	.2474E-01	.9740E-03	41.16	37.46
	75.30	2.964	94507	.2584E-01	.9858E-03	42.58	38.75
F	79.63	3.135	94668	.2540E-01	.1000E-02	44.85	40.09
F	80.90	3.185	94730	.3556E-01	.1400E-02	44.88	42.84
F	82.68	3.255	94783	.3302E-01	.1300E-02	45.83	41.71
F	84.33	3.320	94830	.3302E-01	.1300E-02	46.78	42.57
F	85.98	3.385	94880	.4064E-01	.1600E-02	47.88	43.57
F	88.01	3.465	94930	.3266E-01	.1286E-02	48.85	44.46
F	89.15	3.510	94965	.1826E+00	.4038E-02	50.06	45.56
F	91.82	3.615	94991	.6032E+00	.2375E-01	51.76	47.18
F	94.23	3.710	94995	.8893E+00	.3500E-01	52.91	48.15
F	95.12	3.745	94996				

TABLE D1-15

SPECIMEN NUMBER:	63-2L9
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	STIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	302.0 K
SPECIMEN THICKNESS:	1.91 MM (.0635 IN)
MAXIMUM STRESS:	118.7 MPA (17.2 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	16328 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 66.48 MPA SQRT(M) (60.50 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.62	.221	1				
6.21	.244	1899	.3125E-03	.1230E-04	15.41	14.03
6.91	.272	3766	.3769E-03	.1484E-04	16.24	14.78
7.74	.305	5708	.4278E-03	.1681E-04	17.17	15.62
8.62	.339	7622	.6669E-03	.2626E-04	18.14	16.51
9.14	.360	7652	.8265E-03	.3254E-04	18.91	17.21
10.18	.401	8838	.8802E-03	.3465E-04	19.73	17.96
11.10	.437	9472	.1448E-02	.5702E-04	20.72	18.86
12.20	.480	10250	.1414E-02	.5566E-04	21.70	19.74
12.91	.508	10766	.1368E-02	.5388E-04	22.54	20.51
13.77	.542	11157	.2202E-02	.8670E-04	23.24	21.15
14.76	.581	11636	.2203E-02	.8675E-04	24.05	21.89
16.10	.634	12114	.2640E-02	.1039E-03	25.04	22.79
17.11	.674	12499	.2622E-02	.1032E-03	26.00	23.66
18.09	.712	12796	.3310E-02	.1303E-03	26.80	24.39
18.97	.747	13035	.4223E-02	.1663E-03	27.52	25.05
20.31	.800	13323	.4209E-02	.1657E-03	28.37	25.82
21.96	.865	13645	.5115E-02	.2014E-03	29.48	26.83
23.81	.937	13985	.5431E-02	.2138E-03	30.74	27.98
25.50	1.004	14271	.5906E-02	.2325E-03	31.98	29.11
27.35	1.077	14526	.7271E-02	.2863E-03	33.20	30.21
29.00	1.142	14719	.8574E-02	.3376E-03	34.38	31.28
30.95	1.218	14938	.8884E-02	.3498E-03	35.56	32.36
32.66	1.286	15084	.1169E-01	.4603E-03	36.75	33.44
34.02	1.339	15231	.1164E-01	.4581E-03	37.74	34.34
35.75	1.407	15318	.1481E-01	.5829E-03	38.72	35.24
37.65	1.482	15473	.1248E-01	.4914E-03	39.86	36.26
39.32	1.548	15576	.1574E-01	.6198E-03	40.98	37.30
41.10	1.618	15664	.2023E-01	.7966E-03	42.06	38.28
42.49	1.673	15742	.1781E-01	.7013E-03	43.05	39.17
44.07	1.735	15808	.2398E-01	.9439E-03	43.97	40.02
45.97	1.810	15878	.2721E-01	.1071E-02	45.06	41.01
47.62	1.875	15948	.2359E-01	.9286E-03	46.16	42.01
49.02	1.930	16008	.2328E-01	.9167E-03	47.12	42.88
50.93	2.005	16058	.3813E-01	.1500E-02	48.15	43.82
52.83	2.080	16138	.3813E-01	.1500E-02	49.36	44.92

D1-15 (CON'T.)

F	54.10	2.130	16140	.3175E-01	.1250E-02	50.37	45.84
F	55.37	2.180	16183	.3629E-01	.1429E-02	51.18	46.58
F	57.28	2.255	16208	.7620E-01	.3000E-02	52.21	47.51
F	58.67	2.310	16233	.9586E-01	.2200E-02	53.29	48.49
F	60.58	2.385	16253	.9525E-01	.3750E-02	54.38	49.49
F	61.85	2.435	16268	.8467E-01	.3333E-02	55.44	50.45
F	63.12	2.485	16283	.8467E-01	.3333E-02	56.30	51.23
F	64.64	2.545	16293	.1524E+00	.6000E-02	57.25	52.10
F	66.80	2.630	16305	.1799E+00	.7083E-02	58.54	53.27
F	68.45	2.695	16314	.1834E+00	.7222E-02	59.89	54.50
F	69.98	2.755	16321	.2177E+00	.8571E-02	61.03	55.54
F	72.26	2.845	16327	.3810E+00	.1500E-01	62.44	56.82

TABLE D1-16

SPECIMEN NUMBER: 63-4L2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 353.7 K
SPECIMEN THICKNESS: 1.52 MM (.0600 IN)
MAXIMUM STRESS: 244.4 MPA (35.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1637 CYCLES
K(MAX) 214 CYCLES PRIOR TO FAILURE: 48.19 MPA SQRT(M) (43.77 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.62	.143	1				
			.1931E-02	.7603E-04	25.94	23.61
4.33	.170	366				
			.3296E-02	.1298E-03	28.00	25.48
4.93	.194	549				
			.4624E-02	.1821E-03	30.03	27.33
5.72	.225	719				
			.3401E-02	.1339E-03	31.80	28.94
6.21	.245	865				
			.6094E-02	.2399E-03	33.36	30.36
6.91	.272	979				
			.6604E-02	.2600E-03	35.09	31.93
7.60	.299	1084				
			.1105E-01	.4349E-03	36.61	33.32
8.19	.322	1137				
			.9917E-02	.3904E-03	38.29	34.84
9.07	.357	1226				
			.9862E-02	.3883E-03	39.95	36.35
9.70	.382	1293				
			.1527E-01	.6010E-03	41.42	37.69
10.46	.412	1340				
			.1507E-01	.5933E-03	43.00	39.13
11.25	.443	1392				
			.3191E-01	.1256E-02	44.75	43.72
12.24	.482	1423				

TABLE D1-17

SPECIMEN NUMBER: 63-5T8
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 303.2 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 74.9 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 66606 CYCLES

K(MAX) 51 CYCLES PRIOR TO FAILURE: 41.03 MPA SQRT(M) (37.34 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.49	.295	1				
			.7077E-04	.2786E-05	11.10	10.10
8.12	.320	8956				
			.1150E-03	.4529E-05	11.70	10.65
9.19	.362	18274				
			.1050E-03	.4136E-05	12.41	11.29
10.26	.404	28454				
			.2966E-03	.1168E-04	12.92	11.76
10.81	.426	30308				
			.1506E-03	.5930E-05	13.27	12.07
11.40	.449	34229				
			.2243E-03	.8832E-05	13.63	12.41
12.04	.474	37045				
			.3029E-03	.1192E-04	14.04	12.77
12.79	.503	39519				
			.2162E-03	.8511E-05	14.45	13.15
13.58	.531	42797				
			.3370E-03	.1327E-04	14.87	13.54
14.32	.564	45294				
			.3815E-03	.1502E-04	15.33	13.95
15.17	.597	47468				
			.4078E-03	.1606E-04	15.71	14.29
15.77	.621	48944				
			.4823E-03	.1899E-04	16.03	14.59
16.43	.647	50316				
			.5261E-03	.2079E-04	16.40	14.92
17.21	.677	51763				
			.5712E-03	.2249E-04	16.82	15.30
18.11	.713	53366				
			.7931E-03	.3122E-04	17.21	15.66
18.83	.741	54274				
			.8[illegible]E-03	.3175E-04	17.76	16.16
20.41	.804	56233				
			.1092E-02	.4300E-04	18.43	16.78
21.71	.855	57426				
			.1114E-02	.4385E-04	19.03	17.32
23.05	.907	58622				
			.1564E-02	.6156E-04	19.66	17.89
24.54	.966	59578				
			.1727E-02	.6801E-04	20.30	18.48
26.00	1.024	60422				
			.1880E-02	.7402E-04	20.92	19.04
27.44	1.080	61190				
			.2192E-02	.8629E-04	21.56	19.62
29.05	1.144	61923				
			.2777E-02	.1093E-03	22.18	20.19
30.43	1.198	62422				
			.3279E-02	.1291E-03	22.79	20.74
32.02	1.261	62905				
			.3688E-02	.1452E-03	23.43	21.32
33.63	1.324	63341				
			.4754E-02	.1872E-03	24.09	21.93
35.33	1.391	63699				
			.3759E-02	.1480E-03	24.71	22.49
36.74	1.447	64076				
			.6473E-02	.2548E-03	25.29	23.02
38.29	1.507	64314				
			.5743E-02	.2261E-03	25.90	23.57
39.84	1.568	64584				
			.6929E-02	.2728E-03	26.51	24.12
41.40	1.630	64813				
			.6814E-02	.2683E-03	27.07	24.64
42.74	1.683	65007				
			.7711E-02	.3036E-03	27.61	25.12
44.14	1.738	65188				
			.9757E-02	.3841E-03	28.11	25.58
45.34	1.785	65311				
			.8375E-02	.3297E-03	28.63	26.06
46.61	1.843	65486				
			.1171E-01	.4609E-03	29.18	26.56
48.15	1.896	65601				
			.9479E-02	.3732E-03	29.75	27.08
49.71	1.957	65765				
			.1253E-01	.4934E-03	30.30	27.58
50.95	2.006	65864				
			.1539E-01	.6058E-03	30.97	28.19
53.09	2.090	66003				
			.2163E-01	.8515E-03	31.68	28.83
54.49	2.145	66068				
			.2209E-01	.8699E-03	32.33	29.42
56.33	2.218	66151				
			.1909E-01	.7517E-03	32.94	29.97
57.47	2.263	66211				
			.2484E-01	.9779E-03	33.52	30.50
59.16	2.329	66279				
			.2434E-01	.9582E-03	34.14	31.07
60.50	2.382	66334				
			.3686E-01	.1451E-02	34.75	31.62
62.05	2.443	66376				
			.3446E-01	.1357E-02	35.36	32.18
63.36	2.494	66414				
			.4956E-01	.1951E-02	36.16	32.91
65.78	2.590	66463				
			.6779E-01	.2669E-02	37.01	33.68
67.21	2.646	66484				
			.4667E-01	.1837E-02	37.70	34.31
68.89	2.712	66520				
			.5884E-01	.2317E-02	38.28	34.84
69.77	2.747	66535				
			.5194E-01	.2045E-02	38.66	35.13
70.29	2.767	66545				
			.5512E-01	.2170E-02	38.85	35.35
70.84	2.789	66555				

TABLE D1-18

SPECIMEN NUMBER: 63-3T2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.6 K
SPECIMEN THICKNESS: 1.63 MM (.0645 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .25
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 10236 CYCLES
K(MAX) 296 CYCLES PRIOR TO FAILURE: 38.96 MPA SQRT(M) (35.64 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.60	.221	1				
			.5078E-03	.1999E-04	15.44	14.05
6.33	.249	1429				
			.5888E-03	.2318E-04	16.33	14.86
7.03	.277	261.				
			.7304E-03	.2875E-04	17.49	15.92
8.28	.326	4329				
			.8318E-03	.3275E-04	18.70	17.02
9.20	.362	5439				
			.1003E-02	.3950E-04	19.71	17.93
10.19	.401	6428				
			.1609E-02	.6336E-04	20.80	18.93
11.39	.448	7165				
			.2579E-02	.1015E-03	21.85	19.89
12.39	.488	7594				
			.2430E-02	.9567E-04	22.65	20.61
13.12	.517	7854				
			.2800E-02	.1102E-03	23.24	21.15
13.72	.540	8069				
			.3875E-02	.1526E-03	23.90	21.75
14.63	.576	8303				
			.3394E-02	.1336E-03	24.70	22.48
15.60	.614	8590				
			.5949E-02	.2342E-03	25.61	23.30
16.83	.663	8796				
			.4331E-02	.1706E-03	26.47	24.09
17.76	.699	9012				
			.7524E-02	.2962E-03	27.23	24.78
18.76	.738	9144				
			.8935E-02	.3518E-03	27.99	25.47
19.77	.778	9257				
			.9744E-02	.3836E-03	29.00	26.39
21.46	.845	9431				
			.9907E-02	.3901E-03	30.27	27.55
23.25	.916	9612				
			.1636E-01	.6440E-03	31.43	28.61
24.76	.975	9704				
			.1743E-01	.6861E-03	32.43	29.51
26.14	1.029	9783				
			.1935E-01	.7617E-03	33.49	30.47
27.88	1.098	9873				
			.2368E-01	.9321E-03	34.59	31.48
29.46	1.160	9940				

TABLE D1-19

SPECIMEN NUMBER: 63-6T8
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 394.3 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 198.7 MPA (28.8 KSI)
R-RATIO: .25
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1245 CYCLES
K(MAX) 60 CYCLES PRIOR TO FAILURE: 37.79 MPA SQRT(M) (34.19 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.69	.145	1				
			.2005E-02	.7893E-04	21.03	19.14
4.21	.166	262				
			.3395E-02	.1337E-03	22.37	20.36
4.73	.186	415				
			.4132E-02	.1627E-03	23.72	21.59
5.31	.209	557				
			.4814E-02	.1895E-03	24.98	22.74
5.82	.229	662				
			.4474E-02	.1761E-03	26.29	23.92
6.50	.256	815				
			.9419E-02	.3708E-03	27.71	25.22
7.16	.283	887				
			.7562E-02	.2977E-03	28.89	26.29
7.68	.302	951				
			.9458E-02	.3724E-03	30.05	27.35
8.40	.331	1029				
			.1246E-01	.4905E-03	31.36	28.96
9.12	.359	1087				
			.1847E-01	.7273E-03	32.56	29.63
9.73	.383	1123				
			.2438E-01	.9600E-03	33.92	31.87
10.71	.422	1160				
			.2986E-01	.1144E-02	35.32	32.14
11.44	.450	1185				

TABLE D1-20

SPECIMEN NUMBER: 63-2L6
ALLOY TYPE: 2324-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 303.2 K
SPECIMEN THICKNESS: 1.64 MM (.0645 IN)
MAXIMUM STRESS: 75.2 MPA (10.9 KSI)
R-RATIO: .05
FREQUENCY: 20. CPM
CYCLES TO FAILURE: 259781 CYCLES
K(MAX) 161 CYCLES PRIOR TO FAILURE: 61.41 MPA SQRT(M) (55.89 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.34	.368	1				
10.01	.394	26975	.2453E-04	.9657E-06	6.57	5.98
10.64	.419	44135	.3700E-04	.1457E-05	6.79	6.17
11.14	.438	62317	.2717E-04	.1070E-05	6.97	6.34
12.17	.479	88130	.4015E-04	.1581E-05	7.21	6.57
13.02	.512	105654	.4819E-04	.1897E-05	7.51	6.83
13.69	.539	117799	.5542E-04	.2182E-05	7.73	7.04
14.30	.563	128796	.5555E-04	.2187E-05	7.92	7.21
15.05	.592	141679	.5796E-04	.2282E-05	8.11	7.38
15.58	.614	148974	.7347E-04	.2892E-05	8.29	7.55
16.29	.642	158243	.7673E-04	.3021E-05	8.47	7.70
16.99	.669	166883	.8099E-04	.3189E-05	8.66	7.88
17.55	.691	172439	.1008E-03	.3969E-05	8.82	8.03
18.18	.716	179021	.9573E-04	.3768E-05	8.98	8.17
18.76	.739	185730	.8594E-04	.3384E-05	9.14	8.31
19.68	.775	192693	.1317E-03	.5185E-05	9.33	8.49
21.12	.832	204892	.1206E-03	.4746E-05	9.62	8.76
22.61	.890	212847	.1827E-13	.7192E-05	9.98	9.18
23.87	.940	218495	.2224E-03	.8755E-05	10.31	9.38
25.81	1.016	225360	.2811E-03	.1107E-04	10.68	9.72
26.82	1.056	229029	.2708E-03	.1098E-04	11.01	10.02
28.49	1.122	233385	.3822E-03	.1505E-04	11.31	10.30
29.78	1.172	236595	.4023E-03	.1583E-04	11.64	10.59
31.25	1.230	239475	.5111E-03	.2012E-04	11.94	10.87
32.90	1.295	242432	.5592E-03	.2202E-04	12.28	11.17
34.26	1.349	244279	.7330E-03	.2886E-04	12.60	11.46
35.83	1.410	246459	.7214E-03	.2840E-04	12.91	11.75
37.24	1.466	248666	.6405E-03	.2521E-04	13.22	12.03
38.49	1.515	250038	.9099E-03	.3582E-04	13.50	12.28
40.01	1.575	251750	.8894E-03	.3502E-04	13.79	12.55
41.32	1.627	252897	.1143E-02	.4499E-04	14.08	12.81
42.99	1.692	254312	.1174E-02	.4622E-04	14.39	13.09
44.24	1.742	255308	.1256E-02	.4945E-04	14.69	13.37
45.52	1.792	256232	.1392E-02	.5482E-04	14.95	13.61
46.76	1.841	257142	.1357E-02	.5341E-04	15.21	13.84
48.29	1.897	258061	.1564E-02	.6166E-04	15.49	14.10
49.60	1.953	258999	.1501E-02	.5911E-04	15.79	14.37
50.95	2.006	259740	.1815E-02	.7146E-04	16.07	14.63
52.10	2.051	260261	.2215E-02	.8721E-04	16.34	14.87
53.44	2.104	260896	.2103E-02	.8278E-04	16.60	15.11
54.69	2.153	261494	.2096E-02	.8253E-04	16.87	15.36
55.92	2.201	261968	.2583E-02	.1017E-03	17.14	15.60
57.47	2.263	262643	.2307E-02	.9081E-04	17.44	15.87
58.85	2.317	263183	.2543E-02	.1000E-03	17.76	16.16
60.25	2.372	263684	.2809E-02	.1106E-03	18.06	16.44
61.51	2.421	264086	.3118E-02	.1228E-03	18.36	16.71
62.43	2.458	264328	.3810E-02	.1500E-03	18.60	16.93
63.84	2.513	264688	.3998E-02	.1574E-03	18.86	17.17
65.23	2.568	265016	.4162E-02	.1638E-03	19.19	17.46
67.19	2.645	265415	.4899E-02	.1929E-03	19.58	17.82
68.71	2.705	265773	.4300E-02	.1693E-03	19.99	18.19
70.46	2.774	266142	.4694E-02	.1848E-03	20.38	18.55
72.08	2.838	266453	.5219E-02	.2055E-03	20.80	18.93
73.78	2.905	266808	.4787E-02	.1885E-03	21.21	19.31
75.19	2.960	267037	.6134E-02	.2415E-03	21.61	19.67
77.60	3.055	267239	.1193E-01	.4696E-03	22.11	20.12
			.5169E-02	.2035E-03	22.92	20.86

D1-20 (CON'T.)

41.15	3.195	267927					
85.34	3.360	268422	.8487E-02	.3333E-03	24.04	21.88	
87.63	3.450	268648	.1012E-01	.3982E-03	25.03	22.78	
89.66	3.530	268826	.1129E-01	.4444E-03	25.72	23.41	
92.58	3.645	269073	.1192E-01	.4694E-03	26.56	24.17	
96.01	3.780	269297	.1531E-01	.6027E-03	27.70	25.21	
99.19	3.905	269458	.1972E-01	.7764E-03	28.97	26.37	
101.60	4.000	269620	.1490E-01	.5864E-03	30.14	27.43	

TABLE D1-21

SPECIMEN NUMBER:	63-1L13
ALLOY TYPE:	2(24-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	STIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	302.6 K
SPECIMEN THICKNESS:	1.64 MM (.0645 IN)
MAXIMUM STRESS:	118.7 MPA (17.2 KSI)
R-RATIO:	.59
FREQUENCY:	230 CPM
CYCLES TO FAILURE:	417758 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DEL MPA	STRESS INTENSITY (M)	STRESS INTENSITY KSI SQRT(IN)
7.32	.288	1					
7.92	.312	4309	.1397E-03	.5501E-05			8.37
8.47	.334	8685	.1277E-03	.5028E-05			8.66
8.91	.351	11760	.1401E-03	.5515E-05	9.82		8.94
9.77	.384	16044	.1986E-03	.7820E-05	10.19		9.27
10.30	.405	17845	.2955E-03	.1163E-04	10.56		9.61
11.13	.438	19938	.3968E-03	.1562E-04	10.92		9.94
11.76	.463	21415	.4248E-03	.1672E-04	11.29		10.27
12.45	.490	22731	.5422E-03	.2135E-04	11.62		10.57
13.52	.532	24429	.6152E-03	.2422E-04	12.04		10.96
14.51	.571	25916	.6870E-03	.2626E-04	12.52		11.39
15.43	.608	26930	.9118E-03	.3591E-04	12.95		11.78
16.20	.638	27680	.1018E-02	.4007E-04	13.32		12.12
16.95	.667	28331	.1157E-02	.4555E-04	13.64		12.41
17.77	.700	29152	.1005E-02	.3959E-04	13.97		12.72
18.38	.724	29595	.1362E-02	.5361E-04	14.27		12.98
19.15	.754	30171	.1341E-02	.5278E-04	14.55		13.24
20.44	.805	31063	.1444E-02	.5684E-04	14.96		13.61
21.86	.861	31874	.1752E-02	.6899E-04	15.48		14.09
23.55	.927	32771	.1887E-02	.7430E-04	16.08		14.63
25.27	.995	33435	.2592E-02	.1020E-03	16.71		15.20
26.62	1.048	33995	.2399E-02	.9446E-04	17.26		15.71
28.13	1.107	34438	.3417E-02	.1345E-03	17.77		16.17
29.24	1.151	34730	.3813E-02	.1503E-03	18.23		16.59
30.78	1.212	35096	.4199E-02	.1653E-03	18.69		17.10
31.96	1.258	35390	.4035E-02	.1588E-03	19.15		17.43
33.37	1.314	35725	.4197E-02	.1652E-03	19.59		17.83
34.85	1.372	35961	.6264E-02	.2466E-03	20.07		18.27
36.86	1.451	36253	.6889E-02	.2712E-03	20.65		18.80
38.36	1.510	36492	.6270E-02	.2469E-03	21.23		19.32
40.29	1.586	36717	.8583E-02	.3378E-03	21.80		19.84
41.51	1.634	36856	.8780E-02	.3457E-03	22.31		20.30
43.57	1.716	37053	.1046E-01	.4127E-03	22.85		20.79
44.84	1.765	37136	.1491E-01	.5871E-03	23.39		21.29
46.96	1.849	37316	.1193E-01	.4695E-03	23.95		21.79
48.49	1.909	37388	.2125E-01	.8368E-03	24.54		22.34
51.14	2.013	37475	.3044E-01	.1198E-02	25.23		22.96
52.13	2.052	37497	.4509E-01	.1775E-02	25.83		23.51
58.01	2.284	37563	.8902E-01	.3505E-02	26.99		24.56
64.60	2.542	37578	.1333E+00	.5247E-02	28.33		25.79

TABLE D1-22

SPECIMEN NUMBER: 63-2L10
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 384.3 K
SPECIMEN THICKNESS: 1.63 MM (.064 IN)
MAXIMUM STRESS: 229.5 MPA (32.7 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1655 CYCLES
K(MAX) 15 CYCLES PRIOR TO FAILURE: 67.80 MPA SQRT(M) (61.78 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.29	.208	1				
			.9038E-03	.3558E-04	14.95	13.60
5.89	.232	660				
			.1429E-02	.5628E-04	15.80	14.38
6.59	.259	1154				
			.2236E-02	.8804E-04	16.90	15.38
7.68	.302	1639				
			.2836E-02	.1117E-03	18.12	16.49
8.72	.343	2008				
			.4017E-02	.1581E-03	19.17	17.45
9.61	.378	2229				
			.4399E-02	.1732E-03	19.98	18.18
10.27	.404	2380				
			.4703E-02	.1852E-03	20.59	18.73
10.82	.426	2498				
			.5337E-02	.2101E-03	21.09	19.19
11.30	.445	2587				
			.6469E-02	.2547E-03	21.68	19.73
12.06	.475	2704				
			.6340E-02	.2496E-03	22.40	20.39
12.87	.507	2831				
			.9407E-02	.3704E-03	22.99	20.93
13.37	.527	2885				
			.9306E-02	.3664E-03	23.46	21.35
13.91	.548	2943				
			.1150E-01	.4526E-03	24.08	21.92
14.61	.583	3021				
			.1044E-01	.4110E-03	24.84	22.61
15.71	.618	3107				
			.9954E-02	.3919E-03	25.52	23.22
16.45	.647	3161				
			.1420E-01	.5590E-03	26.10	23.75
17.16	.675	3231				
			.1420E-01	.5592E-03	26.66	24.26
17.85	.703	3283				
			.1968E-01	.7750E-03	27.21	24.76
18.56	.731	3316				
			.1720E-01	.6770E-03	28.14	25.61
20.28	.798	3416				
			.1945E-01	.7658E-03	29.33	26.69
21.76	.857	3492				
			.3172E-01	.1249E-02	30.40	27.67
23.25	.915	3539				
			.2847E-01	.1121E-02	31.51	28.67
24.90	.980	3597				
			.4883E-01	.1922E-02	32.57	29.64
26.32	1.036	3626				
			.9017E-01	.3550E-02	33.47	30.46
27.58	1.086	3648				

TABLE D1-23

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONDITION:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
1.63 MM (.064 IN)
74.4 MPA (10.8 KSI)
[illegible]
[illegible]
186498 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
10.94	.431	1				
			.3944E-04	.1553E-05	7.81	6.38
11.52	.453	14683				
			.2896E-04	.1124E-05	7.19	6.64
12.08	.475	34348				
			.5406E-04	.2128E-05	7.37	6.71
12.67	.499	45334				
			.4798E-04	.1873E-05	7.56	6.88
13.37	.526	59961				
			.6922E-04	.2725E-05	7.73	7.04
13.84	.545	66823				
			.7839E-04	.3086E-05	7.88	7.17
14.39	.566	73741				
			.7938E-04	.3125E-05	8.07	7.34
15.20	.598	83765				
			.8388E-04	.3303E-05	8.31	7.56
16.13	.635	95108				
			.9624E-04	.3789E-05	8.52	7.76
16.78	.661	101851				
			.8163E-04	.3214E-05	8.70	7.91
17.42	.686	109692				
			.1888E-03	.7408E-05	8.86	8.06
18.02	.709	112881				
			.1434E-03	.5647E-05	9.02	8.21
18.67	.735	117414				
			.1778E-03	.6998E-05	9.20	8.37
19.43	.765	121672				
			.1907E-03	.7508E-05	9.45	8.60
20.76	.817	126645				
			.2587E-03	.1019E-04	9.80	8.92
22.29	.878	134585				
			.3325E-03	.1309E-04	10.12	9.21
23.46	.924	138087				
			.4051E-03	.1595E-04	10.44	9.50
25.03	.986	141978				
			.4697E-03	.1849E-04	10.81	9.84
26.72	1.052	145569				
			.4909E-03	.1933E-04	11.13	10.12
27.85	1.096	147869				
			.7829E-03	.3082E-04	11.48	10.45
29.97	1.180	150573				
			.8433E-03	.3320E-04	11.87	10.80
31.45	1.238	152335				
			.8495E-03	.3344E-04	12.19	11.10
33.00	1.299	154159				
			.1180E-02	.4647E-04	12.52	11.40
34.57	1.361	155492				
			.1586E-02	.6246E-04	12.84	11.68
36.02	1.418	156401				
			.1327E-02	.5224E-04	13.13	11.95
37.41	1.473	157449				
			.1543E-02	.6073E-04	13.44	12.23
39.01	1.536	158485				
			.1857E-02	.7312E-04	13.78	12.54
40.71	1.603	159405				
			.2335E-02	.9194E-04	14.13	12.86
42.38	1.668	160118				
			.2251E-02	.8863E-04	14.49	13.19
44.28	1.743	160962				
			.2327E-02	.9160E-04	14.84	13.51
45.82	1.804	161623				
			.3392E-02	.1336E-03	15.15	13.79
47.30	1.862	162061				
			.4327E-02	.1703E-03	15.56	14.16
49.74	1.958	162624				
			.3917E-02	.1542E-03	15.96	14.53
51.22	2.017	163003				
			.5525E-02	.2175E-03	16.26	14.80
52.61	2.071	163254				
			.3902E-02	.1536E-03	16.57	15.08
54.17	2.133	163654				
			.3256E-02	.1282E-03	16.87	15.35
55.43	2.182	164039				
			.7963E-02	.3135E-03	17.15	15.61
56.81	2.237	164213				
			.4480E-02	.1764E-03	17.45	15.88
58.20	2.291	164522				
			.5627E-02	.2215E-03	17.80	16.19
60.02	2.363	164847				
			.8097E-02	.3188E-03	18.19	16.56
61.81	2.434	165068				
			.1316E-01	.5179E-03	18.55	16.88
63.21	2.488	165174				
			.6962E-02	.2741E-03	18.88	17.18
64.75	2.549	165296				
			.1113E-01	.4382E-03	19.21	17.48
66.12	2.603	165519				
			.9887E-02	.3893E-03	19.53	17.77
67.46	2.656	165654				
			.1392E-01	.5480E-03	19.88	18.09
69.16	2.723	165776				
			.1348E-01	.5306E-03	20.25	18.42
70.48	2.775	165874				

TABLE D1-24

SPECIMEN NUMBER: 63-3T1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 383.7 K
SPECIMEN THICKNESS: 1.68 MM (.0658 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .50
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 22988 CYCLES
K(MAX) 116 CYCLES PRIOR TO FAILURE: 42.75 MPA SQRT(M) (38.91 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
7.90	.311	1	.1916E-03	.7543E-05	9.69	8.82
9.05	.356	5967	.2423E-03	.9539E-05	10.25	9.33
9.90	.390	9484	.3969E-03	.1571E-04	10.72	9.76
10.80	.425	11738	.6780E-03	.2636E-04	11.43	10.40
12.67	.499	14530	.8314E-03	.3273E-04	12.13	11.04
13.73	.540	15834	.9849E-03	.3877E-04	12.60	11.46
14.68	.578	16775	.1426E-02	.5615E-04	12.93	11.77
15.23	.600	17157	.1725E-02	.6790E-04	13.25	12.06
16.13	.635	17682	.9568E-03	.3767E-04	13.54	12.32
16.55	.652	18120	.2283E-02	.8990E-04	13.81	12.57
17.43	.686	18506	.1827E-02	.7192E-04	14.15	12.88
18.18	.716	18912	.2273E-02	.8949E-04	14.45	13.15
18.89	.744	19226	.2671E-02	.1052E-03	14.69	13.55
20.42	.804	19797	.2948E-02	.1161E-03	15.54	14.14
22.22	.875	20410	.3167E-02	.1247E-03	16.13	14.68
23.51	.926	20817	.3298E-02	.1298E-03	16.65	15.15
25.04	.986	21201	.5476E-02	.2156E-03	17.21	15.66
26.62	1.048	21578	.6886E-02	.2711E-03	17.77	16.17
28.17	1.109	21795	.8354E-02	.3290E-03	18.27	16.62
29.49	1.161	21952	.6648E-02	.2617E-03	18.78	17.09
31.13	1.225	22199	.9164E-02	.3608E-03	19.41	17.66
33.21	1.307	22426	.1640E-01	.6456E-03	20.28	18.38
35.82	1.410	22585	.2119E-01	.8341E-03	21.88	19.11
38.08	1.499	22692				

TABLE D1-25

SPECIMEN NUMBER: 63-3T11
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 384.3 K
SPECIMEN THICKNESS: 1.63 MM (.0640 IN)
MAXIMUM STRESS: 198.6 MPA (28.8 KSI)
R-RATIO: .50
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1892 CYCLES
K(MAX) 11 CYCLES PRIOR TO FAILURE: 45.86 MPA SQRT(M) (41.73 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
5.29	.208	1	.1451E-02	.5722E-04	13.35	12.15
6.21	.244	631	.2529E-02	.9958E-04	14.37	13.08
7.11	.280	988	.4384E-02	.1726E-03	15.16	13.80
7.75	.305	1123	.5254E-02	.2068E-03	15.83	14.41
8.43	.332	1262	.4283E-02	.1686E-03	16.61	15.11
9.31	.366	1466	.6016E-02	.2369E-03	17.34	15.78
10.02	.394	1584	.1084E-02	.4266E-03	18.10	16.47
11.01	.434	1676	.1287E-01	.5065E-03	19.07	17.35
12.30	.484	1776	.1773E-01	.6982E-03	19.99	18.19
13.27	.523	1831	.5246E-01	.2066E-02	20.96	19.07
14.80	.583	1860	.9144E-01	.3600E-02	22.24	20.24
16.72	.658	1881				

TABLE D1-26

SPECIMEN NUMBER:	UE3-2LE
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	311.5 K
SPECIMEN THICKNESS:	1.61 MM (.0635 IN)
MAXIMUM STRESS:	75.2 MPA (10.9 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	88365 CYCLES
K(MAX) 125 CYCLES PRIOR TO FAILURE:	40.57 MPA SQRT(M) (36.92 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.99	.275	1				
8.20	.323	17148	.7166E-04	.2742E-05	11.05	10.06
8.99	.353	22211	.7711E-04	.3036E-05	11.76	10.70
9.57	.377	32051	.1226E-03	.4825E-05	12.22	11.12
10.29	.405	38345	.1146E-03	.4512E-05	12.65	11.51
10.91	.429	42536	.1467E-03	.5774E-05	13.17	11.90
11.74	.462	47047	.1841E-03	.7249E-05	13.52	12.30
12.35	.486	50524	.1717E-03	.6759E-05	13.94	12.69
13.06	.514	53039	.2306E-03	.9064E-05	14.33	13.04
13.63	.537	56029	.2471E-03	.9673E-05	14.70	13.37
14.42	.568	58630	.2811E-03	.1107E-04	15.07	13.72
15.02	.591	61036	.2657E-03	.1046E-04	15.45	14.06
15.56	.613	62709	.3346E-03	.1317E-04	15.75	14.34
16.07	.633	64441	.2926E-03	.1152E-04	16.07	14.59
16.71	.658	65532	.5820E-03	.2291E-04	16.32	14.86
17.20	.677	66561	.4402E-03	.1733E-04	16.61	15.12
17.84	.703	67751	.5759E-03	.2267E-04	16.90	15.38
18.57	.731	69231	.4747E-03	.1869E-04	17.23	15.68
19.12	.751	70607	.5713E-03	.2249E-04	17.59	16.01
20.76	.819	72237	.7334E-03	.2888E-04	18.17	16.45
22.26	.877	74441	.7959E-03	.3137E-04	18.75	17.07
23.75	.935	75563	.9763E-03	.3844E-04	19.49	17.73
25.17	.991	77113	.1206E-02	.4749E-04	20.13	18.32
26.72	1.052	78422	.1211E-02	.4768E-04	20.78	18.91
28.25	1.112	79644	.1492E-02	.5876E-04	21.44	19.51
29.51	1.162	80217	.1597E-02	.6286E-04	22.07	20.04
31.02	1.221	81020	.1973E-02	.7693E-04	22.60	20.57
32.29	1.271	81636	.1860E-02	.7322E-04	23.17	21.08
33.73	1.328	82258	.2540E-02	.1000E-03	23.72	21.59
34.81	1.371	82642	.2604E-02	.1025E-03	24.33	22.15
36.33	1.430	83244	.2705E-02	.1065E-03	24.75	22.52
37.45	1.474	83639	.2503E-02	.9854E-04	25.27	23.00
39.04	1.537	84179	.3261E-02	.1284E-03	25.91	23.49
40.26	1.585	84621	.3561E-02	.1402E-03	26.37	23.99
41.52	1.635	84867	.3931E-02	.1548E-03	26.87	24.46
42.76	1.683	85140	.4154E-02	.1636E-03	27.36	24.90
44.45	1.750	85526	.4386E-02	.1727E-03	27.92	25.41
45.91	1.804	85613	.4757E-02	.1873E-03	28.53	25.96
47.41	1.867	86120	.5212E-02	.2052E-03	29.11	26.49
48.75	1.918	86294	.5973E-02	.2351E-03	29.63	26.96
49.40	1.951	86553	.5188E-02	.2042E-03	30.10	27.39
51.02	2.008	86717	.7434E-02	.2927E-03	30.61	27.85
52.31	2.063	86975	.7285E-02	.2868E-03	31.23	28.42
53.93	2.123	87119	.7219E-02	.2842E-03	31.42	28.95
56.32	2.217	87437	.7599E-02	.3010E-03	32.50	29.58
58.91	2.319	87647	.1003E-01	.3949E-03	33.53	30.51
59.88	2.357	87764	.1257E-01	.4949E-03	34.27	31.19
62.02	2.442	87902	.1551E-01	.6105E-03	34.93	31.78
63.25	2.490	87975	.1621E-01	.6382E-03	35.65	32.44
65.62	2.584	88033	.1963E-01	.7727E-03	36.43	33.15
66.51	2.622	88143	.2292E-01	.9023E-03	37.17	33.83
69.15	2.722	88243	.2594E-01	.1021E-02	37.96	34.55

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-27

SPECIMEN NUMBER: U63-2L2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 322.8 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 16545 CYCLES
K(MAX) 152 CYCLES PRIOR TO FAILURE: 43.64 MPA SQRT(M) (39.72 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.41	.213	1	.2105E-03	.8286E-05	15.02	13.67
5.89	.232	2313	.2862E-03	.1127E-04	15.76	14.34
6.64	.261	4593	.4693E-03	.1846E-04	16.48	15.00
7.06	.278	5675	.5037E-03	.1983E-04	17.27	15.72
7.47	.294	7276	.6494E-03	.2556E-04	18.11	16.48
8.56	.337	8316	.9543E-03	.3364E-04	18.94	17.24
9.39	.370	9293	.1095E-02	.4313E-04	19.78	18.00
10.14	.399	9987	.1222E-02	.4811E-04	20.53	18.68
10.89	.429	10594	.1134E-02	.4465E-04	21.21	19.30
11.53	.454	11194	.1655E-02	.6516E-04	21.93	19.96
12.41	.488	11715	.2194E-02	.8654E-04	22.74	20.69
13.32	.524	12123	.2141E-02	.8430E-04	23.48	21.37
14.08	.554	12483	.2631E-02	.1036E-03	24.23	22.05
14.64	.576	12847	.2748E-02	.1395E-03	24.97	22.72
15.49	.610	13135	.2616E-02	.1027E-03	25.62	23.32
16.63	.655	13433	.3643E-02	.1433E-03	26.28	23.91
17.47	.688	13672	.4349E-02	.1594E-03	27.02	24.59
18.58	.731	13931	.4141E-02	.1633E-03	27.77	25.27
19.42	.765	14146	.4674E-02	.1843E-03	28.73	26.15
21.09	.830	14513	.6336E-02	.2496E-03	29.94	27.24
22.73	.894	14794	.5933E-02	.2336E-03	31.14	28.34
24.43	.961	15059	.7813E-02	.3079E-03	32.38	29.47
26.27	1.034	15247	.9694E-02	.3823E-03	33.58	30.55
28.12	1.107	15484	.1139E-01	.4485E-03	34.55	31.44
29.19	1.149	15631	.1162E-01	.4574E-03	35.57	32.37
31.14	1.226	15753	.1383E-01	.5444E-03	36.60	33.31
32.27	1.270	15849	.1611E-01	.6342E-03	37.60	34.22
34.16	1.345	15965	.1671E-01	.6584E-03	38.62	35.14
35.59	1.401	16044	.1744E-01	.7023E-03	39.76	36.19
37.02	1.457	16174	.2441E-01	.9619E-03	40.94	37.29
38.47	1.514	16234				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-28

SPECIMEN NUMBER:	U63-1L4
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	ARGON
TEST TEMPERATURE:	384.3 K
SPECIMEN THICKNESS:	1.65 MM (.0650 IN)
MAXIMUM STRESS:	217.6 MPA (31.6 KSI)
R-RATIO:	.05
FREQUENCY:	288 CPM
CYCLES TO FAILURE:	1178 CYCLES
K(MAX) 12 CYCLES PRIOR TO FAILURE:	57.18 MPA SQRT(M) (52.03 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.12	.162	1				
			.3450E-02	.1358E-03	24.87	22.63
5.09	.200	261				
			.4674E-02	.1840E-03	27.62	24.59
5.77	.227	427				
			.8476E-02	.3337E-03	28.79	26.20
6.55	.258	519				
			.6708E-02	.2641E-03	30.86	28.08
7.60	.299	675				
			.9873E-02	.3887E-03	32.95	29.98
8.52	.335	768				
			.1143E-01	.4093E-03	34.77	31.64
9.41	.373	864				
			.1233E-01	.4842E-03	36.51	33.23
10.34	.407	930				
			.1985E-01	.7816E-03	38.26	34.82
11.32	.446	979				
			.2253E-01	.8871E-03	39.80	36.22
12.11	.477	1014				
			.3212E-01	.1265E-02	41.32	37.60
13.10	.516	1049				
			.3321E-01	.1307E-02	42.87	39.31
14.00	.551	1072				
			.4916E-01	.1935E-02	44.25	40.27
14.83	.584	1089				
			.5193E-01	.2044E-02	45.62	41.52
15.77	.621	1107				
			.4932E-01	.1942E-02	47.08	42.77
16.66	.656	1125				
			.5623E-01	.2214E-02	48.40	44.04
17.67	.696	1141				
			.1708E+00	.6725E-02	50.11	45.60
19.03	.749	1151				
			.1595E+00	.6280E-02	52.71	47.97
21.42	.843	1166				

TABLE D1-29

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

KMAX= 378 CYCLES PRIOR TO FAILURE: 35.20 MPA SQRT(M) (32.04 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.94	.313	1				
			.1916E-03	.7544E-05	11.48	10.45
8.76	.345	4276				
			.1971E-03	.7759E-05	12.00	10.92
9.47	.373	7859				
			.2326E-03	.9156E-05	12.43	11.31
10.09	.397	10513				
			.3385E-03	.1333E-04	12.86	11.71
10.85	.427	12764				
			.3227E-03	.1271E-04	13.33	12.13
11.61	.457	15137				
			.3893E-03	.1533E-04	13.77	12.53
12.32	.485	16941				
			.4454E-03	.1754E-04	14.25	12.97
13.29	.523	19128				
			.2856E-03	.1125E-04	14.68	13.36
13.86	.546	21123				
			.4779E-03	.1882E-04	15.87	13.72
14.73	.580	22946				
			.3466E-03	.1365E-04	15.52	14.12
15.53	.611	25258				
			.6279E-03	.2472E-04	15.92	14.48
16.26	.640	26417				
			.4961E-03	.1953E-04	16.31	14.84
17.06	.672	28035				
			.5992E-03	.2359E-04	16.85	15.33
18.45	.726	30343				
			.1004E-02	.3953E-04	17.44	15.87
19.49	.767	31379				
			.9745E-03	.3836E-04	18.14	16.51
21.42	.843	33360				
			.9797E-03	.3857E-04	18.90	17.20
22.82	.898	34795				
			.1552E-02	.6110E-04	19.53	17.77
24.22	.954	35696				
			.1580E-02	.6220E-04	20.19	18.38
25.88	1.019	36749				
			.2072E-02	.8159E-04	20.85	18.98
27.31	1.075	37436				
			.2011E-02	.7918E-04	21.44	19.51
28.66	1.128	38106				
			.2843E-02	.1119E-03	22.12	20.13
30.60	1.205	38789				
			.3038E-02	.1196E-03	22.88	20.82
32.38	1.275	39375				
			.2922E-02	.1150E-03	23.55	21.43
33.96	1.337	39917				
			.4151E-02	.1634E-03	24.21	22.04
35.69	1.405	40334				
			.5008E-02	.1972E-03	24.92	22.68
37.56	1.479	40706				
			.4871E-02	.1918E-03	25.54	23.24
38.83	1.529	40967				
			.5470E-02	.2153E-03	26.15	23.80
40.68	1.602	41336				
			.6406E-02	.2522E-03	26.79	24.38
42.12	1.658	41531				
			.6747E-02	.2656E-03	27.42	24.95
43.89	1.728	41793				
			.9277E-02	.3653E-03	28.08	25.56
45.63	1.793	41970				
			.1037E-01	.4084E-03	28.77	26.19
47.44	1.868	42154				
			.8821E-02	.3473E-03	29.40	26.76
48.75	1.919	42302				
			.1105E-01	.4352E-03	29.99	27.30
50.46	1.987	42457				
			.1258E-01	.4952E-03	30.62	27.86
51.89	2.043	42571				
			.1195E-01	.4703E-03	31.19	28.39
53.36	2.101	42694				
			.1588E-01	.6250E-03	31.80	28.94
54.92	2.162	42792				
			.1426E-01	.5616E-03	32.47	29.55
56.70	2.232	42917				
			.2071E-01	.8153E-03	33.14	30.16
58.19	2.291	42989				

TABLE D1-30

SPECIMEN NUMBER: 63-S10
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 303.2 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 280 CPM
CYCLES TO FAILURE: 66686 CYCLES
K(MAX) 51 CYCLES PRIOR TO FAILURE: 41.83 MPA SQRT(M) (37.34 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.49	.295	1				
			.7077E-04	.2786E-05	11.10	10.10
8.12	.320	8956				
			.1150E-03	.4529E-05	11.78	10.65
9.19	.362	18274				
			.1058E-03	.4136E-05	12.41	11.29
10.26	.404	28454				
			.2966E-03	.1168E-04	12.92	11.76
10.81	.426	30388				
			.1506E-03	.5930E-05	13.27	12.07
11.40	.449	34220				
			.2243E-03	.8832E-05	13.63	12.41
12.04	.474	37845				
			.3029E-03	.1192E-04	14.04	12.77
12.79	.503	39519				
			.2162E-03	.8511E-05	14.45	13.15
13.50	.531	42797				
			.3370E-03	.1327E-04	14.87	13.54
14.32	.564	45254				
			.3819E-03	.1502E-04	15.33	13.95
15.17	.597	47468				
			.4078E-03	.1606E-04	15.71	14.29
15.77	.621	48944				
			.4023E-03	.1899E-04	16.03	14.59
16.43	.647	50316				
			.5281E-03	.2079E-04	16.48	14.92
17.21	.677	51783				
			.5712E-03	.2249E-04	16.82	15.38
18.11	.713	53366				
			.7931E-03	.3122E-04	17.21	15.66
18.83	.741	54274				
			.8069E-03	.3175E-04	17.76	16.16
20.41	.804	56233				
			.1092E-02	.4380E-04	18.43	16.78
21.71	.855	57426				
			.1114E-02	.4385E-04	19.03	17.32
23.05	.907	58622				
			.1564E-02	.6156E-04	19.66	17.89
24.54	.966	59578				
			.1727E-02	.6801E-04	20.30	18.48
26.00	1.024	60422				
			.1880E-02	.7402E-04	20.92	19.04
27.44	1.080	61193				
			.2192E-02	.8629E-04	21.56	19.62
29.05	1.144	61923				
			.2777E-02	.1093E-03	22.18	20.19
30.43	1.198	62422				
			.3279E-02	.1291E-03	22.79	20.74
32.02	1.261	62905				
			.3688E-02	.1452E-03	23.43	21.32
33.63	1.324	63341				
			.4754E-02	.1872E-03	24.09	21.93
35.33	1.391	63699				
			.3759E-02	.1480E-03	24.71	22.49
36.74	1.447	64076				
			.6473E-02	.2548E-03	25.29	23.02
38.29	1.507	64314				
			.5743E-02	.2261E-03	25.90	23.57
39.84	1.568	64584				
			.6929E-02	.2728E-03	26.51	24.12
41.40	1.630	64810				
			.6814E-02	.2683E-03	27.07	24.64
42.74	1.683	65007				
			.7711E-02	.3036E-03	27.61	25.12
44.14	1.738	65188				
			.9797E-02	.3841E-03	28.11	25.58
45.34	1.785	65311				
			.8375E-02	.3297E-03	28.63	26.06
46.81	1.843	65486				
			.1171E-01	.4609E-03	29.18	26.56
48.15	1.896	65601				
			.9479E-02	.3732E-03	29.75	27.08
49.71	1.957	65765				
			.1253E-01	.4934E-03	30.30	27.58
50.95	2.006	65864				
			.1539E-01	.6058E-03	30.97	28.19
53.09	2.090	66003				
			.2163E-01	.8515E-03	31.68	28.83
54.49	2.145	66068				
			.2209E-01	.8699E-03	32.33	29.42
56.33	2.218	66151				
			.1909E-01	.7517E-03	32.94	29.97
57.47	2.263	66211				
			.2404E-01	.9779E-03	33.52	30.50
59.16	2.329	66279				
			.2434E-01	.9582E-03	34.14	31.07
60.50	2.382	66334				
			.3686E-01	.1451E-02	34.75	31.62
62.05	2.443	66376				
			.3446E-01	.1357E-02	35.36	32.18
63.36	2.494	66414				
			.4956E-01	.1951E-02	36.16	32.91
65.78	2.590	66463				
			.6779E-01	.2669E-02	37.01	33.68
67.21	2.646	66484				
			.4667E-01	.1837E-02	37.70	34.31
68.89	2.712	66520				
			.5884E-01	.2317E-02	38.28	34.84
69.77	2.747	66535				
			.5194E-01	.2045E-02	38.60	35.13
70.29	2.767	66545				
			.5512E-01	.2170E-02	38.85	35.35
70.84	2.789	66555				

TABLE D1-31

SPECIMEN NUMBER: U63-4T3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.6 K
SPECIMEN THICKNESS: 1.68 MM (.0660 IN)
MAXIMUM STRESS: 101.1 MPA (14.7 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 12224 CYCLES
K(MAX) 375 CYCLES PRIOR TO FAILURE: 31.67 MPA SQRT(M) (28.82 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.29	.208	1				
			.3121E-03	.1229E-04	12.86	11.70
6.10	.240	2597				
			.4212E-03	.1658E-04	13.76	12.52
6.93	.273	4560				
			.7203E-03	.2836E-04	14.65	13.34
7.85	.309	5833				
			.8750E-03	.3445E-04	15.52	14.13
8.72	.343	6833				
			.1110E-02	.4370E-04	16.26	14.79
9.44	.372	7476				
			.1356E-02	.5338E-04	16.94	15.42
10.28	.405	8097				
			.1637E-02	.6447E-04	17.69	16.10
11.18	.440	8650				
			.1625E-02	.6398E-04	18.40	16.74
12.01	.473	9158				
			.2564E-02	.1009E-03	19.10	17.38
12.96	.510	9529				
			.2507E-02	.9870E-04	19.80	18.02
13.83	.544	9874				
			.2914E-02	.1147E-03	20.47	18.63
14.78	.582	10200				
			.3829E-02	.1507E-03	21.09	19.20
15.55	.612	10402				
			.4595E-02	.1809E-03	21.61	19.67
16.25	.640	10554				
			.4515E-02	.1777E-03	22.15	20.16
17.11	.674	10745				
			.7995E-02	.3148E-03	22.77	20.73
18.09	.712	10867				
			.6128E-02	.2413E-03	23.40	21.30
19.00	.748	11016				
			.8701E-02	.3426E-03	24.17	21.99
20.46	.806	11104				
			.8102E-02	.3190E-03	25.15	22.89
22.11	.870	11307				
			.1426E-01	.5613E-03	26.15	23.80
23.75	.935	11502				
			.1319E-01	.5193E-03	27.18	24.74
25.55	1.006	11639				
			.1920E-01	.7561E-03	28.12	25.59
26.97	1.062	11713				
			.1613E-01	.6351E-03	28.93	26.33
28.38	1.117	11800				
			.2755E-01	.1085E-02	29.71	27.04
29.73	1.170	11849				

TABLE D1-32

SPECIMEN NUMBER: U63-5T5
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 305.3 K
SPECIMEN THICKNESS: 1.63 MM (.0648 IN)
MAXIMUM STRESS: 198.7 MPA (28.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 724 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 53.61 MPA SQRT(M) (48.25 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.83	.190	1				
			.4744E-02	.1868E-03	24.47	22.27
5.86	.231	220				
			.5470E-02	.2154E-03	26.54	24.16
6.70	.264	373				
			.1088E-01	.4283E-03	28.18	25.64
7.45	.293	442				
			.1356E-01	.5340E-03	29.58	26.91
8.13	.320	492				
			.1496E-01	.5890E-03	31.28	28.46
9.28	.365	569				
			.4638E-01	.1826E-02	33.47	30.46
10.63	.418	598				
			.2228E-01	.8771E-03	35.66	32.45
11.94	.470	657				
			.4544E-01	.1789E-02	37.51	34.13
12.99	.511	680				
			.1110E+00	.4369E-02	39.37	35.83
14.43	.568	693				
			.1092E+00	.4300E-02	41.19	37.49
15.52	.611	703				
			.2650E+00	.1043E-01	43.56	39.66
17.91	.705	712				
			.6924E+00	.2726E-01	47.82	43.52
22.06	.869	718				

TABLE D1-33

SPECIMEN NUMBER:	U63-2L12
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	WET AIR
TEST TEMPERATURE:	308.9 K
SPECIMEN THICKNESS:	1.61 MM (.6635 IN)
MAXIMUM STRESS:	75.2 MPA (10.9 KSI)
R-RATIO:	.05
FREQUENCY:	280 CPM
CYCLES TO FAILURE:	46457 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	52.68 MPA SQRT(M) (47.94 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	7.65	.278	1				
				.2331E-03	.7997E-05	10.88	9.90
	7.84	.302	3102				
				.2388E-03	.9402E-05	11.36	10.34
	8.37	.329	5979				
				.2409E-03	.9485E-05	11.84	13.78
	9.09	.356	8831				
				.2638E-03	.1039E-04	12.31	11.20
	9.76	.384	11493				
				.2916E-03	.1148E-04	12.81	11.65
	10.59	.417	14354				
				.3136E-03	.1236E-04	13.26	12.37
	11.20	.441	16302				
				.3631E-03	.1430E-04	13.67	12.44
	11.94	.470	18349				
				.3594E-03	.1415E-04	14.10	12.43
	12.67	.499	20355				
				.4544E-03	.1791E-04	14.52	13.22
	13.40	.528	21969				
				.4528E-03	.1783E-04	14.92	13.58
	14.18	.554	23478				
				.5397E-03	.2125E-04	15.35	13.97
	14.98	.590	25137				
				.5565E-03	.2191E-04	15.76	14.34
	15.60	.614	26262				
				.6011E-03	.2366E-04	16.15	14.70
	16.47	.648	27703				
				.7248E-03	.2854E-04	16.60	15.11
	17.36	.684	28933				
				.7278E-03	.2865E-04	16.99	15.47
	18.45	.711	29877				
				.8453E-03	.3330E-04	17.39	15.82
	18.96	.746	30949				
				.9211E-03	.3626E-04	17.94	16.32
	20.33	.801	32445				
				.1095E-02	.4309E-04	18.57	16.90
	21.65	.852	33647				
				.1125E-02	.4429E-04	19.19	17.46
	23.04	.907	34845				
				.1229E-02	.4837E-04	19.79	18.01
	24.32	.957	35921				
				.1434E-02	.5661E-04	20.37	18.54
	25.63	1.011	36974				
				.1886E-02	.7427E-04	20.96	19.08
	27.13	1.068	37947				
				.1987E-02	.7825E-04	21.57	19.63
	28.58	1.125	38903				
				.2345E-02	.9050E-04	22.14	20.15
	29.74	1.171	39616				
				.2203E-02	.8674E-04	22.64	21.60
	31.47	1.239	40434				
				.2725E-02	.1073E-03	23.15	21.07
	32.82	1.292	41065				
				.2682E-02	.1056E-03	23.69	21.56
	33.84	1.332	41471				
				.2690E-02	.1059E-03	24.23	22.05
	34.88	1.373	41842				
				.3059E-02	.1203E-03	24.84	22.61
	36.71	1.445	42533				
				.3429E-02	.1350E-03	25.53	23.23
	38.32	1.508	43034				
				.3873E-02	.1525E-03	26.14	23.79
	39.87	1.569	43342				
				.4131E-02	.1626E-03	26.71	24.31
	41.23	1.623	43739				
				.4463E-02	.1757E-03	27.33	24.87
	42.95	1.691	44316				
				.4953E-02	.1950E-03	27.97	25.46
	44.65	1.758	44821				
				.5661E-02	.2229E-03	28.54	25.97
	45.83	1.804	45154				
				.5644E-02	.2222E-03	29.02	26.41
	46.94	1.848	45452				
				.5513E-02	.2170E-03	29.51	26.85
	48.30	1.901	45834				
				.5792E-02	.2281E-03	30.07	27.37
	49.79	1.960	46259				
				.7199E-02	.2834E-03	30.69	27.93
	51.39	2.023	46674				
				.1155E-01	.4546E-03	31.65	28.81
F	52.61	2.071	46893				
				.8259E-02	.3251E-03	32.64	29.7.
F	53.26	2.096	46943				
				.7620E-02	.3002E-03	33.61	

D1-33 (CON'T.)

F	69.91	2.735	45643	.1116E-01	.4006E-03	34.67	31.55
F	71.34	2.815	45643	.1143E-01	.4500E-03	35.35	32.17
F	72.68	2.862	45743	.1905E-01	.7500E-03	36.60	32.76
F	74.39	2.935	45843	.1397E-01	.5501E-03	36.72	33.42
F	75.79	2.990	45943	.1524E-01	.6000E-03	37.37	34.01
F	77.31	3.050	46043	.2540E-01	.1000E-02	38.29	34.85
F	78.85	3.151	46143	.3556E-01	.1400E-02	39.29	35.76
F	81.61	3.220	46233	.2286E-01	.9000E-03	39.94	36.39
F	82.77	3.266	46283	.2794E-01	.1100E-02	40.59	36.94
F	84.17	3.322	46333	.4318E-01	.1700E-02	41.47	37.74
F	86.33	3.405	46383	.1168E+00	.4600E-02	42.76	38.91
F	89.25	3.520	46443	.1219E+00	.4800E-02	44.34	40.35
F	92.21	3.636	46493	.1778E+00	.7000E-02	45.67	41.56
F	94.67	3.733	46543	.3810E+00	.1500E-01	46.73	42.52
F	96.98	3.825	46594	.5397E+00	.2125E-01	47.93	43.62
F	99.14	3.911	46643	.5715E+00	.2250E-01	49.31	44.87
F	101.42	4.000	46696				

TABLE D1-34

SPECIMEN NUMBER: U63-3L1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 303.9 K
SPECIMEN THICKNESS: 1.63 MM (.0640 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 7313 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 57.01 MPA SQRT(M) (51.86 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.62	.316	1				
			.6407E-03	.2523E-04	18.50	16.84
9.09	.358	1663	.1193E-02	.4697E-04	19.52	17.77
9.96	.391	2378	.1621E-02	.6383E-04	20.25	18.43
10.52	.414	2736	.2081E-02	.8201E-04	20.91	19.03
11.28	.444	3103	.1612E-02	.6346E-04	21.55	19.61
11.85	.466	3453	.2534E-02	.9984E-04	22.19	20.20
12.65	.498	3771	.2748E-02	.1082E-03	22.88	20.82
13.36	.526	4027	.2787E-02	.1097E-03	23.61	21.48
14.32	.563	4366	.3361E-02	.1563E-03	24.46	22.26
15.75	.620	4833	.2954E-02	.1163E-03	25.28	23.01
16.27	.640	4960	.5086E-02	.2002E-03	26.09	23.74
17.35	.683	5153	.4467E-02	.1791E-03	26.98	24.55
18.52	.729	5416	.5547E-02	.2184E-03	27.80	25.30
19.48	.767	5693	.5571E-02	.2193E-03	28.52	25.95
20.42	.804	5954	.6499E-02	.2558E-03	29.38	26.74
21.81	.859	5972	.7473E-02	.2941E-03	30.52	27.77
23.54	.927	62.3	.9372E-02	.3690E-03	31.59	28.75
24.87	.979	6346	.1104E-01	.4346E-03	32.64	29.71

D1-34 (CON'T.)

	20.64	1.49	6636	.1595E-01	.5925E-03	33.92	33.86
	28.64	1.127	6639	.1352E-01	.5329E-03	35.09	31.93
	30.19	1.189	6793	.1514E-01	.5959E-03	36.13	32.84
	31.84	1.254	6863	.1862E-01	.7330E-03	37.26	33.91
	33.71	1.327	6963	.2211E-01	.8703E-03	38.53	35.06
	35.83	1.411	7059	.2883E-01	.1135E-02	39.63	36.06
	37.19	1.464	7136	.3508E-01	.1381E-02	40.46	36.82
F	38.48	1.515	7147	.3312E-01	.1303E-02	41.37	37.65
F	40.13	1.593	7193	.3813E-01	.1500E-02	42.36	38.55
F	41.66	1.640	7233	.5927E-01	.2333E-02	43.38	39.48
F	43.43	1.711	7261	.6773E-01	.2667E-02	44.67	40.66
F	45.47	1.791	7293	.1778E-00	.7000E-02	45.47	41.38
F	[illegible]	1.826	7294	.2543E-00	.1002E-01	46.14	41.99
F	47.62	1.874	7313	.6396E-00	.2400E-01	47.49	43.22
F	49.67	1.955	7314	.1051E-01	.6600E-01	49.49	45.04
F	53.97	2.125	7317	.1774E+01	.7030E-01	51.11	46.51
F	55.75	2.195	7311	.3913E+01	.1530E+00	52.91	48.15
F	59.56	2.345	7317				

TABLE D1-35

SPECIMEN NUMBER:	U63-2L13
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	WET AIR
TEST TEMPERATURE:	302.0 K
SPECIMEN THICKNESS:	1.63 MM (.0640 IN)
MAXIMUM STRESS:	225.5 MPA (32.7 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	654 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	69.30 MPA SQRT(M) (63.08 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	7.90	.272	1				
	8.47	.333	175	.8999E-02	.3543E-03	33.33	30.33
	9.24	.364	261	.9034E-02	.3558E-03	35.80	32.58
	10.22	.399	325	.1352E-01	.5323E-03	37.45	34.39
	10.49	.413	351	.1444E-01	.5660E-03	38.66	35.18
	11.29	.445	384	.2755E-01	.1084E-02	39.76	36.18
	12.12	.477	426	.1938E-01	.7628E-03	41.24	37.53
	12.80	.504	473	.1539E-01	.6057E-03	42.57	38.74
	13.89	.547	519	.2413E-01	.9503E-03	44.07	40.11
	14.35	.604	541	.5627E-01	.2215E-02	46.18	42.02
	16.23	.639	555	.6253E-01	.2464E-02	48.04	43.72
	17.72	.698	595	.3731E-01	.1469E-02	49.86	48.38
	21.46	.845	641	.8122E-01	.3198E-02	53.71	48.88
F	23.24	.915	647	.2976E+00	.1172E-01	57.96	52.38
F	24.26	.955	652	.2032E+00	.8000E-02	59.44	54.09
F	28.70	1.130	653	.4445E+01	.1750E+00	63.01	57.34

TABLE D1-36

SPECIMEN NUMBER: U63-ST2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 302.0 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 40234 CYCLES
K(MAX) 529 CYCLES PRIOR TO FAILURE: 31.79 MPA SQRT(M) (28.93 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.82	.269	1				
			.1822E-03	.7166E-05	10.5	9.63
7.38	.291	3078				
			.2514E-03	.9899E-05	11.08	10.09
8.17	.322	6235				
			.1672E-03	.6583E-05	11.59	10.54
8.82	.347	10086				
			.2811E-03	.1107E-04	12.08	10.99
9.63	.379	12991				
			.3077E-03	.1211E-04	12.57	11.44
10.33	.407	15249				
			.3614E-03	.1423E-04	13.01	11.84
11.05	.435	17238				
			.3281E-03	.1292E-04	13.42	12.22
11.69	.460	19193				
			.4376E-03	.1723E-04	13.81	12.56
12.34	.486	20673				
			.4799E-03	.1889E-04	14.20	12.93
13.07	.515	22208				
			.4938E-03	.1944E-04	14.58	13.27
13.68	.539	23440				
			.4866E-03	.1916E-04	14.98	13.56
14.24	.560	24578				
			.7056E-03	.2778E-04	15.34	13.96
15.31	.603	26099				
			.6569E-03	.2586E-04	15.83	14.48
16.09	.633	27290				
			.6831E-03	.2689E-04	16.19	14.73
16.72	.658	28214				
			.9503E-03	.3741E-04	16.52	15.04
17.41	.685	28933				
			.8832E-03	.3477E-04	16.85	15.33
18.03	.710	29639				
			.9534E-03	.3754E-04	17.24	15.69
19.02	.749	30682				
			.1255E-02	.4942E-04	17.81	16.21
20.43	.804	31806				
			.1258E-02	.4944E-04	18.46	16.80
21.78	.858	32881				
			.1536E-02	.6046E-04	19.15	17.43
23.49	.925	33995				
			.1814E-02	.7219E-04	19.91	18.12
25.24	.994	34948				
			.2313E-02	.9108E-04	20.62	18.76
26.75	1.053	35598				
			.2924E-02	.1151E-03	21.27	19.36
28.33	1.115	36140				
			.2807E-02	.1105E-03	21.96	19.98
30.05	1.183	36754				
			.3592E-02	.1414E-03	22.67	20.63
31.79	1.252	37238				
			.3694E-02	.1454E-03	23.29	21.19
33.12	1.304	37598				
			.4809E-02	.1893E-03	23.80	21.66
34.36	1.353	37856				
			.4793E-02	.1887E-03	24.37	22.18
35.97	1.416	38192				
			.5099E-02	.2008E-03	24.95	22.71
37.32	1.469	38455				
			.7161E-02	.2819E-03	25.54	23.24
38.94	1.533	38682				
			.9295E-02	.3659E-03	26.23	23.87
40.64	1.600	38886				
			.8706E-02	.3427E-03	26.93	24.51
42.58	1.676	39086				
			.7934E-02	.3124E-03	27.56	25.08
44.82	1.733	39268				
			.1309E-01	.5155E-03	28.20	25.66
45.88	1.806	39412				
			.1246E-01	.4882E-03	28.86	26.26
47.41	1.866	39533				
			.1519E-01	.5981E-03	29.39	26.75
48.61	1.914	39612				
			.1569E-01	.6177E-03	29.91	27.22
50.07	1.971	39734				

TABLE D1-37

SPECIMEN NUMBER: V63-ST3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: DRY AIR
TEST TEMPERATURE: 394.3 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3761 CYCLES
K(MAX) 358 CYCLES PRIOR TO FAILURE: 33.96 MPA SQRT(M) (30.90 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.10	.319	1				
			.1490E-02	.5864E-04	18.63	16.96
9.22	.363	753				
			.1753E-02	.6900E-04	19.66	17.89
10.05	.396	1224				
			.2996E-02	.1180E-03	20.58	18.66
10.89	.429	1585				
			.2480E-02	.9763E-04	21.24	19.33
11.57	.456	1779				
			.3670E-02	.1445E-03	21.91	19.94
12.30	.484	1978				
			.3405E-02	.1340E-03	22.58	20.55
13.03	.513	2191				
			.4641E-02	.1827E-03	23.23	21.14
13.76	.542	2350				
			.5664E-02	.2230E-03	23.98	21.75
14.54	.572	2487				
			.6619E-02	.2604E-03	24.57	22.36
15.33	.604	2607				
			.6208E-02	.2444E-03	25.22	22.95
16.11	.634	2732				
			.6848E-02	.2696E-03	25.90	23.57
17.00	.669	2862				
			.1055E-01	.4152E-03	26.54	24.16
17.73	.698	2931				
			.1113E-01	.4382E-03	27.16	24.72
18.57	.731	3007				
			.1260E-01	.4961E-03	27.40	25.38
19.38	.763	3071				
			.1232E-01	.4852E-03	28.56	25.99
20.59	.811	3169				
			.1342E-01	.5282E-03	29.50	26.85
21.94	.864	3270				
			.1826E-01	.7188E-03	30.51	27.77
23.40	.921	3353				
			.2359E-01	.9287E-03	31.65	28.80
25.17	.991	3429				

TABLE D1-38

SPECIMEN NUMBER: V63-ST3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: DRY AIR
TEST TEMPERATURE: 382.0 K
SPECIMEN THICKNESS: 1.65 MM (.0648 IN)
MAXIMUM STRESS: 198.7 MPA (28.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 386 CYCLES
K(MAX) 13 CYCLES PRIOR TO FAILURE: 45.46 MPA SQRT(M) (41.37 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.74	.255	1				
			.1153E-01	.4538E-03	28.43	25.88
7.67	.302	81				
			.1539E-01	.6060E-03	29.95	27.26
8.31	.327	123				
			.1862E-01	.7329E-03	31.20	28.40
9.02	.355	161				
			.2485E-01	.9783E-03	32.50	29.57
9.77	.384	191				
			.3211E-01	.1264E-02	33.82	30.78
10.57	.416	216				
			.4788E-01	.1882E-02	35.47	32.28
11.76	.463	241				
			.4688E-01	.1846E-02	37.29	33.94
12.89	.507	265				
			.1261E+00	.4966E-02	40.73	37.07
16.42	.646	293				

TABLE D1-39

SPECIMEN NUMBER: 63-3L3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.61 MM (.0634 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 30686 CYCLES
K(MAX) AT CYCLES PRIOR TO FAILURE: 69.35 MPA SQRT(M) (63.12 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.98	.117	1				
				.1195E-03	.4706E-05	11.59	10.54
	3.91	.154	7821	.2195E-03	.8642E-05	12.98	11.81
	4.73	.186	11541	.3006E-03	.1184E-04	14.06	12.79
	5.40	.213	13787	.3470E-03	.1366E-04	14.95	13.60
	6.05	.238	15646	.4395E-03	.1731E-04	15.76	14.35
	6.68	.263	17082	.5903E-03	.2324E-04	16.50	15.02
	7.26	.286	18063	.6857E-03	.2700E-04	17.23	15.68
	7.93	.312	19039	.7369E-03	.2901E-04	17.93	16.32
	8.52	.335	19837	.8173E-03	.3218E-04	18.61	16.94
	9.19	.362	20659	.9109E-03	.3587E-04	19.37	17.63
	9.98	.393	21534	.1664E-02	.6551E-04	20.17	18.36
	10.78	.424	22011	.1123E-02	.4420E-04	20.85	18.98
	11.40	.449	22563	.1647E-02	.6483E-04	21.51	19.58
	12.15	.479	23035	.1663E-02	.6628E-04	22.10	20.11
	12.69	.499	23336	.1591E-02	.6264E-04	22.64	20.60
	13.34	.527	23775	.2313E-02	.9108E-04	23.22	21.13
	14.00	.551	24044	.2064E-02	.8143E-04	23.73	21.60
	14.58	.574	24324	.2527E-02	.9950E-04	24.29	22.11
	15.34	.604	24625	.2851E-02	.1123E-03	24.91	22.67
	16.14	.633	24882	.2658E-02	.1046E-03	25.52	23.22
	16.85	.663	25173	.3651E-02	.1437E-03	26.10	23.75
	17.55	.691	25365	.2593E-02	.1020E-03	26.65	24.26
	18.28	.720	25646	.3043E-02	.1197E-03	27.16	24.71
	18.86	.743	25839				
				.3342E-02	.1316E-03	27.61	25.13
	19.47	.767	26021	.4403E-02	.1734E-03	28.33	25.79
	20.82	.820	26327	.4486E-02	.1766E-03	29.30	26.66
	22.13	.871	26614	.5295E-02	.2085E-03	30.23	27.51
	23.44	.923	26866	.5832E-02	.2296E-03	31.16	28.35
	24.80	.976	27099	.5784E-02	.2277E-03	32.09	29.21
	26.19	1.031	27339	.6042E-02	.2379E-03	33.04	30.06
	27.61	1.087	27574	.6317E-02	.2495E-03	33.91	30.86
	28.84	1.135	27769	.6724E-02	.2647E-03	34.71	31.59
	30.05	1.183	27949	.6953E-02	.2737E-03	35.50	32.31
	31.30	1.232	28128	.8023E-02	.3157E-03	36.31	33.05
	32.60	1.283	28290	.8529E-02	.3356E-03	37.16	33.82
	33.98	1.338	28452	.9365E-02	.3687E-03	38.00	34.58
	35.28	1.389	28591	.9423E-02	.3710E-03	38.85	35.35
	36.69	1.445	28741	.1157E-01	.4555E-03	39.68	36.11
	37.95	1.494	28850	.1304E-01	.5133E-03	40.89	37.22
F	40.64	1.600	29056	.1355E-01	.5333E-03	42.34	38.53
F	42.67	1.680	29206	.1397E-01	.5500E-03	44.25	40.27
F	46.86	1.845	29506	.1778E-01	.7000E-03	46.08	41.94
F	48.64	1.915	29606	.1143E-01	.4500E-03	46.99	42.76
F	49.78	1.960	29706	.1524E-01	.6000E-03	47.81	43.51
F	51.31	2.020	29836	.1524E-01	.6000E-03	48.76	44.38
F	52.83	2.080	29936	.2413E-01	.9500E-03	50.00	45.50
F	55.24	2.175	30006	.2286E-01	.9000E-03	51.49	46.86
F	57.53	2.265	30136	.3895E-01	.1533E-02	53.17	48.39
F	60.45	2.380	30181	.2540E-01	.1000E-02	55.40	50.41
F	64.26	2.530	30331	.3556E-01	.1400E-02	57.60	52.42
F	66.93	2.635	30436	.6016E-01	.2368E-02	60.56	55.11
F	72.64	2.860	30501	.9313E-01	. 667E-02	64.25	58.47
F	76.83	3.025	30546				

TABLE D1-40

SPECIMEN NUMBER: 63-2L7
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.64 MM (.0647 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 3833 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 78.17 MPA SQRT(M) (71.14 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.69	.106	1				
			.6415E-03	.2603E-04	17.81	16.21
3.18	.125	780				
			.1523E-02	.5919E-04	19.56	17.80
3.85	.152	1226				
			.1561E-02	.6143E-04	21.29	19.37
4.47	.176	1624				
			.2115E-02	.8329E-04	22.96	21.89
5.21	.205	1971				
			.2594E-02	.1019E-03	24.57	22.36
5.84	.231	2231				
			.2873E-02	.1133E-03	25.93	23.60
6.47	.255	2437				
			.4023E-02	.1584E-03	27.18	24.74
7.13	.279	2592				
			.4433E-02	.1746E-03	28.29	25.74
7.68	.300	2733				
			.8001E-02	.3150E-03	29.59	26.93
8.46	.333	2813				
			.7235E-02	.2848E-03	30.97	28.19
9.11	.359	2912				
			.7460E-02	.2937E-03	32.15	29.26
9.82	.386	2997				
			.9642E-02	.3796E-03	33.93	33.88
11.02	.442	3144				
			.1439E-01	.5667E-03	35.68	32.47
12.11	.477	3199				
			.1035E-01	.4074E-03	36.65	33.36
12.51	.492	3245				
			.1536E-01	.6046E-03	37.65	34.27
13.34	.525	3333				
			.1658E-01	.6529E-03	38.90	35.40
14.21	.559	3352				
			.2416E-01	.9513E-03	40.17	36.55
15.12	.595	3393				
			.1671E-01	.6577E-03	41.11	37.41
15.56	.612	3416				
			.2413E-01	.9498E-03	42.07	38.29
16.55	.651	3457				
			.2264E-01	.8912E-03	43.25	39.36
17.32	.682	3491				
			.3043E-01	.1197E-02	44.05	40.09
17.77	.700	3506				
			.3641E-01	.1433E-02	44.90	40.87
18.64	.734	3533				
			.3305E-01	.1301E-02	46.29	42.13
19.97	.786	3573				
			.3476E-01	.1369E-02	47.86	43.55
21.19	.834	3615				
			.3863E-01	.1523E-02	49.29	44.86
22.34	.880	3635				
			.5268E-01	.2074E-02	50.94	46.36
23.94	.944	3666				
			.7518E-01	.2963E-02	53.22	48.43
26.31	1.036	3687				
			.9118E-01	.3590E-02	56.75	51.64
30.32	1.194	3741				
			.1147E+00	.4517E-02	60.39	54.96
33.07	1.302	3765				
			.1926E+00	.7582E-02	62.96	57.30
35.19	1.385	3776				
			.2233E+00	.8792E-02	64.77	58.94
36.53	1.438	3782				
			.3414E+00	.1344E-01	66.35	60.38
38.24	1.505	3787				
			.4181E+00	.1646E-01	68.09	61.96
39.91	1.571	3791				
			.5092E+00	.2001E-01	70.51	64.17
42.96	1.691	3797				
			.5350E+00	.2106E-01	73.17	66.58
45.13	1.776	3801				

TABLE D1-41

SPECIMEN NUMBER: 63-479
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.65 MM (.0651 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 22409 CYCLES
K(MAX) 19 CYCLES PRIOR TO FAILURE: 71.98 MPA SQRT(M) (65.50 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.04	.120	1	.1337E-03	.5264E-05	11.43	10.40
	3.67	.144	4693	.2943E-03	.1158E-04	12.54	11.41
	4.40	.173	7179	.3054E-03	.1202E-04	13.47	12.26
	4.91	.193	8859	.4688E-03	.1846E-04	14.24	12.96
	5.49	.216	10097	.3870E-03	.1523E-04	15.02	13.67
	6.07	.239	11987	.6270E-03	.2469E-04	15.80	14.38
	6.72	.264	12622	.7169E-03	.2822E-04	16.59	15.10
	7.38	.290	13545	.8119E-03	.3196E-04	17.36	15.80
	8.04	.316	14360	.9187E-03	.3617E-04	18.09	16.47
	8.70	.343	15083	.1218E-02	.4797E-04	18.88	17.11
	9.36	.369	15625	.1302E-02	.5126E-04	19.49	17.73
	10.03	.395	16139	.1408E-02	.5544E-04	20.18	18.37
	10.76	.424	16654	.1973E-02	.7766E-04	20.86	18.98
	11.42	.450	16992	.2058E-02	.8101E-04	21.58	19.57
	12.13	.478	17337	.1648E-02	.6488E-04	22.05	20.07
	12.83	.497	17636	.2931E-02	.1154E-03	22.55	20.52
	13.25	.522	17847	.2694E-02	.1061E-03	23.19	21.11
	14.09	.555	18161	.2691E-02	.1059E-03	23.88	21.73
	14.84	.584	18439	.3426E-02	.1349E-03	24.56	22.35
	15.73	.619	18780	.3147E-02	.1239E-03	25.19	22.92
	16.37	.645	18993	.3948E-02	.1551E-03	25.84	23.52
	17.37	.684	19157	.4156E-02	.1636E-03	26.52	24.13
	18.11	.713	19333	.4349E-02	.1712E-03	27.09	24.65
	18.85	.742	19535	.5059E-02	.1992E-03	27.83	25.33
	20.08	.790	19747	.5779E-02	.2275E-03	28.80	26.21
	21.50	.847	19994	.5757E-02	.2267E-03	29.72	27.05
	22.63	.891	20189	.7051E-02	.2776E-03	30.59	27.84
	23.98	.944	20381	.7994E-02	.3147E-03	31.48	28.65
	25.20	.992	20534	.7986E-02	.3145E-03	32.37	29.46
	26.61	1.048	20710	.8459E-02	.3330E-03	33.28	30.29
	27.93	1.100	20866	.1189E-01	.4679E-03	34.17	31.10
	29.32	1.154	20983	.9689E-02	.3815E-03	35.07	31.92
	30.71	1.209	21126	.9351E-02	.3681E-03	35.92	32.69
	31.97	1.259	21261	.1030E-01	.4054E-03	36.75	33.44
	33.30	1.311	21390	.1328E-01	.5227E-03	37.58	34.20
	34.61	1.363	21489	.1438E-01	.5661E-03	38.53	35.07
	36.35	1.431	21610	.1280E-01	.5040E-03	39.48	35.92
	37.64	1.482	21711	.1761E-01	.6934E-03	40.41	36.77
F	39.37	1.550	21809	.2159E-01	.8500E-03	41.60	37.86
F	41.53	1.635	21909	.1905E-01	.7500E-03	42.85	38.99
F	43.41	1.710	22009	.1905E-01	.7500E-03	44.02	40.06
F	45.34	1.785	22109	.2413E-01	.9500E-03	45.34	41.26
F	47.75	1.880	22209	.3302E-01	.1300E-02	47.11	42.87
F	51.05	2.010	22309	.3175E-01	.1250E-02	49.12	44.70
F	54.23	2.135	22409	.2540E-01	.1000E-02	50.93	46.35
F	56.77	2.235	22509	.2794E-01	.1100E-02	52.19	47.50
F	58.17	2.290	22559	.5842E-01	.2300E-02	53.59	48.77
F	61.09	2.405	22609	.4318E-01	.1700E-02	55.27	50.30
F	63.25	2.490	22659	.8346E-01	.3286E-02	56.99	51.87
F	66.17	2.605	22694	.8128E-01	.3200E-02	58.71	53.43
F	68.20	2.685	22719	.9144E-01	.3600E-02	60.25	54.83
F	70.48	2.775	22744	.1609E+00	.6333E-02	61.96	56.39
F	72.90	2.870	22759	.2413E+00	.9500E-02	64.71	58.89
F	77.72	3.060	22779	.1963E+00	.7727E-02	67.49	61.42
F	79.88	3.145	22793				

TABLE D1-42

SPECIMEN NUMBER: 63-ST4
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 1.04 MM (.041 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 2.0 CPM
CYCLES TO FAILURE: 1975 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 58.37 MPA SQRT(M) (53.12 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.14	.124	1				
			.1441E-02	.5675E-04	19.47	17.72
3.83	.151	475				
			.2687E-02	.1027E-03	21.31	19.39
4.52	.178	739				
			.2818E-02	.1118E-03	22.89	20.83
5.11	.201	949				
			.5886E-02	.2286E-03	24.46	22.26
5.88	.231	1882				
			.4628E-02	.1819E-03	26.09	23.75
6.62	.261	1242				
			.7874E-02	.3188E-03	27.88	25.38
7.56	.298	1362				
			.8363E-02	.3293E-03	29.46	26.81
8.35	.329	1456				
			.1818E-01	.3978E-03	30.68	28.83
9.03	.355	1523				
			.1455E-01	.5727E-03	31.82	28.98
9.51	.374	1556				
			.1125E-01	.4427E-03	32.76	29.81
10.13	.399	1611				
			.1546E-01	.6086E-03	33.64	30.62
10.57	.416	1640				
			.1811E-01	.7129E-03	34.46	31.36
11.14	.438	1671				
			.1887E-01	.6326E-03	35.58	32.38
11.87	.468	1717				
			.2666E-01	.1047E-02	36.76	33.46
12.78	.503	1751				
			.1621E-01	.6388E-03	37.74	34.35
13.18	.519	1776				
			.2381E-01	.9379E-03	38.52	35.06
13.85	.545	1804				
			.2435E-01	.9588E-03	39.68	36.04
14.68	.578	1838				
			.2841E-01	.1118E-02	40.78	37.11
15.53	.611	1868				
			.4366E-01	.1719E-02	41.84	38.08
16.23	.639	1884				
			.5347E-01	.2105E-02	42.67	38.83
16.76	.660	1894				
			.6178E-01	.2432E-02	43.72	39.78
17.81	.701	1911				
			.7632E-01	.3005E-02	44.94	40.90
18.65	.734	1922				
			.9665E-01	.3805E-02	46.68	42.48
20.59	.810	1942				
			.1071E+00	.4217E-02	48.65	44.27
21.87	.861	1954				
			.1761E+00	.6931E-02	50.25	45.73
23.28	.917	1962				
			.3173E+00	.1249E-01	52.18	47.49
25.18	.991	1968				
			.3896E+00	.1534E-01	54.36	49.47
27.13	1.068	1973				

TABLE D1-43

SPECIMEN NUMBER:		U63-4L1
ALLOY TYPE:		2024-T861
SPECIMEN ORIENTATION:		LONGITUDINAL
CONSTRAINT:		UNSTIFFENED
ENVIRONMENT:		LAB AIR
TEST TEMPERATURE:		422.0 K
SPECIMEN THICKNESS:		1.65 MM (.0650 IN)
MAXIMUM STRESS:		114.4 MPA (16.6 KSI)
R-RATIO:		.05
FREQUENCY:		288 CPM
CYCLES TO FAILURE:		9829 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:		66.83 MPA SQRT M (60.89 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.64	.340	1				
			.9565E-03	.3766E-04	18.25	16.61
9.24	.364	637				
			.1129E-02	.4429E-04	18.98	17.28
9.92	.391	1241				
			.1235E-02	.4864E-04	19.66	17.89
10.78	.425	1940				
			.1163E-02	.4578E-04	20.35	18.52
11.39	.444	2461				
			.1298E-02	.5111E-04	20.84	18.97
11.86	.467	2821				
			.1993E-02	.7847E-04	21.37	19.45
12.56	.495	3174				
			.1499E-02	.5897E-04	21.94	19.96
13.15	.518	3564				
			.2212E-02	.8710E-04	22.51	20.49
13.90	.547	3905				
			.1994E-02	.7850E-04	23.17	21.08
14.71	.579	4312				
			.2297E-02	.9042E-04	23.84	21.69
15.14	.612	4672				
			.2224E-02	.8757E-04	24.35	22.14
15.94	.624	4883				
			.3195E-02	.1258E-03	24.80	22.57
16.74	.659	5193				
			.2674E-02	.1053E-03	25.41	23.12
17.61	.689	5384				
			.3516E-02	.1384E-03	26.07	23.73
18.49	.728	5639				
			.2464E-02	.9701E-04	26.61	24.22
18.94	.746	5853				
			.4216E-02	.1660E-03	27.15	24.71
19.97	.786	6237				
			.4333E-02	.1706E-03	28.09	25.51
21.40	.842	6626				
			.4484E-02	.1766E-03	29.04	26.43
22.84	.899	6968				
			.4941E-02	.1945E-03	30.00	27.30
24.19	.953	7282				
			.5072E-02	.1997E-03	30.90	28.12
25.62	1.009	7591				
			.5145E-02	.2419E-03	31.75	28.90
26.78	1.054	7845				
			.6823E-02	.2689E-03	32.55	29.62
27.97	1.101	7973				
			.6991E-02	.2736E-03	33.38	33.18
29.33	1.167	7821				
			.6844E-02	.2695E-03	34.11	31.04
30.28	1.192	7934				
			.7547E-02	.2947E-03	34.94	31.80
32.13	1.261	8114				
			.9235E-02	.3659E-03	36.37	33.10
34.90	1.374	8411				
			.1314E-01	.5175E-03	37.58	34.20
36.98	1.417	8525				
			.1067E-01	.4199E-03	38.29	34.85
37.25	1.466	8634				
			.1211E-01	.4766E-03	38.96	35.45
38.20	1.504	8773				
			.1121E-01	.4412E-03	39.65	36.08
39.54	1.557	8937				
			.1673E-01	.6587E-03	40.36	36.73
40.59	1.598	9055				
			.1593E-01	.6295E-03	41.10	37.40
42.03	1.655	9143				
			.1446E-01	.5691E-03	41.91	38.14
43.28	1.704	9232				
			.1736E-01	.7070E-03	42.91	39.05
46.35	1.825	9247				
			.1513E-01	.5979E-03	43.85	39.91
46.44	1.828	9311				
			.1961E-01	.7737E-03	44.63	40.62
47.94	1.888	9402				
			.2243E-01	.8989E-03	45.40	41.31
48.98	1.929	9445				
			.2393E-01	.9434E-03	46.27	42.11
50.84	2.002	9523				
			.3675E-01	.1447E-02	47.18	42.93
51.98	2.046	9554				
			.4434E-01	.1746E-02	48.14	43.81
F 52.97	2.085	9581				
			.2546E-01	.1000E-02	49.14	44.72
F 55.24	2.175	9643				

F	57.51	2.265	9831	.5715E-01	.2250E-02	50.24	45.72
F	59.44	2.340	9913	.6350E-01	.2500E-02	51.56	46.92
F	63.84	2.515	9774	.8382E-01	.3182E-02	53.60	48.77
F	65.79	2.590	9794	.9525E-01	.3750E-02	55.69	50.68
F	67.94	2.675	9833	.1439E+00	.5667E-02	57.06	51.93
F	69.72	2.745	9819	.1778E+00	.7000E-02	58.42	53.16
F	71.37	2.810	9825	.2692E+00	.1083E-01	59.62	54.26
F	72.84	2.868	9827	.6350E+00	.2500E-01	60.67	55.21
F	74.82	2.946	9824	.2159E+01	.8500E-01	61.93	56.36

TABLE D1-44

SPECIMEN NUMBER: [illegible]
ALLOY TYPE: [illegible]
SPECIMEN ORIENTATION: [illegible]
CONSTRAINT: [illegible]
ENVIRONMENT: [illegible]
TEST TEMPERATURE: [illegible]
SPECIMEN THICKNESS: 1.65 MM (.065 IN)
MAXIMUM STRESS: 111.5 MPA (17.2 KSI)
R-RATION: .1
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 7102 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 58.78 MPA SQRT(M) (53.49 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	8.45	.333	1	.1031E-02	.4059E-04	9.53	8.68
	9.72	.383	1228	.1261E-02	.4963E-04	10.04	9.13
	10.40	.410	1773	.1443E-02	.5682E-04	10.45	9.51
	11.38	.448	2447	.2009E-02	.7909E-04	10.88	9.90
	12.21	.481	2863	.2357E-02	.9279E-04	11.30	10.28
	13.19	.519	3279	.2171E-02	.8547E-04	11.70	10.65
	14.02	.552	3661	.3039E-02	.1197E-03	12.13	11.03
	15.16	.597	4035	.3599E-02	.1417E-03	12.57	11.44
	16.13	.635	4386	.3166E-02	.1246E-03	12.99	11.82
	17.21	.678	4647	.5316E-02	.2093E-03	13.43	12.22
	18.16	.721	4862	.4579E-02	.1803E-03	13.83	12.59
	19.31	.760	5070	.6409E-02	.2523E-03	14.40	13.10
	21.38	.842	5393	.8542E-02	.3363E-03	15.16	13.80
	23.50	.925	5641	.8534E-02	.3360E-03	15.95	14.51
	25.87	1.018	5919	.1064E-01	.4157E-03	16.75	15.24
	28.19	1.110	6139	.1373E-01	.5406E-03	17.43	15.86
	29.95	1.179	6267	.1439E-01	.5665E-03	18.02	16.40
	31.86	1.254	6400	.1834E-01	.7222E-03	18.64	16.97
	33.81	1.331	6506	.2059E-01	.8109E-03	19.23	17.50
	35.58	1.401	6592	.2218E-01	.8733E-03	19.82	18.04
	37.53	1.478	6668	.2800E-01	.1102E-02	20.41	18.58
	39.38	1.550	6746	.2911E-01	.1146E-02	21.00	19.11
	41.27	1.625	6811	.2789E-01	.1098E-02	21.53	19.59
	42.81	1.685	6866	.2350E-01	.9250E-03	21.91	19.94
	43.75	1.722	6906	.6060E-01	.2781E-02	22.60	20.57
F	47.24	1.860	6957	.4318E-01	.1700E-02	23.48	21.37
F	49.40	1.945	7007	.7197E-01	.2833E-02	24.15	21.98
F	51.56	2.030	7037	.4011E-01	.1579E-02	24.61	22.40
F	52.32	2.060	7056	.1123E+00	.4423E-02	25.20	22.93
F	55.24	2.175	7082	.1058E+00	.4167E-02	25.87	23.54
F	56.51	2.225	7094	.1397E+00	.5500E-02	26.38	23.94
F	57.91	2.280	7104	.9525E+00	.3750E-01	26.84	24.43
F	59.82	2.355	7106	.2286E+01	.9000E-01	27.54	25.06
F	62.10	2.445	7107				

TABLE D1-45

SPECIMEN NUMBER: 63-1115
ALLOY TYPE: 2024-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 433.0 K
SPECIMEN THICKNESS: 4.64 MM (.1845 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 26231 CYCLES
K(MAX) 1517 CYCLES PRIOR TO FAILURE: 41.41 MPA SQRT(M) (37.68 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.71	.107	1				
			.1228E-03	.4835E-05	10.89	9.91
3.38	.133	5454	.2226E-03	.8762E-05	11.99	10.92
4.00	.158	8273	.3367E-03	.1326E-04	13.04	11.87
4.72	.186	10389	.3980E-03	.1567E-04	14.06	12.79
5.42	.213	12144	.5862E-03	.2316E-04	15.07	13.71
6.22	.245	13513	.5845E-03	.2317E-04	16.08	14.56
6.89	.271	14646	.7728E-03	.3042E-04	16.76	15.25
7.49	.295	15425	.7132E-03	.2808E-04	17.47	15.90
8.13	.320	16326	.1093E-02	.4301E-04	18.49	16.83
9.36	.368	17446	.1517E-02	.5971E-04	19.41	17.66
9.89	.389	17796	.1270E-02	.5000E-04	20.02	18.22
10.57	.416	18330	.1149E-02	.4522E-04	20.54	18.69
10.96	.432	18675	.1396E-02	.5498E-04	21.05	19.16
11.63	.458	19157	.2011E-02	.7915E-04	21.62	19.68
12.18	.480	19428	.1839E-02	.7239E-04	22.18	20.18
12.85	.506	19792	.2229E-02	.8774E-04	22.73	20.68
13.42	.528	20049	.2170E-02	.8542E-04	23.30	21.21
14.17	.558	20392	.2351E-02	.9257E-04	23.87	21.72
14.75	.581	20641	.3183E-02	.1253E-03	24.34	22.15
15.29	.602	20809	.2749E-02	.1081E-03	24.86	22.63
16.02	.631	21076	.3172E-02	.1249E-03	25.40	23.11
16.61	.654	21251	.2841E-02	.1118E-03	25.82	23.50
17.18	.673	21434	.3387E-02	.1333E-03	26.28	23.92
17.78	.700	21635				
			.3379E-02	.1330E-03	26.78	24.37
18.37	.723	21809	.4081E-02	.1575E-03	27.44	24.97
19.63	.769	22101	.4213E-02	.1659E-03	28.34	25.79
20.78	.818	22397	.4285E-02	.1687E-03	29.25	26.62
22.04	.868	22691	.4809E-02	.1893E-03	30.11	27.48
23.19	.913	22933	.5614E-02	.2210E-03	31.34	28.52
25.59	1.008	23358	.6675E-02	.2628E-03	32.63	29.69
26.97	1.062	23565	.6952E-02	.2737E-03	33.49	30.47
28.18	1.109	23736	.7483E-02	.2946E-03	34.22	31.14
29.22	1.150	23877	.8365E-02	.3293E-03	34.97	31.82
30.47	1.200	24027	.8717E-02	.3432E-03	35.74	32.52
31.62	1.245	24159	.8801E-02	.3150E-03	36.44	33.16
32.66	1.286	24269	.8690E-02	.3486E-03	37.11	33.77
33.76	1.329	24416	.1017E-01	.4005E-03	37.78	34.38
34.78	1.369	24516	.1104E-01	.4345E-03	38.44	34.98
35.88	1.413	24616	.9123E-02	.3592E-03	39.06	35.55
36.78	1.448	24714				

TABLE D1-46

SPECIMEN NUMBER: 63-6L4
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.63 MM (.2640 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .15
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3461 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 93.72 MPA SQRT(M) (85.29 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.75	.108	1				
3.22	.127	384	.1204E-02	.4742E-04	18.02	16.40
3.90	.153	845	.1487E-02	.5853E-04	19.67	17.90
4.65	.179	1183	.1939E-02	.7633E-04	21.44	19.51
5.32	.209	1467	.2688E-02	.1058E-03	23.18	21.09
5.92	.233	1668	.3354E-02	.1320E-03	24.74	22.51
6.61	.260	1829	.3799E-02	.1492E-03	26.13	23.78
7.17	.282	1951	.4591E-02	.1807E-03	27.40	24.94
7.69	.303	2049	.4572E-02	.1799E-03	28.65	26.07
8.67	.341	2225	.5029E-02	.2295E-03	29.96	27.27
9.26	.365	2332	.6469E-02	.2547E-03	31.20	28.39
10.11	.398	2482	.7666E-02	.3018E-03	32.53	29.60
10.90	.429	2644	.7706E-02	.3034E-03	33.89	30.84
11.66	.459	2813	.8702E-02	.3426E-03	35.14	31.98
12.44	.490	2978	.9034E-02	.3576E-03	36.34	33.07
13.21	.520	2734	.1013E-01	.3987E-03	37.50	34.13
14.03	.554	2861	.1304E-01	.5134E-03	38.71	35.23
14.86	.585	2914	.1478E-01	.5821E-03	39.90	36.31
15.77	.621	2963	.1854E-01	.7316E-03	41.08	37.38
16.63	.655	3011	.1783E-01	.7021E-03	42.28	38.47
17.41	.685	3047	.2145E-01	.8444E-03	43.36	39.46
18.23	.718	3083	.2317E-01	.9083E-03	44.40	40.41
19.17	.751	3113	.2781E-01	.1095E-02	45.47	41.38
20.76	.817	3175	.2726E-01	.1073E-02	47.04	42.81
21.46	.845	3223	.1569E-01	.6178E-03	48.51	44.14
23.69	.929	3253	.7047E-01	.2790E-02	50.19	45.68
25.14	.991	3275	.6213E-01	.2446E-02	52.33	47.62
26.85	1.057	3312	.4636E-01	.1814E-02	54.18	49.31
28.58	1.125	3336	.6668E-01	.2621E-02	56.09	51.04
30.78	1.212	3369	.7115E-01	.2832E-02	58.24	53.00
31.91	1.256	3381	.9366E-01	.3687E-02	60.02	54.62
32.97	1.298	3393	.5315E+00	.2092E-01	61.18	55.68
34.82	1.371	3396	.1423E+00	.5604E-02	62.72	57.38
36.11	1.422	3412	.2148E+00	.8458E-02	64.36	58.57
37.56	1.479	3418	.2411E+00	.9492E-02	65.78	59.86
38.66	1.538	3414	.2508E+00	.9875E-02	67.30	61.25
40.96	1.613	3423	.2114E+00	.8322E-02	69.05	62.84
42.54	1.675	3429	.2635E+00	.1037E-01	70.84	64.46
44.65	1.758	3434	.4214E+00	.1659E-01	72.72	66.18
46.27	1.822	3439	.3429E+00	.1350E-01	74.68	67.96
48.75	1.919	3445	.3973E+00	.1564E-01	76.79	69.88
51.42	2.025	3451	.5344E+00	.2104E-01	79.40	72.26
54.44	2.143	3454	.7544E+00	.2970E-01	82.37	74.96
59.18	2.331	3459	.9482E+00	.3733E-01	86.48	78.70

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-47

SPECIMEN NUMBER: 63-3T12
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.63 MM (.0643 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 280 CPM
CYCLES TO FAILURE: 24929 CYCLES
K(MAX) 638 CYCLES PRIOR TO FAILURE: 44.06 MPA SQRT(M) (40.10 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.13	.123	1				
			.1484E-03	.5842E-05	11.56	10.52
3.73	.147	4032				
			.1329E-03	.5234E-05	12.39	11.28
4.15	.163	7213				
			.1508E-03	.1381E-04	13.29	12.10
4.91	.193	9305				
			.2699E-03	.1062E-04	14.25	12.97
5.50	.217	11578				
			.4739E-03	.1866E-04	15.12	13.76
6.21	.244	13060				
			.6007E-03	.2365E-04	15.97	14.54
6.86	.270	14153				
			.6881E-03	.2709E-04	16.82	15.31
7.62	.300	15253				
			.7450E-03	.2933E-04	17.63	16.05
8.29	.326	16148				
			.1053E-02	.4144E-04	18.31	16.67
8.86	.349	16697				
			.1048E-02	.4124E-04	18.99	17.28
9.56	.377	17365				
			.1548E-02	.6093E-04	19.71	17.94
10.28	.405	17827				
			.1343E-02	.5289E-04	20.34	18.51
10.84	.427	18242				
			.2019E-02	.7947E-04	20.96	19.07
11.56	.455	18600				
			.1841E-02	.7246E-04	21.64	19.69
12.28	.484	18994				
			.2184E-02	.8598E-04	22.32	20.31
13.05	.514	19347				
			.3159E-02	.1244E-03	22.88	20.82
13.55	.534	19505				
			.2615E-02	.1030E-03	23.42	21.31
14.33	.563	19791				
			.3091E-02	.1217E-03	24.03	21.87
15.00	.591	20017				
			.2941E-02	.1158E-03	24.61	22.39
15.64	.617	20248				
			.3477E-02	.1369E-03	25.23	22.96
16.53	.651	20492				
			.3602E-02	.1418E-03	25.93	23.59
17.43	.686	20742				
			.4272E-02	.1682E-03	26.61	24.21
18.27	.719	20940				
			.4263E-02	.1678E-03	27.23	24.78
19.06	.751	21125				
			.5624E-02	.2214E-03	28.84	25.92
20.43	.804	21368				
			.5540E-02	.2181E-03	28.96	26.36
21.58	.849	21575				
			.5637E-02	.2219E-03	29.90	27.21
23.05	.908	21837				
			.7593E-02	.2989E-03	30.91	28.13
24.47	.963	22023				
			.7776E-02	.3061E-03	31.96	29.08
26.11	1.028	22235				
			.8893E-02	.3500E-03	33.58	30.56
29.31	1.154	22595				
			.1114E-01	.4386E-03	35.12	31.96
30.83	1.214	22731				
			.1281E-01	.5045E-03	36.10	32.85
32.39	1.275	22853				
			.1355E-01	.5333E-03	37.11	33.77
34.02	1.339	22973				
			.1474E-01	.5804E-03	38.25	34.81
36.01	1.418	23108				
			.1559E-01	.6137E-03	39.32	35.79
37.49	1.476	23203				
			.1726E-01	.6797E-03	40.27	36.65
39.06	1.538	23294				
			.1657E-01	.7309E-03	41.31	37.59
40.86	1.609	23391				

TABLE D1-48

SPECIMEN NUMBER	63-1T1
ALLOY TYPE	2024-T861
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	STIFFENED
ENVIRONMENT	LAB AIR
TEST TEMPERATURE	450.0 K
SPECIMEN THICKNESS	1.63 MM (.0640 IN)
MAXIMUM STRESS	195.8 MPA (28.4 KSI)
R-RATIO	.05
FREQUENCY	200 CPM
CYCLES TO FAILURE	2017 CYCLES
K(MAX) 4 CYCLES PRIOR TO FAILURE	60.98 MPA SQRT(M) (55.49 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.21	.126	1				
			.2321E-02	.9136E-04	19.85	18.06
4.03	.159	354				
			.3999E-02	.1574E-03	21.83	19.87
4.73	.186	529				
			.4244E-02	.1671E-03	23.51	21.40
5.43	.214	693				
			.5786E-02	.2278E-03	25.22	22.96
6.26	.246	837				
			.7274E-02	.2864E-03	26.94	24.51
7.06	.278	947				
			.6437E-02	.2534E-03	28.84	26.24
8.19	.323	1123				
			.7601E-02	.2993E-03	30.36	27.63
8.70	.343	1190				
			.1009E-01	.3973E-03	32.13	29.24
10.21	.402	1339				
			.1093E-01	.4304E-03	34.67	31.55
11.77	.463	1482				
			.2148E-01	.8456E-03	36.47	33.19
12.50	.492	1516				
			.1486E-01	.5535E-03	37.47	34.10
13.10	.516	1559				
			.1719E-01	.6769E-03	38.41	34.96
13.77	.542	1598				
			.1822E-01	.7175E-03	39.42	35.87
14.50	.571	1638				
			.1889E-01	.7436E-03	40.45	36.81
15.24	.600	1677				
			.2070E-01	.8150E-03	41.53	37.80
16.07	.633	1717				
			.2216E-01	.8726E-03	42.55	38.73
16.76	.660	1748				
			.2578E-01	.1015E-02	43.57	39.65
17.61	.693	1781				
			.6587E-01	.2562E-02	45.88	40.96
18.97	.747	1802				
			.2281E-01	.8979E-03	46.21	42.06
19.52	.769	1826				
			.2499E-01	.9837E-03	47.17	42.93
20.52	.808	1866				
			.3371E-01	.1327E-02	48.58	44.14
21.70	.854	1901				
			.4670E-01	.1839E-02	50.07	45.57
23.15	.911	1932				
			.5234E-01	.2061E-02	51.77	47.11
24.61	.969	1960				
			.7874E-01	.3100E-02	53.55	48.73
26.27	1.034	1981				
			.9532E-01	.3753E-02	55.49	50.50
28.08	1.105	2000				
			.1020E+00	.4015E-02	57.21	52.06
29.40	1.158	2013				

TABLE D1-49

SPECIMEN NUMBER: 63-11
ALLOY TYPE: 2024-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.0646 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 78978 CYCLES

K(MAX) 10 CYCLES PRIOR TO FAILURE: 80.15 MPA SQRT(M) (72.94 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.16	.124	1				
	3.90	.154	11664	.6368E-04	.2507E-05	6.18	5.62
	4.68	.184	21029	.8289E-04	.3264E-05	6.81	6.20
	5.41	.213	27136	.1184E-03	.4661E-05	7.38	6.72
	6.07	.239	32547	.1225E-03	.4823E-05	7.88	7.17
	6.67	.263	36485	.1542E-03	.6069E-05	8.30	7.55
	7.37	.290	40283	.1839E-03	.7241E-05	8.72	7.93
	7.98	.314	43331	.1984E-03	.7811E-05	9.11	8.29
	8.53	.336	45907	.2169E-03	.8459E-05	9.45	8.60
	9.41	.370	49399	.2517E-03	.9908E-05	9.86	8.97
	10.11	.398	51752	.2963E-03	.1167E-04	10.29	9.36
	11.01	.434	54117	.3829E-03	.1507E-04	10.71	9.74
	11.81	.465	56015	.4215E-03	.1660E-04	11.14	10.13
	12.45	.490	57456	.4433E-03	.1745E-04	11.49	10.45
	13.14	.518	58859	.4955E-03	.1951E-04	11.80	10.74
	13.84	.545	60106	.5597E-03	.2204E-04	12.13	11.04
	14.54	.572	61047	.7696E-03	.3030E-04	12.44	11.32
	15.18	.597	62004	.6423E-03	.2528E-04	12.74	11.59
	15.82	.623	62787	.8191E-03	.3225E-04	13.02	11.85
	16.42	.646	63453	.8923E-03	.3512E-04	13.28	12.09
	16.99	.669	64094	.8961E-03	.3528E-04	13.53	12.31
	17.66	.695	64643	.1228E-02	.4836E-04	13.79	12.55
	18.27	.719	65174	.1150E-02	.4529E-04	14.05	12.79
	18.85	.734	65527	.1083E-02	.4263E-04	14.25	12.97
	20.02	.788	66684	.1178E-02	.4637E-04	14.60	13.28
	21.81	.859	68050	.1314E-02	.5172E-04	15.21	13.84
	23.21	.914	69029	.1427E-02	.5619E-04	15.81	14.39
	24.68	.969	69715	.2033E-02	.8006E-04	16.32	14.85
	26.02	1.024	70439	.1961E-02	.7722E-04	16.83	15.31
	27.25	1.073	71059	.1988E-02	.7825E-04	17.30	15.74
	28.62	1.127	71619	.2443E-02	.9617E-04	17.75	16.15
	29.94	1.179	72119	.2696E-02	.1061E-03	18.21	16.57
	31.35	1.234	72628	.2709E-02	.1066E-03	18.67	16.99
	32.93	1.296	73111	.3266E-02	.1286E-03	19.18	17.45
	34.34	1.352	73591	.2947E-02	.1160E-03	19.67	17.90
	35.75	1.408	74012	.3348E-02	.1318E-03	20.14	18.33
	37.09	1.460	74336	.4135E-02	.1628E-03	20.59	18.74
	38.36	1.510	74643	.4173E-02	.1643E-03	21.01	19.12
	39.78	1.566	74981	.4153E-02	.1635E-03	21.45	19.52
	41.14	1.620	75257	.4924E-02	.1938E-03	21.90	19.93
	42.35	1.667	75516	.4837E-02	.1904E-03	22.31	20.31
	43.85	1.727	75761	.5934E-02	.2336E-03	22.75	20.71
	44.98	1.771	75986	.5012E-02	.1973E-03	23.18	21.09
	46.21	1.819	76163	.6967E-02	.2743E-03	23.56	21.44
	47.33	1.863	76353	.5855E-02	.2305E-03	23.94	21.78
F	49.40	1.945	.579	.9229E-02	.3633E-03	24.45	22.25
F	50.93	2.005	76929	.4354E-02	.1714E-03	25.04	22.79
F	53.09	2.090	77178	.8636E-02	.3400E-03	25.65	23.34
F	56.26	2.215	77428	.1279E-01	.5080E-03	26.53	24.14
F	58.04	2.285	77628	.8890E-02	.3500E-03	27.36	24.90
F	61.72	2.430	77828	.1842E-01	.7250E-03	28.30	25.75
F	64.39	2.535	78028	.1333E-01	.5250E-03	29.41	26.76
F	65.91	2.595	78178	.1016E-01	.4000E-03	30.16	27.45
F	67.18	2.645	78278	.1270E-01	.5000E-03	30.67	27.91
F	69.09	2.720	78378	.1905E-01	.7500E-03	31.26	28.44
F	71.25	2.805	78448	.3084E-01	.1214E-02	32.02	29.14
				.1089E-01	.4286E-03	32.59	29.66

D1-49 (CON'T.)

F	72.01	2.835	78518	.1951E-01	.7897E-03	33.01	30.04
F	73.41	2.890	78588	.3266E-01	.1286E-02	33.75	30.71
F	75.69	2.980	78658	.3179E-01	.1258E-02	34.61	31.49
F	77.60	3.055	78718	.2328E-01	.9167E-03	35.30	32.13
F	78.99	3.110	78778	.5334E-01	.2100E-02	36.19	32.93
F	81.66	3.215	78828	.2794E-01	.1100E-02	37.18	33.76
F	83.06	3.270	78878	.2286E-01	.9000E-03	37.69	34.30
F	84.28	3.319	78928	.7628E-01	.3000E-02	38.23	34.79
F	85.34	3.360	78963	.6985E-01	.2750E-02	38.84	35.34
F	86.74	3.415	78963	.3956E+00	.1400E-01	39.62	36.06
F	88.52	3.485	78968				

TABLE D1-50

SPECIMEN NUMBER: 61-2L15
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: SKIFFCNED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.64 MM (.0644 IN)
MAXIMUM STRESS: 199.8 MPA (28.4 KSI)
R-RATIO: .50
FREQUENCY: 285 CPM
CYCLES TO FAILURE: 12732 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE (NET STRESS GREATER THAN 0.9 FTY)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.13	.123	1				
3.76	.148	1964	.3215E-03	.1266E-04	10.10	9.27
4.44	.175	3794	.3727E-03	.1467E-04	11.11	10.11
5.05	.199	4926	.5374E-03	.2116E-04	11.96	11.00
5.98	.235	6302	.6784E-03	.2671E-04	12.90	11.74
6.59	.259	7019	.8431E-03	.3319E-04	13.77	12.53
7.32	.288	7699	.1065E-02	.4272E-04	14.49	13.19
7.85	.309	7964	.1962E-02	.7726E-04	15.14	13.77
8.51	.335	8266	.2193E-02	.8621E-04	15.72	14.30
9.11	.359	8519	.2379E-02	.9368E-04	16.32	14.85
9.90	.390	8858	.2330E-02	.9174E-04	16.96	15.43
10.70	.421	9174	.2536E-02	.9984E-04	17.66	16.07
11.29	.444	9474	.1964E-02	.7733E-04	18.25	16.61
12.10	.477	9646	.4748E-02	.1869E-03	18.84	17.14
12.72	.501	9791	.4257E-02	.1676E-03	19.42	17.67
13.45	.530	993	.4968E-02	.1956E-03	19.94	18.15
14.05	.553	10104	.3603E-02	.1419E-03	20.45	18.61
14.79	.582	10272	.4487E-02	.1735E-03	20.96	19.07
15.39	.606	10395	.4063E-02	.1915E-03	21.4	19.52
15.98	.629	10530	.4393E-02	.1730E-03	21.73	19.91
16.83	.663	13646	.7324E-02	.2884E-03	22.39	20.38
17.68	.696	10782	.6210E-02	.2445E-03	22.98	20.92
18.24	.718	10897	.4925E-02	.1939E-03	23.46	21.35
18.88	.743	10997	.4426E-02	.2530E-03	23.87	21.72

D1-50 (CON'T.)

	20.24	.797	11155	.8568E-02	.3373E-03	24.53	22.32
	21.41	.843	11282	.9240E-02	.3638E-03	25.35	23.17
	22.60	.890	11432	.9246E-02	.3640E-03	26.15	23.86
	24.23	.954	11551	.1108E-01	.4360E-03	27.02	24.59
	25.58	1.007	11642	.1116E-01	.4393E-03	27.86	25.36
	27.15	1.069	11743	.1377E-01	.5421E-03	28.70	26.12
F	[illegible]	[illegible]	11831	.1512E-01	.5952E-03	29.72	26.66
F	[illegible]	[illegible]	11913	.1974E-01	.7771E-03	30.[illegible]	27.48
F	[illegible]	1.240	12052	.1977E-01	.7501E-03	31.28	28.47
F	33.40	1.315	12142	.2117E-01	.8333E-03	32.20	29.31
F	35.31	1.390	12222	.2381E-01	.9376E-03	33.26	30.27
F	37.08	1.460	12292	.2540E-01	.1000E-02	34.27	31.19
F	39.02	1.960	12362	.3629E-01	.1429E-02	35.44	32.25
F	42.04	1.655	12432	.3447E-01	.1357E-02	36.78	33.47
F	43.81	1.725	12492	.2963E-01	.1167E-02	37.91	34.50
F	45.47	1.791	12542	.3302E-01	.1300E-02	38.83	35.34
F	47.37	1.865	12586	.4331E-01	.1705E-02	39.79	36.21
F	50.16	1.975	12622	.7761E-01	.3056E-02	41.07	37.37
F	52.20	2.055	12652	.6771E-01	.2667E-02	42.38	38.57
F	54.36	2.140	12677	.8636E-01	.3400E-02	43.54	39.62
F	57.39	2.220	12697	.1016E+00	.4000E-02	44.70	40.68
F	58.93	2.320	12712	.1693E+00	.6667E-02	45.99	41.85
F	62.10	2.445	12720	.3969E+00	.1563E-01	47.63	43.34
F	64.90	2.555	12724	.6985E+00	.2750E-01	49.38	44.94
F	67.18	2.645	12728	.5715E+00	.2250E-01	50.91	46.33
F	67.94	2.675	12730	(NET STRESS GREATER THAN 3.9 FTY)			
F	68.83	2.710	12731	(NET STRESS GREATER THAN 0.9 FTY)			

TABLE D1-51

SPECIMEN NUMBER: 63-4TT
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.66 MM (.0655 IN)
MAXIMUM STRESS: 118.5 MPA (17.2 KSI)
R-RATIO: .20
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 23714 CYCLES
K(MAX) 20 CYCLES PRIOR TO FAILURE: 67.71 MPA SQRT(M) (61.62 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	9.13	.359	1				
	9.80	.386	2293	.2931E-03	.1154E-04	10.24	9.32
	10.50	.413	3977	.4148E-03	.1633E-04	10.61	9.66
	11.63	.458	6442	.4596E-03	.1809E-04	11.09	10.09
	12.40	.488	7555	.6869E-03	.2704E-04	11.56	13.52
	12.95	.510	8687	.4858E-03	.1913E-04	11.88	13.81
	13.25	.522	9190	.6113E-03	.2406E-04	12.08	10.99
	14.03	.551	10091	.8345E-03	.3285E-04	12.33	11.22
	14.97	.589	11121	.9359E-03	.3684E-04	12.72	11.57
	16.01	.630	12052	.1119E-02	.4404E-04	13.16	11.98
	17.38	.684	13206	.1191E-02	.4688E-04	13.68	12.45
	18.39	.724	14001	.1264E-02	.4975E-04	14.17	12.90
	19.43	.765	14697	.1496E-02	.5891E-04	14.59	13.28
	20.75	.817	15519	.1607E-02	.6326E-04	15.06	13.70
	22.21	.874	16257	.1979E-02	.7791E-04	15.60	14.19
	23.57	.928	16826	.2388E-02	.9402E-04	16.13	14.68
	25.44	1.002	17690	.2168E-02	.8536E-04	16.72	15.22
	27.63	1.088	18234	.2916E-02	.1148E-03	17.35	15.79
	28.59	1.126	18795	.2780E-02	.1094E-03	17.90	16.29
	30.05	1.183	19230	.3349E-02	.1318E-03	18.43	16.77
	31.79	1.251	19759	.3289E-02	.1295E-03	18.98	17.27
	33.48	1.318	20158	.4243E-02	.1670E-03	19.56	17.80
	35.22	1.387	20497	.5144E-02	.2025E-03	20.13	18.32
	36.91	1.453	20789	.5776E-02	.2274E-03	20.70	18.84
	39.48	1.554	21194	.6344E-02	.2498E-03	21.40	19.48
	41.60	1.638	21534	.6253E-02	.2462E-03	22.17	20.18
	43.77	1.723	21838	.7119E-02	.2803E-03	22.87	20.81
	45.02	1.772	21972	.9335E-02	.3675E-03	23.43	21.32
	46.98	1.850	22227	.7695E-02	.3029E-03	23.95	21.80
	48.24	1.899	22346	.1054E-01	.4164E-03	24.48	22.28
	50.25	1.978	22546	.1006E-01	.3960E-03	25.02	22.77
	51.57	2.030	22661	.1146E-01	.4513E-03	25.57	23.27
	54.09	2.129	22867	.1[illegible]5E-01	.4389E-03	26.20	23.85
	55.23	2.174	22981	.1[illegible]12E-01	.4771E-03	26.82	24.41
	57.33	2.257	23117	.1543E-01	.6074E-03	27.37	24.90
	58.68	2.310	23206	.[illegible]525E-01	.5983E-03	27.96	25.44
	60.15	2.368	23322	.1270E-01	.5030E-03	28.45	25.89
F	61.72	2.430	23408	.1825E-01	.7186E-03	28.98	26.37
F	63.37	2.495	23504	.1651E-01	.6500E-03	29.55	26.89
F	64.90	2.555	23564	.2543E-01	.1000E-02	30.12	27.41
F	67.56	2.660	23626	.4445E-01	.1750E-02	30.89	28.11
F	68.71	2.705	23664	.2858E-01	.1125E-02	31.60	28.76
F	70.87	2.790	23678	.2159E+00	.8500E-02	32.23	29.33
F	71.63	2.820	23698	.7623E-01	.3000E-02	32.79	29.84
F	73.91	2.910	23698	.2286E+00	.9000E-02	33.40	30.39

TABLE D1-52

SPECIMEN NUMBER: 62-3710
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 458.0 K
SPECIMEN THICKNESS: 1.62 MM (.638 IN)
MAXIMUM STRESS: 195.0 MPA (28.4 KSI)
R-RATIO: .10
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 8233 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 74.19 MPA SQRT(M) (67.51 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.89	.114	1	.3366E-03	.1325E-04	9.81	8.93
	3.49	.138	1782	.6363E-03	.2505E-04	10.71	9.75
	4.12	.162	2776	.9499E-03	.3740E-04	11.61	10.57
	4.82	.190	3506	.1026E-02	.4036E-04	12.42	11.30
	5.42	.213	4088	.1341E-02	.5278E-04	13.12	11.94
	5.99	.236	4523	.1782E-02	.7015E-04	13.85	12.60
	6.72	.265	4927	.1892E-02	.7449E-04	14.63	13.31
	7.46	.294	5317	.2731E-02	.1075E-03	15.33	13.95
	8.69	.319	5553	.2046E-02	.8054E-04	15.89	14.46
	8.62	.339	5807	.3793E-02	.1493E-03	16.55	15.06
	9.49	.374	6036	.3259E-02	.1283E-03	17.38	15.82
	10.47	.412	6334	.3492E-02	.1375E-03	18.01	16.39
	10.95	.431	6474	.6912E-02	.2564E-03	18.52	16.85
	11.66	.459	6584	.4622E-02	.1820E-03	19.11	17.39
	12.39	.488	6742	.4971E-02	.1957E-03	19.79	18.01
	13.38	.527	6943	.6123E-02	.2409E-03	20.44	18.60
	14.09	.555	7056	.7244E-02	.2852E-03	20.90	19.02
	14.60	.575	7127	.7533E-02	.2966E-03	21.34	19.42
	15.27	.601	7215	.9100E-02	.3583E-03	21.98	20.00
	16.37	.644	7336	.8295E-02	.3266E-03	22.60	20.56
	17.02	.670	7419	.8128E-02	.3200E-03	23.05	20.97
	17.67	.696	7495	.1451E-01	.5713E-03	23.50	21.39
	18.35	.723	7542	.1027E-01	.4051E-03	24.00	21.84
	19.16	.754	7620	.1206E-01	.4748E-03	24.72	22.50
	20.54	.809	7735	.1840E-01	.7244E-03	25.69	23.38
	22.20	.874	7825	.2740E-01	.1079E-02	26.51	24.13
	23.16	.912	7866	.1341E-01	.5278E-03	27.67	24.63
F	24.03	.946	7923	.2359E-01	.9286E-03	27.82	25.32
F	25.65	1.010	7993	.2963E-01	.1167E-02	28.84	26.24
F	27.43	1.080	8053	.3048E-01	.1200E-02	29.80	27.12
F	28.96	1.140	8103	.3810E-01	.1500E-02	30.67	27.91
F	30.48	1.200	8143	.2961E-01	.1167E-02	31.35	28.53
F	31.37	1.235	8173	.1101E+00	.4333E-02	32.86	29.18
F	33.02	1.300	8188	.1947E+00	.7667E-02	33.33	30.33
F	35.94	1.415	8203	.1145E+00	.4667E-02	34.62	31.50
F	37.72	1.485	8218	.2631E+00	.1036E-01	36.10	32.85
F	41.40	1.630	8232				

TABLE D1-53

SPECIMEN NUMBER:	U63-3L4
ALLOY TYPE:	2.24-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	LAB AIR
TEST TEMPERATURE:	450.0 K
SPECIMEN THICKNESS:	1.60 MM (.0630 IN)
MAXIMUM STRESS:	119.6 MPA (17.2 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	9606 CYCLES
K(MAX) 438 CYCLES PRIOR TO FAILURE:	49.36 MPA SQRT(M) (44.92 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.47	.137	1				
			.6894E-03	.2714E-04	18.90	17.20
9.29	.166	1051				
			.1143E-02	.4503E-04	19.67	17.90
10.03	.195	1691				
			.1271E-02	.4809E-04	20.49	18.65
10.92	.430	2419				
			.1831E-02	.7090E-04	21.33	19.41
11.79	.462	2973				
			.1465E-02	.7341E-04	22.19	20.20
12.77	.503	3413				
			.1904E-02	.7512E-04	23.02	20.95
13.58	.535	3841				
			.2422E-02	.9536E-04	24.20	22.03
15.49	.610	4633				
			.2903E-02	.1145E-03	25.53	23.24
16.77	.660	5071				
			.2628E-02	.1035E-03	26.52	24.13
17.96	.707	5519				
			.3693E-02	.1454E-03	27.38	24.92
18.99	.748	5862				
			.4449E-02	.1751E-03	28.35	25.80
20.49	.807	6343				
			.4533E-02	.1785E-03	29.55	26.89
22.21	.875	6923				
			.4938E-02	.1944E-03	30.63	27.88
23.51	.926	6782				
			.6359E-02	.2503E-03	31.74	28.89
25.40	1.000	7079				
			.6216E-02	.2447E-03	32.93	29.97
26.99	1.063	7339				
			.7758E-02	.3055E-03	34.16	31.09
28.65	1.128	7601				
			.7664E-02	.3017E-03	35.35	32.17
30.59	1.204	7802				
			.8663E-02	.3411E-03	36.46	33.18
32.44	1.277	8022				
			.7501E-02	.2953E-03	37.42	34.06
33.61	1.323	8173				
			.1102E-01	.4337E-03	38.49	35.03
35.84	1.411	8371				
			.9975E-02	.3927E-03	39.61	36.04
37.15	1.463	8504				
			.1307E-01	.5146E-03	40.71	37.05
39.38	1.551	8675				
			.1512E-01	.5952E-03	41.85	38.08
41.79	1.646	8764				
			.1435E-01	.5648E-03	43.08	39.20
43.36	1.707	8947				
			.1726E-01	.6795E-03	44.23	40.25
44.53	1.752	9013				
			.1864E-01	.7337E-03	45.31	41.23
46.85	1.844	9133				
			.2327E-01	.9161E-03	46.47	42.29
48.22	1.898	9198				

TABLE D1-54

SPECIMEN NUMBER:	U63-1L9
ALLOY TYPE:	2524-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	LAB AIR
TEST TEMPERATURE:	458.2 K
SPECIMEN THICKNESS:	1.64 MM (.0645 IN)
MAXIMUM STRESS:	195.9 MPA (28.4 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	1884 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	29.66 MPA SQRT(M) (27.46 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.35	.250	1				
	6.71	.264	153	.4211E-02	.1658E-03	26.57	24.18
	7.01	.276	343	.4777E-02	.1737E-03	28.23	25.69
	7.44	.293	493	.6236E-02	.2455E-03	29.79	27.11
	7.84	.309	624	.6443E-02	.2536E-03	30.76	27.99
	8.23	.324	771	.5746E-02	.2273E-03	31.73	28.87
	8.66	.341	799	.8196E-02	.3315E-03	32.96	30.00
	9.06	.357	863	.6927E-02	.2727E-03	34.06	31.00
	9.52	.375	932	.6479E-02	.3337E-03	35.10	31.94
	9.93	.391	986	.1163E-01	.4213E-03	36.20	33.35
	10.41	.410	1053	.9183E-02	.3634E-03	37.49	34.12
	10.97	.432	1134	.1543E-01	.5914E-03	38.85	35.31
	11.51	.453	1213	.1023E-02	.3939E-03	39.72	36.14
	11.97	.471	1286	.1543E-01	.4991E-03	40.71	37.05
	12.32	.485	1317	.1143E-01	.4196E-03	41.68	37.93
	12.72	.501	1372	.2203E-01	.7873E-03	42.78	38.93
	13.06	.514	1421	.1688E-01	.6612E-03	44.04	40.08
	13.77	.542	1511	.2196E-01	.8212E-03	45.11	41.05
	14.43	.568	1616	.1783E-01	.7341E-03	46.04	41.89
	15.19	.598	1667	.2314E-01	.9127E-03	47.44	43.19
	15.54	.612	1636	.2803E-01	.1145E-02	49.13	44.71
	15.77	.621	1645	.4134E-01	.1617E-02	50.61	45.96
F	16.64	.655	1674	.3256E-01	.1273E-02	51.94	47.27
F	17.28	1.015	1714	.2858E-01	.1124E-02	53.31	48.52
F	17.19	1.072	1744	.4657E-01	.1833E-02	54.74	49.82
F	18.06	1.140	1774	.5927E-01	.2331E-02	56.50	51.42
F	18.94	1.175	1804	.6773E-01	.2667E-02	58.57	53.30
F	19.80	1.260	1834	.5142E-01	.2000E-02	60.20	54.79
F	20.27	1.315	1853	.8667E-01	.3331E-02	61.42	55.89
F	20.91	1.390	1884	.1355E+00	.5333E-02	63.15	57.47
F	21.43	1.463	1904	.1524E+00	.6000E-02	65.01	59.16
F	22.10	1.500	1869	.2543E+00	.1000E-01	66.45	60.48
F	22.66	1.525	1874	.3810E+00	.1500E-01	68.09	61.96
F	23.28	1.545	1877	.5427E+00	.2333E-01	69.94	63.68
F	23.80	1.585	1879	.5083E+00	.2000E-01	71.41	64.99
F	24.73	1.760	1882	.6350E+00	.2500E-01	72.91	66.35
F	26.36	1.825	1883	.1651E+01	.6500E-01	74.73	68.01

TABLE D1-55

SPECIMEN NUMBER: U63-6T3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 1.65 MM (.0650 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1214 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 78.61 MPA SQRT(M) (64.26 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.44	.253	1	.7634E-02	.3006E-03	27.18	24.74
	7.12	.280	91	.8864E-02	.3490E-03	29.90	27.21
	9.26	.365	332	.9462E-02	.3725E-03	32.61	29.68
	10.21	.402	432	.1088E-01	.4285E-03	34.17	31.10
	11.14	.439	518	.1092E-01	.4300E-03	35.31	32.13
	11.63	.458	563	.1304E-01	.5132E-03	36.42	33.14
	12.57	.495	635	.1414E-01	.5567E-03	38.15	34.72
	13.94	.549	732	.1121E-01	.4415E-03	39.52	35.96
	14.47	.570	779	.2361E-01	.9297E-03	40.42	36.79
	15.23	.599	811	.2081E-01	.8192E-03	41.69	37.94
	16.31	.642	863	.1672E-01	.6581E-03	42.83	38.98
	16.93	.666	908	.2580E-01	.1016E-02	43.78	39.84
	17.75	.699	932	.1831E-01	.7210E-03	44.68	40.66
	18.32	.721	963	.3246E-01	.1278E-02	45.56	41.46
	19.13	.753	988	.4438E-01	.1747E-02	47.01	42.78
	20.64	.813	1022	.2893E-01	.1139E-02	48.74	44.36
F	21.97	.865	1068	.5080E-01	.2000E-02	50.73	46.17
F	24.00	.945	1108	.6531E-01	.2571E-02	53.22	48.43
F	26.29	1.035	1143	.9652E-01	.3800E-02	55.85	50.82
F	28.70	1.130	1168	.8259E-01	.3250E-02	58.07	52.84
F	30.35	1.195	1188	.1651E+00	.6500E-02	59.84	54.46
F	32.00	1.260	1198	.1143E+00	.4500E-02	61.32	55.81
F	33.15	1.305	1208	.5080E+00	.2000E-01	63.26	57.57
F	35.69	1.405	1213	.6832E+00	.2375E-01	65.84	59.91
F	38.10	1.500	1217				

TABLE D1-56

SPECIMEN NUMBER:			UK3-KTP
ALLOY TYPE:			2024-T861
SPECIMEN ORIENTATION:			T-L
CONSTRAINT:			UNIT PROPAGATION
ENVIRONMENT:			LAB AIR
TEST TEMPERATURE:			450.0 K
SPECIMEN THICKNESS:		1.65 MM	(.0650 IN)
MAXIMUM STRESS:		118.7 MPA	(17.2 KSI)
R-RATIO:			.05
FREQUENCY:			200 CPM
CYCLES TO FAILURE:			6588 CYCLES
K(MAX) 441 CYCLES PRIOR TO FAILURE:		46.41 MPA SQRT(M)	(42.24 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.70	.342	1	.1976E-02	.7780E-04	18.97	17.26
9.26	.365	287	.1714E-02	.6749E-04	19.67	17.90
10.02	.394	738	.1796E-02	.7070E-04	20.44	18.60
10.79	.425	1168	.2540E-02	.1000E-03	21.15	19.25
11.48	.452	1429	.2055E-02	.8089E-04	21.66	19.72
11.87	.467	1620	.3494E-02	.1376E-03	22.15	20.16
12.51	.493	1809	.2458E-02	.9679E-04	22.69	20.65
13.05	.514	2023	.2885E-02	.1136E-03	23.24	21.15
13.74	.541	2262	.3690E-02	.1453E-03	23.90	21.75
14.56	.573	2484	.3226E-02	.1270E-03	24.62	22.40
15.44	.608	2756	.3947E-02	.1554E-03	25.30	23.03
16.20	.638	2953	.2669E-02	.1051E-03	25.77	23.45
16.57	.652	3088	.4482E-02	.1765E-03	26.19	23.83
17.26	.679	3241	.4238E-02	.1668E-03	27.08	24.64
18.83	.741	3612	.6256E-02	.2463E-03	28.13	25.60
20.01	.788	3801	.6399E-02	.2519E-03	29.07	26.45
21.34	.840	4008	.6052E-02	.2383E-03	30.10	27.39
22.83	.899	4255	.6243E-02	.3245E-03	31.09	28.29
24.12	.950	4412	.8103E-02	.3192E-03	31.94	29.09
25.35	.998	4563	.7628E-02	.3003E-03	32.81	29.86
26.59	1.047	4726	.8100E-02	.3189E-03	34.13	31.06
29.27	1.153	5057	.1090E-01	.4292E-03	35.46	32.27
30.64	1.206	5182	.1122E-01	.4417E-03	36.35	33.08
31.99	1.260	5303	.1232E-01	.4849E-03	37.25	33.90
33.46	1.317	5422	.1273E-01	.5014E-03	38.16	34.73
34.85	1.372	5531	.1205E-01	.4746E-03	39.03	35.52
36.20	1.425	5643	.1616E-01	.6361E-03	39.94	36.35
37.76	1.487	5743	.1581E-01	.6224E-03	40.91	37.23
39.28	1.547	5836	.1752E-01	.6896E-03	41.83	38.07
40.72	1.603	5918	.1748E-01	.6883E-03	42.78	38.94
42.36	1.668	6012	.2743E-01	.1080E-02	43.69	39.76
43.65	1.719	6059				

TABLE D1-57

SPECIMEN NUMBER: 63-1L4
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 1.63 MM (.0642 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 280 CPM
CYCLES TO FAILURE: 25937 CYCLES
K(MAX) 20 CYCLES PRIOR TO FAILURE: 83.21 MPA SQRT(M) (75.72 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.34	.131	1				
	4.01	.158	4145	.1615E-03	.6359E-05	11.97	10.89
	4.66	.183	6655	.2591E-03	.1020E-04	13.00	11.83
	5.28	.208	8648	.3094E-03	.1218E-04	13.92	12.67
	5.87	.231	10043	.4273E-03	.1682E-04	14.75	13.42
	6.44	.258	11523	.4543E-03	.1791E-04	15.57	14.17
	7.12	.280	12499	.5038E-03	.2298E-04	16.33	14.86
	8.70	.342	14497	.7922E-03	.3118E-04	17.58	16.00
	9.33	.367	15193	.8955E-03	.3526E-04	18.78	17.09
	9.99	.393	15694	.1328E-02	.5229E-04	19.44	17.70
	10.64	.419	16169	.1383E-02	.5446E-04	20.10	18.29
	11.29	.443	16642	.1294E-02	.5095E-04	20.72	18.85
	11.94	.470	17257	.1656E-02	.6518E-04	21.33	19.41
	12.60	.492	17769	.1793E-02	.7059E-04	21.98	19.93
	13.16	.518	17731	.1993E-02	.7846E-04	22.45	20.43
	13.92	.547	18075	.1986E-02	.7821E-04	23.07	21.00
	14.62	.573	18373	.2105E-02	.8289E-04	23.66	21.53
	15.21	.599	18655	.2385E-02	.9388E-04	24.21	22.03
	15.88	.625	18935	.2734E-02	.1076E-03	24.77	22.54
	16.69	.657	19186	.2825E-02	.1112E-03	25.37	23.09
	17.35	.683	19436	.2642E-02	.1056E-03	25.95	23.62
	17.94	.706	19625	.3131E-02	.1233E-03	26.44	24.06
	18.60	.732	19817	.3426E-02	.1349E-03	26.92	24.50
	19.14	.753	20303	.2971E-02	.1170E-03	27.72	25.23
	21.38	.842	21688	.3487E-02	.1373E-03	28.75	26.16
	22.80	.898	21849	.3912E-02	.1540E-03	29.74	27.06
	24.42	.946	21313	.4544E-02	.1789E-03	30.66	27.91
	25.46	1.002	21625	.4493E-02	.1771E-03	31.56	28.72
	26.64	1.047	21894	.4362E-02	.1717E-03	32.43	29.51
	27.94	1.100	22164	.4995E-02	.1967E-03	33.28	30.28
	29.12	1.147	22394	.5245E-02	.2064E-03	34.11	31.04
	30.47	1.200	22613	.6174E-02	.2429E-03	34.93	31.79
	31.81	1.252	22829	.6162E-02	.2426E-03	35.79	32.58
	33.24	1.309	23026	.7278E-02	.2865E-03	36.67	33.38
	34.63	1.362	23203	.7431E-02	.2926E-03	37.55	34.18
	35.84	1.411	23379	.7521E-02	.2961E-03	38.37	34.92
	37.26	1.467	23547	.8196E-02	.3227E-03	39.20	35.67
	38.47	1.515	23691	.8431E-02	.3319E-03	40.01	36.41
	39.83	1.568	23823	.8879E-02	.3478E-03	40.76	37.09
F	42.54	1.675	23937	.2642E-01	.1040E-02	42.01	38.23
F	44.2.	1.740	24117	.4255E-02	.3250E-03	43.39	39.49
F	46.61	1.835	24337	.1236E-01	.4753E-03	44.64	40.62
F	49.28	1.940	24537	.1333E-01	.5250E-03	46.20	42.04
F	52.96	2.085	24737	.1841E-01	.7250E-03	48.16	43.83
F	59.69	2.350	24937	.3345E-01	.1200E-02	51.25	46.64
F	62.81	2.473	25103	.1548E-01	.6222E-03	54.38	49.49
F	65.62	2.583	25237	.3217E-01	.1267E-02	56.38	51.31
F	66.87	2.632	25287	.3303E-01	.1300E-02	57.77	52.57
F	69.94	2.753	25337	.6614E-01	.2603E-02	59.51	54.16
F	72.62	2.859	25387	.6096E-01	.2402E-02	61.41	56.35
F	74.64	2.938	25427	.2254E+00	.8875E-02	66.45	60.47
F	76.71	3.019	25457	.8898E-01	.3503E-02	71.36	64.94
F	78.91	3.106	25497	.9144E-01	.3603E-02	73.59	66.97
F	80.19	3.156	25517	.1343E+00	.4250E-02	75.69	68.88
F	81.44	3.207	25537	.1524E+00	.6000E-02	77.88	70.87

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D1-58

SPECIMEN NUMBER= 63-6L3
ALLOY TYPE= 2024-T861
SPECIMEN ORIENTATION= LONGITUDINAL
CONSTRAINT= STIFFENED
ENVIRONMENT= LAB AIR
TEST TEMPERATURE= 478.0 K
SPECIMEN THICKNESS= 1.64 MM (.0645 IN)
MAXIMUM STRESS= 140.0 MPA (20.4 KSI)
R-RATIO= .05
FREQUENCY= 20 CPM
CYCLES TO FAILURE= 2025 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE= (NET STRESS GREATER THAN 0.9 FTY)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.91	.115	1	.1279E-03	.3653E-04	18.81	16.94
3.56	.140	835	.2451E-03	.9683E-04	20.46	18.62
4.24	.167	919	.1598E-03	.6283E-04	22.00	20.02
4.80	.189	1175	.2013E-03	.8167E-04	23.35	21.24
5.36	.211	1417	.4911E-03	.1933E-03	25.06	22.81
6.17	.243	1582	.4133E-03	.1627E-03	26.54	24.19
6.73	.265	1737	.5214E-03	.2054E-03	27.80	25.30
7.19	.283	1869	.7292E-03	.2774E-03	29.03	26.42
8.07	.318	1961	.7231E-03	.2845E-03	30.14	27.42
8.81	.347	2046	.9671E-03	.3739E-03	31.60	28.76
9.64	.379	2116	.1366E-02	.1466E-03	33.26	30.27
10.77	.424	2169	.1557E-01	.6130E-03	34.89	31.75
11.68	.460	2234	.1673E-01	.6585E-03	36.09	32.85
12.32	.484	2306	.1672E-01	.6581E-03	37.40	34.03
13.20	.520	2403	.1394E-01	.5485E-03	38.49	35.03
13.78	.543	2467	.2438E-01	.9600E-03	39.52	35.97
14.84	.584	2477	.2350E-01	.9250E-03	40.52	36.88
15.46	.609	2521	.2166E-01	.8526E-03	41.21	37.50
15.84	.624	2521	.1073E-01	.1288E-02	42.08	38.30
16.49	.649	2567	.2433E-01	.9577E-03	43.87	39.20
17.12	.674	2623	.2398E-01	.1571E-02	45.91	39.98
17.82	.701	2680	.4422E-01	.1741E-02	45.00	40.95
18.77	.739	2812	.4472E-01	.1760E-02	46.18	42.02
19.86	.774	2832				
21.92	.863	2877	.4123E-01	.1623E-02	47.87	43.57
23.35	.881	2891	.4494E-01	.2343E-02	49.69	45.24
23.98	.967	2913	.4724E-01	.2254E-02	50.93	46.34
25.46	1.022	2941	.6823E-01	.2686E-02	52.72	47.97
26.44	1.041	2957	.8167E-01	.2624E-02	54.12	49.26
28.22	1.113	2994	.9758E-01	.3842E-02	55.65	50.65
29.16	1.154	3006	.1004E+00	.3955E-02	57.22	52.07
30.92	1.217	3043	.1194E+00	.4543E-02	58.69	53.41
32.17	1.266	3057	.1362E+00	.7014E-02	60.23	54.81
33.74	1.328	3078	.1794E+00	.6867E-02	61.72	56.17
35.13	1.383	3094	.1737E+00	.6837E-02	63.27	57.58
F 36.29	1.429	3099	.1325E+00	.5220E-02	64.13	60.18
F 41.53	1.635	3206	.2286E+00	.9000E-02	69.45	63.18
F 43.81	1.725	3275	.2746E+00	.9000E-02	71.77	65.31
F 46.74	1.840	3384	.2921E+00	.1150E-01	74.44	67.74
F 49.15	1.935	3432	.3447E+00	.1357E-01	77.18	70.23
F 51.69	2.035	3498	.4733E+00	.1867E-01	79.74	72.57
F 53.67	2.113	3547	.4445E+00	.1750E-01	81.99	74.61
F 56.01	2.205	3626	.6153E+00	.2500E-01	84.26	76.68
F 57.40	2.260	3659	.4697E+00	.1849E-01	86.36	78.59
F 59.82	2.355	3717	.6043E+00	.3187E-01	88.42	80.46
F 62.36	2.455	3819	.8467E+00	.3333E-01	91.13	82.93
F 66.29	2.610	3919	.9963E+00	.3879E-01	96.77	86.24
F 67.82	2.670	3920				
F 69.67	2.735	3921				
F 72.14	2.840	3922				
F 75.31	2.965	3923				
F 81.28	3.200	3924				

(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)

TABLE D1-59

SPECIMEN NUMBER: 63-4T6
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 1.66 MM (.0654 IN)
MAXIMUM STRESS: 117.2 MPA (17.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 28298 CYCLES
K(MAX) 971 CYCLES PRIOR TO FAILURE: 43.87 MPA SQRT(M) (39.92 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.37	.133	1	.1809E-03	.7121E-05	11.90	10.83
3.90	.153	2929	.2778E-03	.1094E-04	12.87	11.71
4.60	.181	5462	.4537E-03	.1786E-04	13.91	12.66
5.33	.210	7063	.4898E-03	.1928E-04	14.82	13.49
5.93	.234	8385	.5798E-03	.2283E-04	15.61	14.21
6.55	.258	9374	.7371E-03	.2902E-04	16.51	15.02
7.40	.291	10518	.9589E-03	.3775E-04	17.41	15.84
8.11	.319	11257	.1024E-02	.4030E-04	18.22	16.58
8.87	.349	11999	.1000E-02	.3938E-04	19.21	17.48
9.49	.373	13120	.2174E-02	.8559E-04	20.10	18.29
10.63	.418	13415	.2001E-02	.7880E-04	20.75	18.88
11.33	.446	13764	.1977E-02	.7782E-04	21.41	19.48
12.03	.474	14118	.1666E-02	.6559E-04	21.99	20.01
12.69	.496	14458	.2[illegible]E-02	.9479E-04	22.58	20.55
13.33	.525	14765	.2429E-02	.9561E-04	23.24	21.15
14.11	.555	15084	.3047E-02	.1200E-03	23.90	21.75
14.88	.586	15337	.3316E-02	.1306E-03	24.52	22.32
15.59	.614	15553	.3067E-02	.1207E-03	25.04	22.78
16.13	.635	15729	.3619E-02	.1425E-03	25.53	23.24
16.83	.663	15922	.3372E-02	.1328E-03	26.12	23.77
17.61	.694	16154	.4198E-02	.1653E-03	26.79	24.38
18.56	.731	16383	.4323E-02	.1702E-03	27.42	24.96
19.28	.759	16546	.4649E-02	.1830E-03	28.23	25.69
20.73	.816	16858	.4884E-02	.1923E-03	29.23	26.60
22.03	.867	17124	.5378E-02	.2117E-03	30.26	27.54
23.63	.930	17422	.5581E-02	.2197E-03	31.26	28.45
24.91	.981	17650	.6680E-02	.2630E-03	32.21	29.31
26.42	1.040	17877	.6696E-02	.2636E-03	33.26	30.27
28.04	1.104	18119	.7821E-02	.3079E-03	34.26	31.18
29.47	1.160	18302	.8602E-02	.3387E-03	35.21	32.04
30.95	1.219	18474	.8836E-02	.3479E-03	36.28	33.01
32.62	1.292	18685	.1189E-01	.4680E-03	37.32	33.97
34.27	1.349	18807	.1081E-01	.4255E-03	38.30	34.86
35.94	1.415	18962	.1158E-01	.4559E-03	39.28	35.75
37.41	1.473	19089	.1236E-01	.4867E-03	40.23	36.61
39.00	1.535	19217	.1430E-01	.5632E-03	41.20	37.49
40.57	1.597	19327				

TABLE D1-60

SPECIMEN NUMBER: 83-9712
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.2 K
SPECIMEN THICKNESS: 1.65 MM (.0648 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2390 CYCLES
K(MAX) 280 CYCLES PRIOR TO FAILURE: 50.26 MPA SQRT(M) (45.74 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.84	.144	1				
4.12	.162	149	.3244E-02	.1277E-03	20.56	18.71
4.61	.181	398	.1943E-02	.7651E-04	21.80	19.84
5.21	.205	552	.3892E-02	.1532E-03	23.11	21.03
5.83	.230	707	.4023E-02	.1584E-03	24.51	22.31
7.12	.280	996	.4460E-02	.1756E-03	26.56	24.17
7.73	.304	1089	.6555E-02	.2581E-03	28.45	25.89
8.56	.337	1231	.5867E-02	.2310E-03	29.81	27.13
9.27	.365	1323	.7648E-02	.3011E-03	31.20	28.39
10.04	.395	1412	.8862E-02	.3410E-03	32.47	29.55
10.78	.424	1506	.7890E-02	.3106E-03	33.74	30.78
11.49	.452	1589	.8584E-02	.3380E-03	34.91	31.77
12.29	.484	1671	.9680E-02	.3811E-03	36.09	32.84
13.04	.514	1734	.1203E-01	.4738E-03	37.27	33.91
13.58	.535	1791	.9336E-02	.3675E-03	38.22	34.78
14.33	.564	1839	.1584E-01	.6196E-03	39.15	35.63
15.18	.598	1886	.1816E-01	.7149E-03	40.29	36.66
15.71	.619	1917	.1712E-01	.6742E-03	41.25	37.54
16.38	.645	1953	.1870E-01	.7361E-03	42.06	38.28
17.00	.669	1980	.2291E-01	.9019E-03	42.93	39.07
17.66	.695	2010	.2193E-01	.8633E-03	43.77	39.83
18.45	.726	2038	.2821E-01	.1111E-02	44.70	40.68
19.14	.753	2069	.2212E-01	.8710E-03	45.64	41.54
20.49	.807	2113	.3296E-01	.1298E-02	46.92	42.70

TABLE D1-61

SPECIMEN NUMBER: 83-9715
ALLOY TYPE: 2.24-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.2 K
SPECIMEN THICKNESS: 1.61 MM (.0640 IN)
MAXIMUM STRESS: 119.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4569 CYCLES
K(MAX) [illegible] CYCLES PRIOR TO FAILURE: 49.43 MPA SQRT(M) (45.02 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.44	.141	1				
4.44	.173	841	.4111E-03	.3666E-04	19.37	17.35
4.55	.417	1449	.1451E-02	.6104E-04	19.38	18.15
11.13	.438	1937	.1661E-02	.6103E-04	20.77	18.40
11.72	.461	2165	.2577E-02	.1.54E-03	21.47	19.49
12.44	.491	2470	.1174E-02	.1212E-03	22.26	20.27
12.48	.537	2651	.1666E-02	.6556E-04	22.62	20.56
13.34	.525	2844	.2913E-02	.9891E-04	22.96	20.92
13.64	.537	3015	.1714E-02	.6754E-04	23.32	21.22
14.32	.564	3213	.2359E-02	.9284E-04	23.74	21.61
14.42	.568	3251	.1931E-02	.7603E-04	24.24	22.06
14.63	.607	3778	.2781E-02	.1.35E-03	24.71	22.49
15.24	.630	3413	.4444E-02	.1749E-03	25.23	22.96
15.47	.648	4034	.2307E-02	.9081E-04	25.66	23.35
16.95	.667	4218	.3465E-02	.1364E-03	26.02	23.68
17.56	.691	4375	.4443E-02	.1748E-03	26.46	24.08
17.91	.705	4539	.2106E-02	.8293E-04	26.84	24.42
18.54	.730	4663	.5238E-02	.2053E-03	27.22	24.77
19.13	.753	4850	.3115E-02	.1226E-03	27.69	25.19
20.10	.791	5045	.5012E-02	.1969E-03	28.28	25.74
21.79	.858	5371	.5364E-02	.1994E-03	29.25	26.62
22.75	.896	5532	.4327E-02	.1703E-03	30.22	27.50
24.28	.956	5877	.5561E-02	.2185E-03	31.11	28.31
25.13	.989	6041	.6412E-02	.2524E-03	32.01	29.13

D1-61 (CON'T.)

	26.88	1.853	6241	.6662E-02	.2619E-03	32.83	29.88
	27.82	1.896	6374	.7415E-02	.2919E-03	33.67	30.64
	28.86	1.944	6525	.8322E-02	.3276E-03	34.63	31.51
	29.84	1.992	6714	.9078E-02	.3574E-03	35.52	32.32
	30.41	1.915	7026	.9263E-02	.3628E-03	36.77	33.46
	35.32	1.791	7294	.7038E-02	.2773E-03	38.29	34.85
	36.84	1.442	7441	.9213E-02	.3626E-03	39.31	35.78
	38.44	1.917	7611	.1123E-01	.4422E-03	40.29	36.67
	39.69	1.562	7893	.1278E-01	.5031E-03	41.24	37.53
	41.71	1.642	7855	.1297E-01	.5106E-03	42.26	38.46
	43.07	1.696	7931	.1745E-01	.7026E-03	43.31	39.41
	45.47	1.790	8066	.1778E-01	.7300E-03	44.47	40.47
	46.74	1.840	8134	.1879E-01	.7397E-03	45.62	41.51
	48.84	1.923	8234	.2825E-01	.1112E-02	46.66	42.47
	50.26	1.979	8253	.3169E-01	.1248E-02	47.76	43.47
F	51.69	2.035	8235	.3391E-01	.1336E-02	48.66	44.28
F	54.23	2.135	8345	.5083E-01	.2003E-02	49.92	45.43
F	56.39	2.220	8365	.5197E-01	.2175E-02	51.42	46.79
F	58.67	2.310	8415	.7625E-01	.3030E-02	52.86	48.10
F	61.47	2.420	8445	.9313E-01	.3667E-02	54.53	49.63
F	62.76	2.471	8470	.9144E-01	.3600E-02	56.24	51.18
F	69.15	2.565	8445	.9313E-01	.3667E-02	57.53	52.33
F	69.63	2.740	8501	.2963E+00	.1167E-01	59.55	54.19
F	74.23	2.925	8515	.3133E+00	.1233E-01	62.89	57.23
F	76.96	3.033	8525	.2667E+00	.1050E-01	65.73	59.81
F	79.63	3.139	8531	.5334E+00	.2100E-01	67.87	61.77
F	82.56	3.250	8534	.7323E+00	.2875E-01	70.22	63.90
F	84.46	3.325	8537	.6353E+00	.2500E-01	72.34	65.83
F	86.74	3.415	8541	.7623E+00	.3000E-01	74.25	67.57
F	89.51	3.786	8543	.2921E+01	.1150E+00	79.67	72.50

TABLE D1-62

SPECIMEN NUMBER	U63-418
ALLOY TYPE	2024-T861
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	LAB AIR
TEST TEMPERATURE	478.0 K
SPECIMEN THICKNESS	1.66 MM (.0655 IN)
MAXIMUM STRESS	118.6 MPA (17.2 KSI)
R-RATIO	.15
FREQUENCY	200 CPM
CYCLES TO FAILURE	7267 CYCLES

K(MAX) 60 CYCLES PRIOR TO FAILURE: 57.11 MPA SQRT(M) (51.97 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	7.47	.294	1				
	10.03	.395	1016	.2530E-02	.9961E-04	18.71	17.03
	10.79	.425	1534	.1459E-02	.5743E-04	20.43	18.59
	11.60	.457	1965	.1889E-02	.7436E-04	21.20	19.29
	12.41	.489	2340	.2161E-02	.8507E-04	21.96	19.99
	13.43	.529	2729	.2616E-02	.1031E-03	22.80	20.75
	14.62	.572	3079	.3117E-02	.1227E-03	23.73	21.60
	15.52	.611	3453	.2673E-02	.1055E-03	24.62	22.41
	16.30	.642	3863	.3701E-02	.1457E-03	25.36	23.08
	17.13	.674	3910	.3352E-02	.1320E-03	26.01	23.67
	17.95	.707	4096	.4431E-02	.1745E-03	26.67	24.27
	18.88	.743	4245	.6248E-02	.2460E-03	27.35	24.89
	19.70	.776	4458	.3846E-02	.1514E-03	28.02	25.50
	21.91	.863	4853	.5637E-02	.2219E-03	29.15	26.53
	23.13	.911	5052	.6042E-02	.2379E-03	30.39	27.66
	24.99	.984	5366	.5901E-02	.2323E-03	31.47	28.64
	26.20	1.031	5491	.9682E-02	.3812E-03	32.53	29.60
	28.15	1.108	5724	.8394E-02	.3305E-03	33.60	30.58
	29.48	1.161	5853	.1029E-01	.4050E-03	34.69	31.57
	31.59	1.244	6055	.1046E-01	.4116E-03	35.82	32.60
	33.05	1.301	6185	.1119E-01	.4404E-03	36.97	33.64
	35.14	1.384	6344	.1314E-01	.5189E-03	38.10	34.67
	36.54	1.438	6443	.1451E-01	.5714E-03	39.20	35.68
	38.52	1.516	6567	.1562E-01	.6150E-03	40.26	36.64
	40.17	1.581	6640	.2256E-01	.8884E-03	41.39	37.67
	41.89	1.649	6747	.1615E-01	.6360E-03	42.44	38.62
	43.00	1.693	6791	.2502E-01	.9852E-03	43.32	39.42
F	46.61	1.835	6917	.2868E-01	.1129E-02	44.74	40.75
F	48.26	1.900	6967	.3302E-01	.1300E-02	46.42	42.24
F	49.40	1.945	7017	.2286E-01	.9000E-03	47.29	43.03
F	50.70	2.075	7067	.6604E-01	.2600E-02	48.68	44.30
F	54.36	2.140	7117	.3302E-01	.1300E-02	50.25	45.73
F	56.13	2.210	7167	.3556E-01	.1400E-02	51.35	46.73
F	59.69	2.350	7287	.8890E-01	.3500E-02	53.08	48.30

(a) Longitudinal

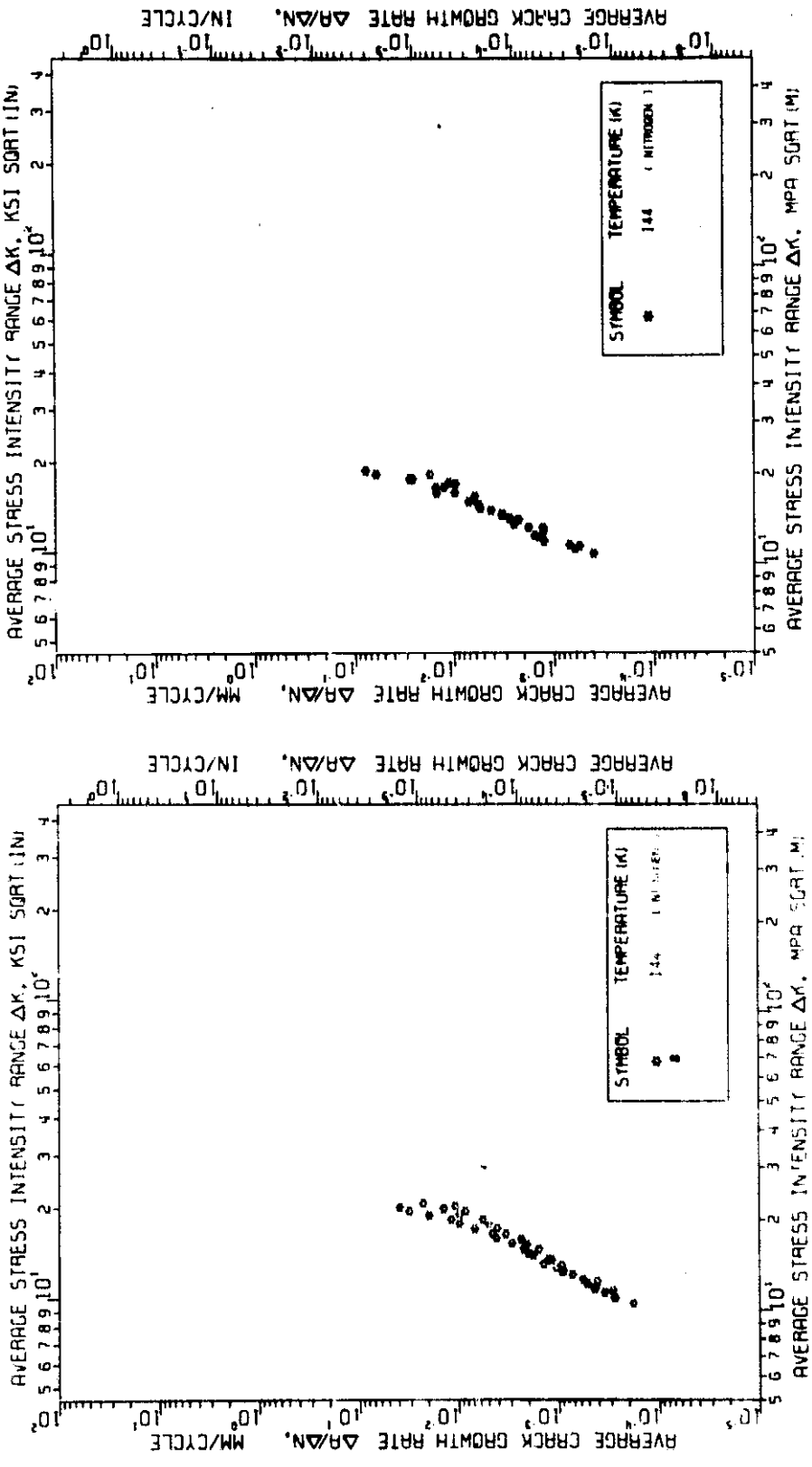
(b) Transverse

Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 1.60 mm (.063 inch) **Constraint:** Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-1

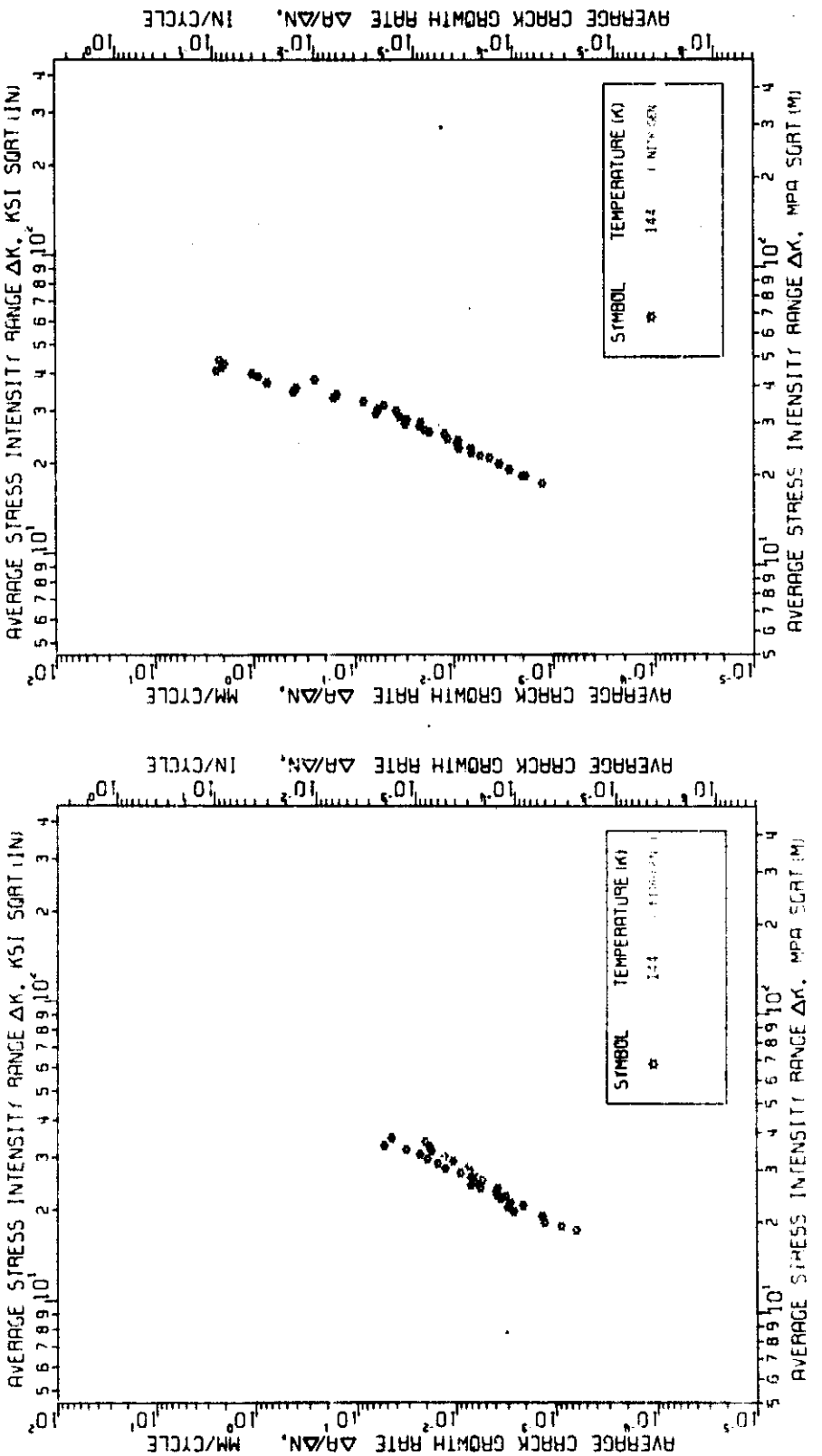


Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-2



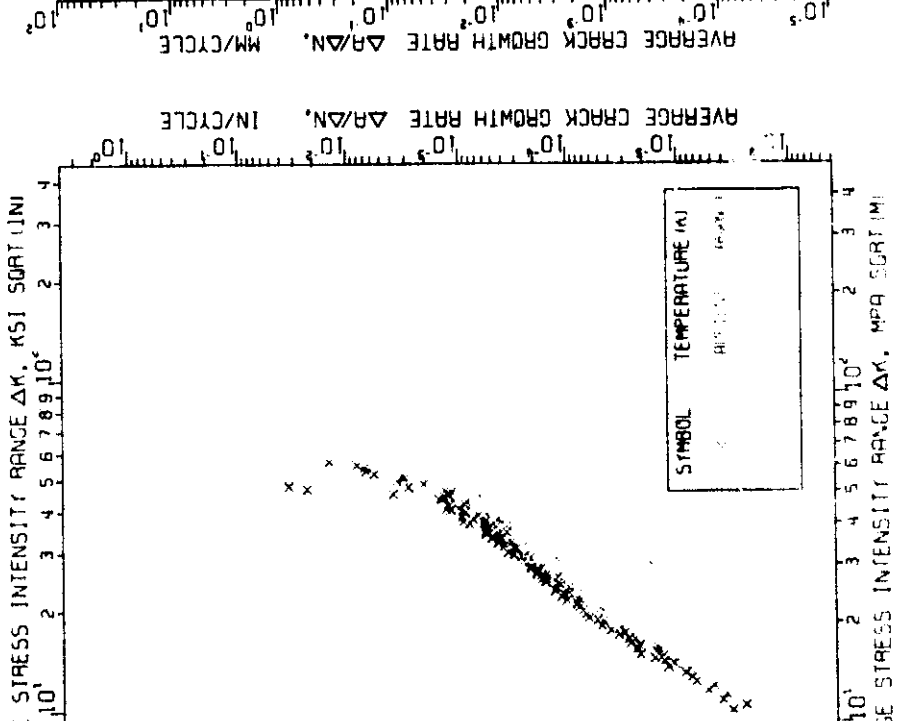
Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Unstiffened

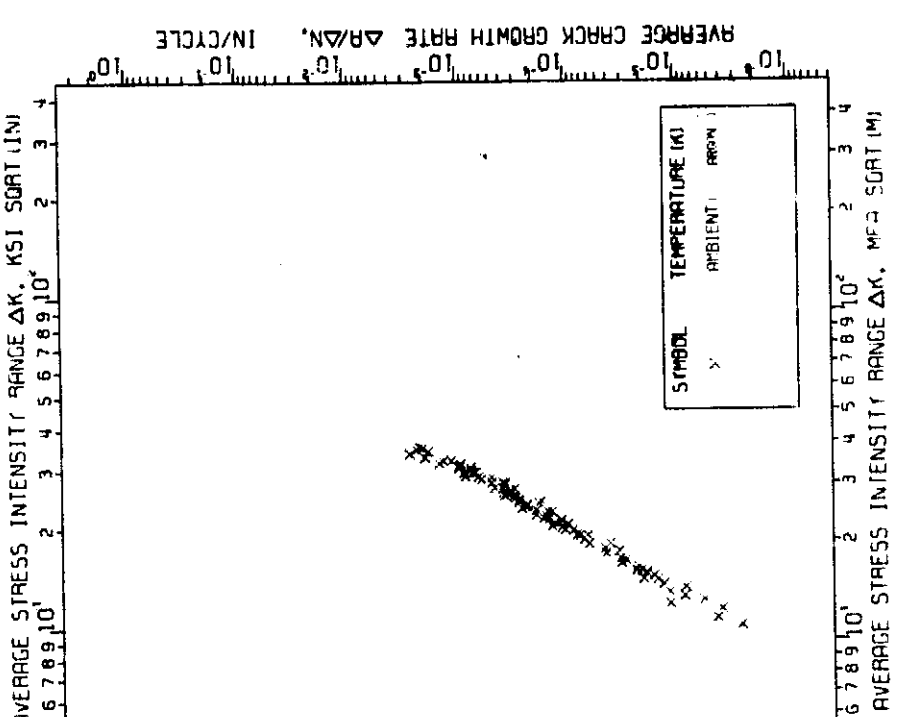
AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-3

(a) Longitudinal



(b) Transverse

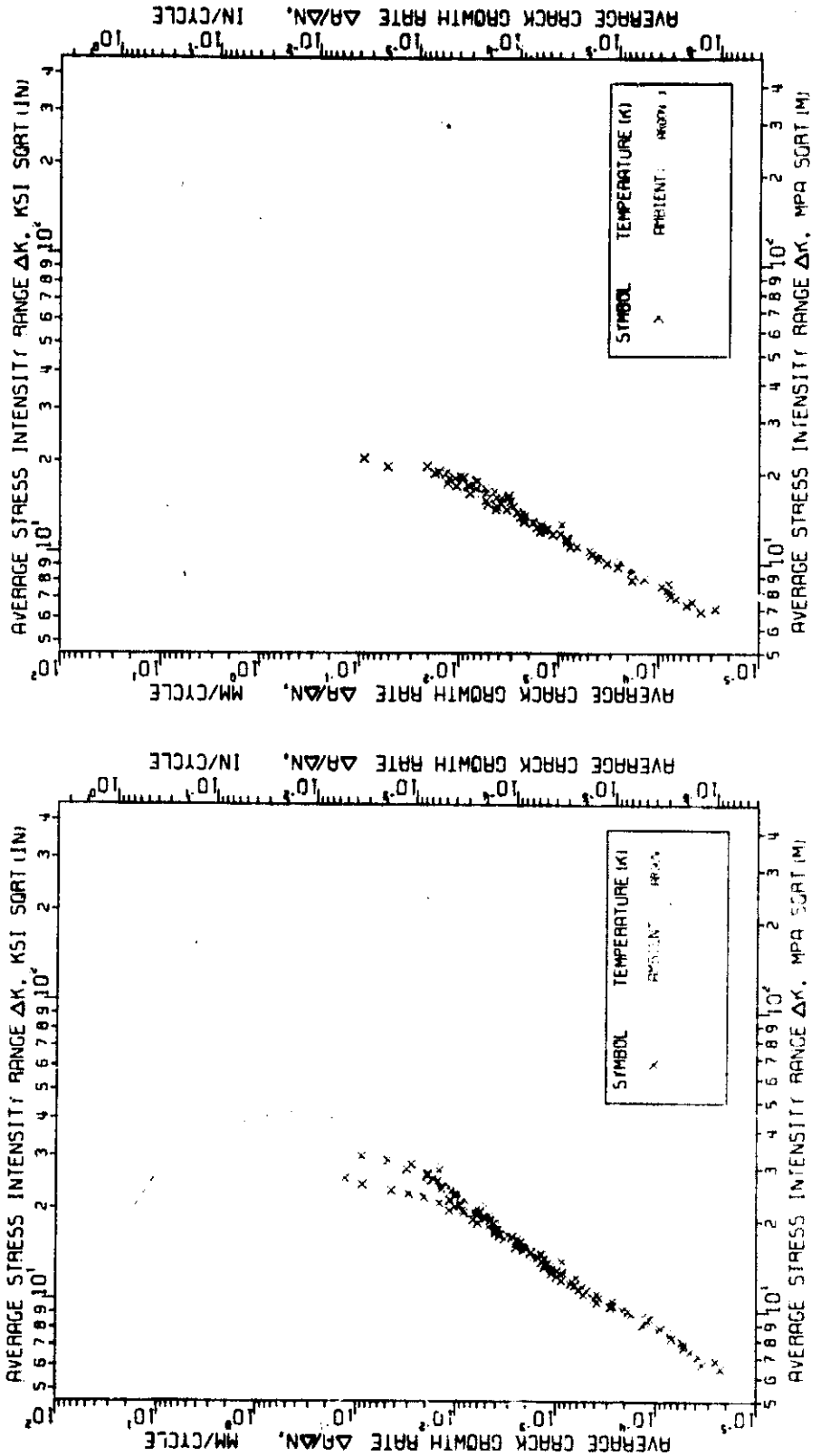


Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 1.60 mm (.063 inch) **Constraint:** Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-4

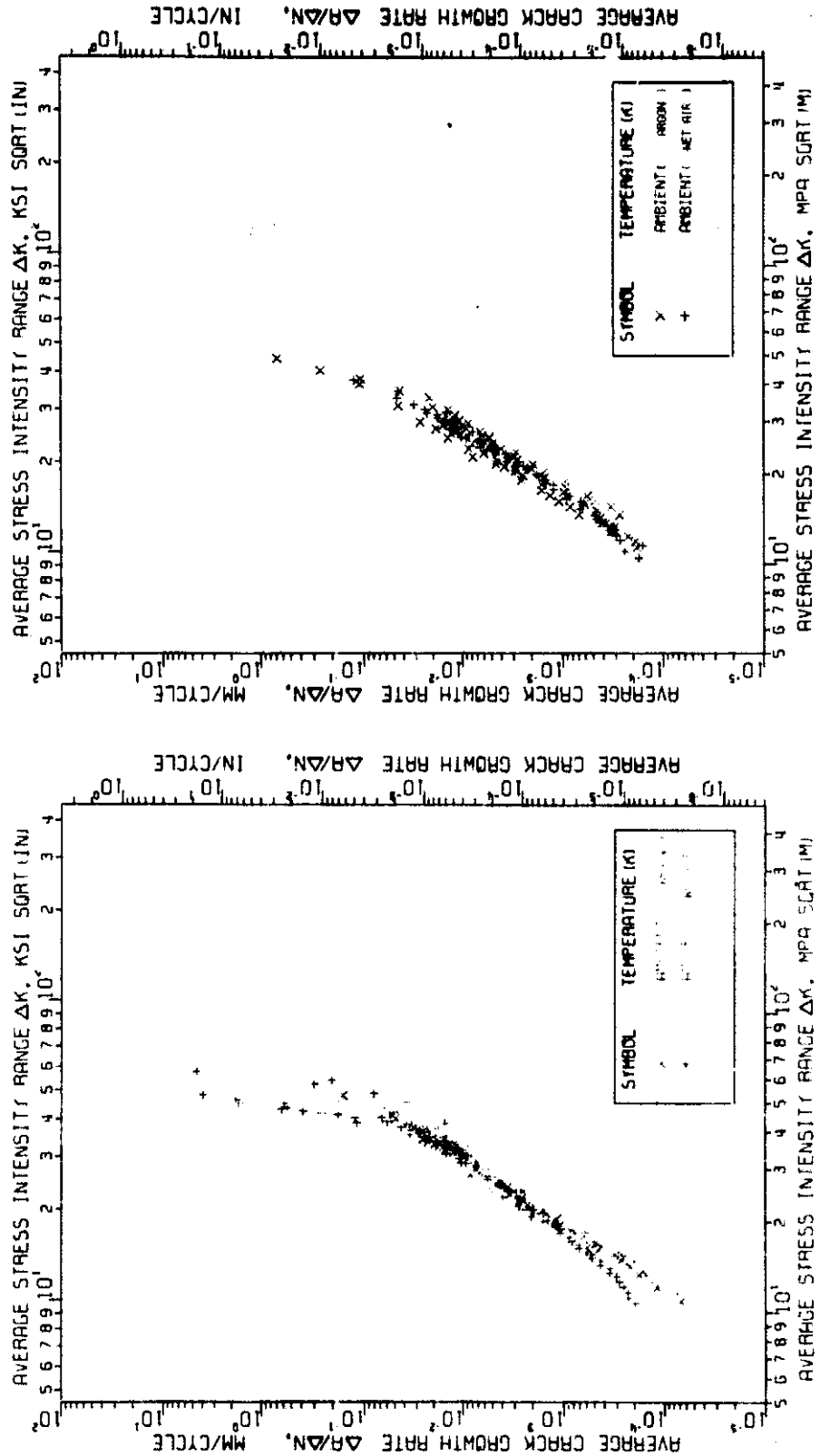


Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-5

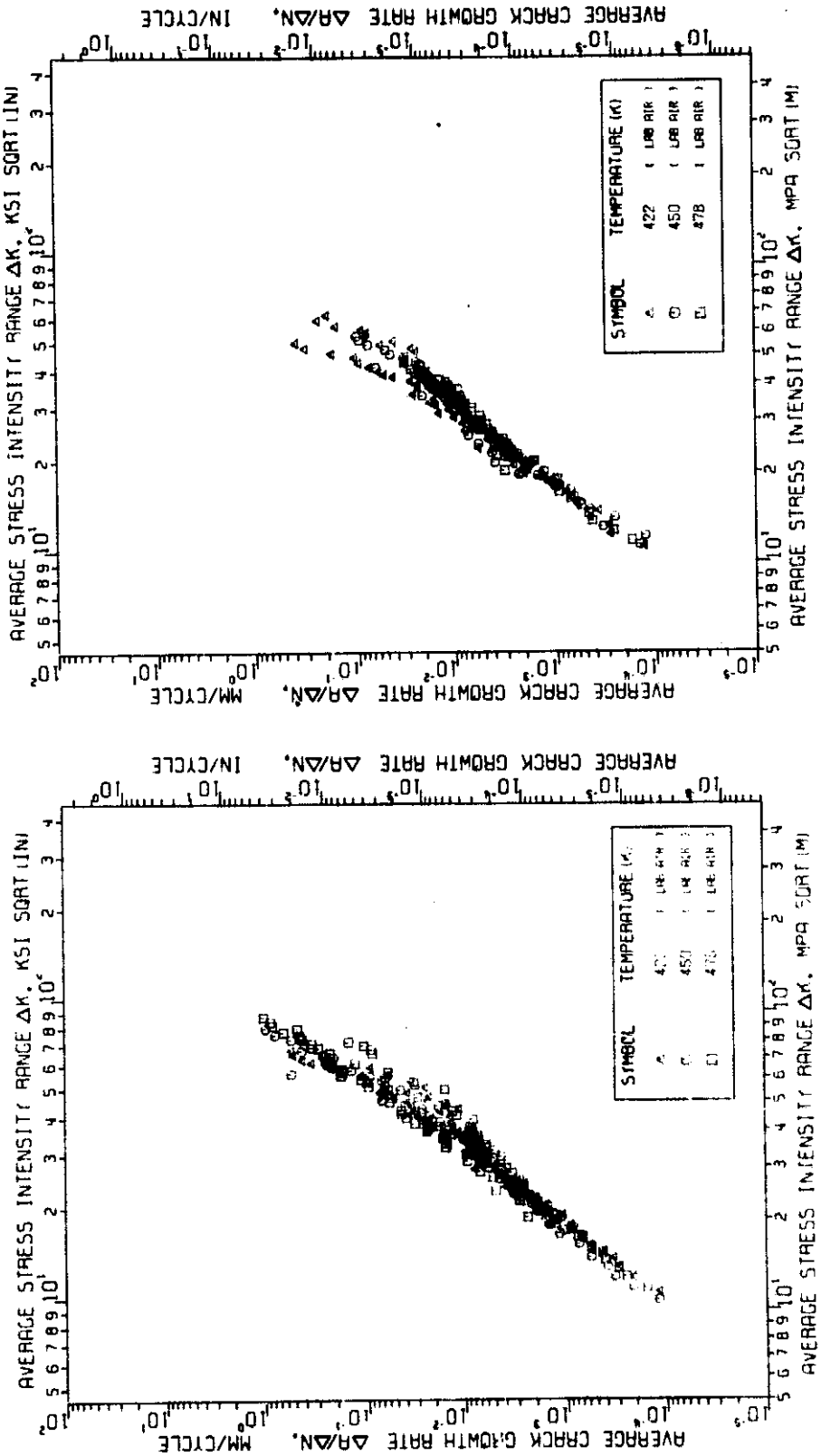


Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-6

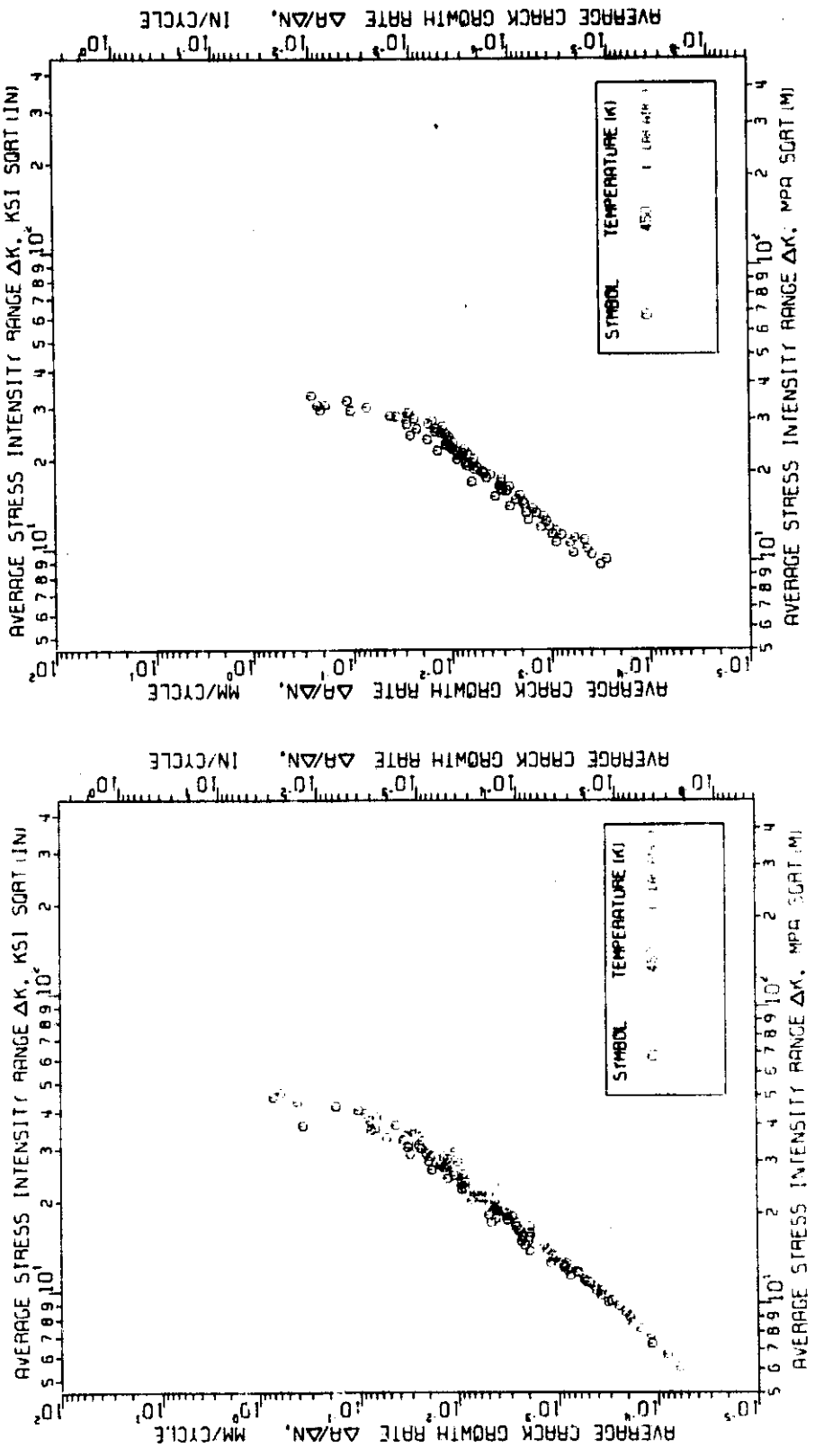


Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-7

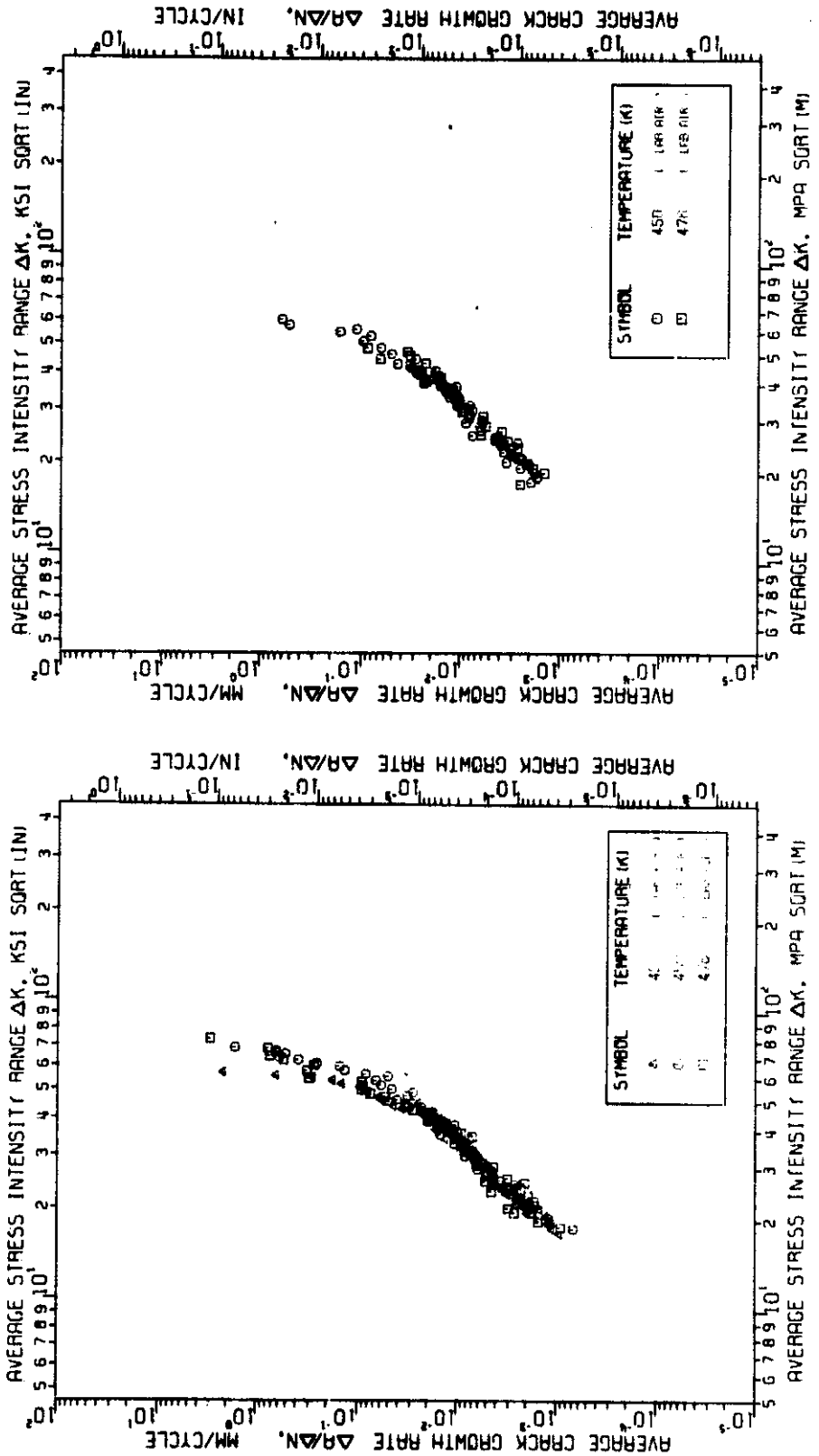


Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-8



Alloy: 2024-T861 Stress Ratio: .05 Frequency: 20G cpm

Thickness: 1.60 mm (.063 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-9

Transverse

Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 1.60 mm (.063 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D1-

SECTION D2 - - FLAW GROWTH RATE DATA

FOR 3.18 mm (.125 INCH) THICK 2024-T861

TABLE D2-1. SUMMARY OF SPECIMEN TEST CONDITIONS FOR 200 CPM TESTS OF 3.18 mm (.125 INCH) THICK 2024-T861

Test Temperature (°K)	Stress Ratio	Constraint	Test Direction	Specimen I.D.	Data Table No.	Figure No.
144 (N_2)	.05	Stiffened	L	125-2L2	D2-2	D2-1(a)
				125-1L2	D2-3	D2-1(a)
			T	125-4T2	D2-4	D2-1(b)
				125-6T9	D2-5	D2-1(b)
	.50	Stiffened	L	125-2L3	D2-6	D2-2(a)
				125-1L9	D2-7	D2-2(a)
			T	125-5T1	D2-8	D2-2(b)
				125-7T5	D2-9	D2-2(b)
	.05	Unstiffened	L	125-2L13	D2-10	D2-3(a)
				125-2L1	D2-11	D2-3(a)
			T	125-5T2	D2-12	D2-3(b)
				125-4T8	D2-13	D2-3(b)
298 (Argon)	.05	Stiffened	L	125-2L6	D2-14	D2-4(a)
				125-1L3	D2-15	D2-4(a)
				125-3L3	D2-16	D2-4(a)
			T	125-4T9	D2-17	D2-4(b)
				125-5T12	D2-18	D2-4(b)
				125-3T6	D2-19	D2-4(b)
				125-5T11	D2-20	D2-4(b)
	.50	Stiffened	L	125-1L8	D2-21	D2-5(a)
				125-1L12	D2-22	D2-5(a)
				125-2L14	D2-23	D2-5(a)
			T	125-3T10	D2-24	D2-5(b)
				125-4T11	D2-25	D2-5(b)
				125-5T3	D2-26	D2-5(b)
	.05	Unstiffened	L	U125-2L7	D2-27	D2-6(a)
				U125-1L13	D2-28	D2-6(a)
				U125-4L2	D2-29	D2-6(a)
			T	U125-6T5	D2-30	D2-6(b)
				U125-3T2	D2-31	D2-6(b)

TABLE D2-1. (CONTINUED)

Test Temperature (°K)	Stress Ratio	Constraint	Test Direction	Specimen I.D.	Data Table No.	Figure No.
298 (Wet Air)	.05	Unstiffened	L	U125-1L10	D2-32	D2-6(a)
				U125-2L10	D2-33	D2-6(a)
				U125-5L1	D2-34	D2-6(a)
			T	U125-5T4	D2-35	D2-6(b)
				U125-6T6	D2-36	D2-6(b)
				U125-1T1	D2-37	D2-6(b)
422	.05	Stiffened	L	125-1L6	D2-38	D2-7(a)
				125-6L1	D2-39	D2-7(a)
			T	125-3T3	D2-40	D2-7(b)
				125-4T3	D2-41	D2-7(b)
	.05	Unstiffened	L	U125-1L11	D2-42	D2-9(a)
				U125-4T7	D2-43	D2-9(b)
450	.05	Stiffened	L	125-1L14	D2-44	D2-7(a)
				125-6L6	D2-45	D2-7(a)
			T	125-3T8	D2-46	D2-7(b)
				125-4T10	D2-47	D2-7(b)
	.50	Stiffened	L	125-2L9	D2-48	D2-8(a)
				125-1L7	D2-49	D2-8(a)
			T	125-6T3	D2-50	D2-8(b)
				125-3T7	D2-51	D2-8(b)
	.05	Unstiffened	L	U125-6L2	D2-52	D2-9(a)
				U125-2L8	D2-53	D2-9(a)
			T	125-5T5	D2-54	D2-9(b)
				U125-2T2	D2-55	D2-9(b)
478	.05	Stiffened	L	125-1L4	D2-56	D2-7(a)
				125-1L5	D2-57	D2-7(a)
			T	125-5T7	D2-58	D2-7(b)
				125-5T9	D2-59	D2-7(b)
	.05	Unstiffened	L	U125-1L15	D2-60	D2-9(a)
			T	U125-5T10	D2-61	D2-9(b)

TABLE D2-2

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

125-1L2
2124-T861
LONGITUDINAL
STIFFENED
NITROGEN
294.4 K
3.25 MM (.1280 IN)
118.6 MPA (17.2 KSI)
.05
250 CPM
3401 CYCLES

K(MAX) 131 CYCLES PRIOR TO FAILURE: 37.68 MPA SQRT(M) (34.29 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
8.77	.345	1	.1353E-02	.4147E-04	19.18	17.46
9.59	.378	741	.1539E-02	.6044E-04	19.96	18.17
10.29	.405	1231	.2846E-02	.8063E-04	20.77	18.91
11.22	.442	1688	.2161E-02	.8538E-04	21.62	19.68
12.04	.474	2076	.3338E-02	.1314E-03	22.46	20.44
13.03	.513	2366	.4727E-02	.1861E-03	23.39	21.29
14.12	.556	2594	.5208E-02	.2050E-03	24.72	22.48
16.14	.635	2994	.1335E-01	.4176E-03	26.11	23.76
17.51	.689	3116	.6984E-02	.3491E-03	27.38	24.62
18.54	.730	3233	.1122E-01	.4418E-03	28.39	25.56
20.19	.795	3393	.1643E-01	.6467E-03	29.25	26.62
21.67	.853	3472	.2106E-01	.8035E-03	30.65	27.99
24.19	.948	3580	.2563E-01	.1009E-02	32.05	29.17
25.67	1.010	3642	.3372E-01	.1213E-02	33.93	30.86
26.96	1.061	3684	.3523E-01	.1386E-02	34.96	30.99
28.72	1.131	3734	.6791E-01	.2673E-02	35.22	32.05
3..48	1.200	3767				

TABLE D2-3

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

125-1L2
2124-T861
LONGITUDINAL
STIFFENED
NITROGEN
294.4 K
3.25 MM (.1280 IN)
165.5 MPA (24.5 KSI)
.05
230 CPM
2882 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 56.72 MPA SQRT(M) (51.62 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	3.96	.156	1	.6371E-01	.2508E-02	18.44	16.79
	4.47	.176	814	.1144E-02	.4503E-04	21.73	19.23
	5.44	.214	1647	.2528E-02	.9.35E-03	21.52	19.67
	6.09	.240	1932	.3786E-02	.1490E-03	22.99	20.92
	6.96	.274	2134	.6182E-02	.2434E-03	24.57	22.36
	7.93	.312	2333	.6982E-02	.2750E-03	25.96	23.63
	8.67	.341	2484	.1234E-01	.4872E-03	27.43	24.96
	9.83	.387	2634	.1174E-01	.4621E-03	28.77	26.19
	10.52	.414	2712	.1533E-01	.6051E-03	29.61	26.95
	11.22	.434	2765	.2779E-01	.1094E-02	31.67	27.87
	12.03	.472	2843	.1383E-01	.5327E-03	31.74	28.89
F	12.70	.500	2713	.6351E-01	.2501E-02	33.41	30.40
F	14.61	.575	2767	.2117E-01	.8333E-03	34.36	31.82
F	15.24	.600	2782	.3325E-01	.3791E-02	36.64	33.18
F	17.14	.675	2812	.6351E-01	.2501E-02	39.28	34.92
F	18.41	.725	2832	.1101E+00	.4333E-02	39.86	36.28
F	20.07	.791	2847	.1143E+00	.4501E-02	41.34	37.63
F	21.21	.835	2847	.1778E+00	.7001E-02	42.99	39.11
F	22.93	.903	2847	.2540E+00	.1000E-01	44.41	40.41
F	24.26	.955	2872	.6351E+00	.2500E-01	45.64	41.56
F	25.53	1.005	2874	.9525E+00	.3750E-01	47.21	42.96
F	27.43	1.080	2876	.6985E+00	.2750E-01	48.78	44.39
F	28.43	1.119	2878	.1143E+01	.4501E-01	49.97	45.48
F	29.97	1.180	2879	.1651E+01	.6501E-01	51.27	46.66
F	31.52	1.241	2881	.2332E+01	.9181E-01	52.98	48.20
F	33.05	1.301	2881				

TABLE D2-4

SPECIMEN NUMBER: 125-6T9
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: T-L
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 139.9 K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
MAXIMUM STRESS: 110.6 MPA (16.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1541 CYCLES
K(MAX) 53 CYCLES PRIOR TO FAILURE: 29.96 MPA SQRT(M) (27.21 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
8.69	.342	0	.2396E-02	.9433E-04	19.16	17.43
9.64	.380	456	.3169E-02	.1247E-03	20.12	18.31
10.56	.416	745	.5320E-02	.1976E-03	20.99	19.11
11.41	.449	915	.4065E-02	.1916E-03	21.85	19.89
12.36	.487	1111	.5282E-02	.3280E-03	22.74	27.72
13.40	.528	1276	.1626E-01	.9613E-03	23.61	21.49
14.78	.582	1298	.1476E-01	.8709E-03	24.60	22.39
15.71	.618	1395	.3863E-01	.1142E-02	25.50	23.21
16.46	.648	1626	.4322E-01	.1701E-02	26.41	24.14
17.97	.708	1669	.5161E-01	.2058E-02	27.71	25.22
19.41	.764	1691				

TABLE D2-5

SPECIMEN NUMBER: 125-6T9
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: T-L
CONSTRAINT: STIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 139.9 K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
MAXIMUM STRESS: 164.1 MPA (23.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1497 CYCLES
K(MAX) 45 CYCLES PRIOR TO FAILURE: 33.62 MPA SQRT(M) (27.32 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
4.27	.168	0	.1473E-02	.5821E-04	18.98	17.28
5.08	.200	549	.4489E-02	.1767E-03	21.94	19.96
6.18	.243	734	.4547E-02	.3522E-03	22.71	20.66
7.18	.283	976	.1669E-01	.8564E-03	24.44	22.24
8.79	.346	972	.2747E-01	.1.481E-02	26.19	23.84
9.47	.373	1115	.2904E-01	.11044-02	27.42	25.30
11.43	.413	1152				

TABLE D2-6

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:
KIMAX) 143 CYCLES PRIOR TO FAILURE:

LONGITUDINAL
STIFFENED
NITROGEN
144.8 K
3.26 MM (.1285 IN)
115.5 MPA (17.2 KSI)
.5
20 CPM
11743 CYCLES
46.03 MPA SQRT(M)(41.89 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
11.29	.436	0				
11.91	.469	1252	.7186E-03	.2778E-04	11.25	10.24
12.49	.491	2643	.4431E-03	.1902E-04	11.63	10.59
13.29	.523	3452	.9657E-03	.3800E-04	11.99	10.91
14.45	.569	4656	.8977E-03	.3868E-04	12.45	11.33
14.91	.587	5178	.8734E-03	.3439E-04	12.41	11.66
15.71	.618	5791	.1297E-02	.5106E-04	13.09	11.91
16.72	.658	6344	.1721E-02	.6785E-04	13.49	12.27
18.23	.718	7263	.1445E-02	.5848E-04	13.98	12.72
19.04	.749	8159	.2274E-02	.8978E-04	14.61	13.38
21.03	.828	8836	.2165E-02	.8526E-04	15.30	13.93
22.97	.904	9613	.2507E-02	.9870E-04	15.90	14.47
24.40	.961	9737	.4479E-02	.1762E-03	16.44	14.96
24.18	1.131	10034	.4496E-02	.1965E-03	17.07	15.49
27.74	1.192	10417	.4491E-02	.1927E-03	17.62	16.03
29.21	1.156	10719	.7124E-02	.2805E-03	18.19	16.52
31.12	1.217	10837	.7721E-02	.3041E-03	18.78	17.02
32.32	1.241	11046	.7681E-02	.3024E-03	19.24	17.54
34.11	1.343	11178	.1122E-01	.4418E-03	19.98	18.02
35.71	1.416	11291	.1434E-01	.5648E-03	20.49	18.58
36.41	1.451	11431	.9954E-02	.3919E-03	20.48	18.93
38.38	1.511	11488	.2524E-01	.9938E-03	21.40	19.48
41.39	1.631	11551	.3225E-01	.1270E-02	22.13	20.14
42.14	1.646	11597	.4675E-01	.1843E-02	22.74	20.69

TABLE D2-7

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:
K(MAX) 1 CYCLE PRIOR TO FAILURE:

LONGITUDINAL
STIFFENED
NITROGEN
144.8 K
3.26 MM (.1283 IN)
164.8 MPA (24.0 KSI)
.5
20 CPM
4586 CYCLES
55.49 MPA SQRT(M)(50.45 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.15	.125	0				
	7.33	.291	1933	.2133E-02	.8393E-04	12.48	9.91
	9.23	.364	2473	.1795E-02	.6922 E-04	13.26	12.18
	9.34	.369	2817	.2240E-02	.8821E-04	14.38	12.42
	11.42	.451	3313	.3346E-02	.1317E-03	14.34	13.66
	11.94	.468	3632	.4192E-02	.1651E-03	15.74	14.38
	12.49	.491	3774	.4711E-02	.1854E-03	16.51	15.03
	13.59	.533	3946	.5471E-02	.2154E-03	17.15	15.61
	14.17	.558	4077	.6533E-02	.2571E-03	17.78	16.19
	15.44	.608	4213	.8147E-02	.3159E-03	18.39	16.74
	16.47	.648	4295	.1213E-01	.4775E-03	19.35	17.73
	17.34	.683	4357	.1413E-01	.5571E-03	19.63	17.96
	17.31	.769	4436	.1443E-01	.5679E-03	20.39	18.25
	19.13	.753	4463	.2665E-01	.1049E-02	21.47	19.72
F	23.13	.795	4494	.2244E-01	.8.44E-03	21.29	19.32
F	21.21	.835	4519	.4086E-01	.1608E-02	21.81	19.84
F	22.61	.891	4539	.6935E-01	.2751E-02	22.46	20.44
F	23.62	.931	4556	.5974E-01	.2351E-02	23.11	21.03
F	24.39	.961	4564	.9325E-01	.3751E-02	23.58	21.46
F	25.91	1.020	4573	.1691E+00	.6667E-02	24.17	22.10
F	27.18	1.070	4577	.3174E+00	.1251E-01	24.88	22.65
F	29.46	1.160	4583	.7621E+00	.3.3.E-01	25.74	23.46
F	31.62	1.245	4582	.1181E+01	.4654E-01	26.47	24.45
F	32.77	1.290	4583	.1143E+01	.4502E-01	27.07	25.14

TABLE D2-8

SPECIMEN NUMBER: 125-ST1
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
CAN ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 149.0 K
SPECIMEN THICKNESS: 3.24 MM (.1275 IN)
PARTIUM STRESS: 118.4 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4514 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 41.17 MPA SQRT(M) (37.46 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	10.90	.417	0				
	11.16	.447	1334	.6479E-03	.2197E-04	11.35	10.15
	12.49	.492	2124	.1481E-02	.5831E-04	11.92	10.68
	13.03	.512	2412	.2018E-02	.7913E-04	11.92	10.65
	13.34	.523	2597	.1586E-02	.6243E-04	12.11	11.02
	14.05	.543	2817	.3127E-02	.1231E-03	12.39	11.24
	14.44	.344	3075	.3348E-02	.1317E-03	12.70	11.56
	15.49	.616	3234	.3663E-02	.1441E-03	13.16	11.98
	16.41	.646	3419	.3433E-02	.1350E-03	13.43	12.19
	16.38	.649	3621	.5578E-02	.2195E-03	13.68	12.45
	17.71	.697	3750	.5491E-02	.2162E-03	13.98	12.73
	18.43	.725	3841	.5594E-02	.2204E-03	14.25	12.97
	19.17	.755	3949	.6479E-02	.2549E-03	14.55	13.24
	21.25	.797	4194	.1179E-01	.4652E-03	14.91	13.57
	22.29	.877	4271	.9835E-02	.3872E-03	15.62	14.12
	23.16	.939	4374	.2131E-01	.8365E-03	16.20	14.74
	25.75	1.014	4419	.3199E-01	.1217E-02	16.94	15.32
	27.47	1.082	4471	.6924E-01	.1939E-02	17.49	15.91
F	29.72	1.17.	4494	.1322E+01	.5203E-02	18.14	16.55
F	31.46	1.219	4534	.1143E+01	.4500E-02	18.77	17.08
F	31.98	1.25	4575	.1316E+01	.4633E-02	19.14	17.41
F	32.89	1.295	4614	.1693E+01	.6667E-02	19.49	17.73
F	34.42	1.35.	4618	.9525E+01	.3751E-01	19.97	18.17
F	35.09	1.38	4619	.A419E+01	.3501E-01	20.44	18.60

TABLE D2-9

SPECIMEN NUMBER: 125-ST5
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
CAN ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 149.0 K
SPECIMEN THICKNESS: 3.25 MM (.1280 IN)
PARTIUM STRESS: 174.0 MPA (25.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1785 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 43.17 MPA SQRT(M) (37.21 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	5.31	.217	0				
	5.41	.232	342	.2353E-02	.9264E-04	11.29	10.27
	7.13	.281	587	.3500E-02	.1378E-03	12.33	10.95
	8.71	.316	828	.3753E-02	.1477E-03	12.73	11.59
	9.71	.3.3	998	.9588E-02	.3814E-03	13.79	12.16
	9.17	.349	998	.6551E-02	.2579E-03	13.92	12.67
	10.17	.337	1071	.9834E-02	.3973E-03	14.44	13.14
	11.79	.443	1159	.1326E-01	.5219E-03	15.13	13.77
	12.44	.440	1239	.2383E-01	.9380E-03	15.96	14.52
F	13.21	.520	1253	.1747E-01	.6452E-03	16.61	15.12
F	14.79	.590	1266	.1116E+01	.4008E-02	17.35	15.78
F	16.13	.635	1279	.1397E+01	.5588E-02	17.28	16.62
F	18.16	.715	1284	.1397E+01	.1333E-01	19.24	17.54
F	19.43	.765	1291	.6359E+00	.2588E-01	20.22	18.42
F	21.71	.835	1297	.1774E+01	.7086E-01	21.84	19.16

TABLE D2-10

SPECIMEN NUMBER: U125-2L1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144° K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
MAXIMUM STRESS: 110.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3262 CYCLES
K(MAX) 148 CYCLES PRIOR TO FAILURE: 33.36 MPA SQRT(M) 30.34 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
9.45	.368		.1487E-02	.5736E-04	19.20	17.48
9.66	.376	691	.1332E-02	.4061E-04	19.74	17.96
9.96	.389	799	.2133E-02	.8397E-04	20.24	18.42
10.35	.415	1111	.1894E-02	.7455E-04	20.93	19.05
11.29	.444	1511	.2969E-02	.2169E-03	21.60	19.65
11.93	.470	1726	.2849E-02	.1121E-03	22.16	20.17
12.50	.492	1914	.4364E-02	.1721E-03	22.71	20.67
13.14	.517	2066	.4725E-02	.1860E-03	23.25	21.16
13.70	.539	2184	.4423E-02	.1742E-03	23.72	21.59
14.22	.560	2332	.5586E-02	.2199E-03	24.29	22.10
15.02	.591	2445	.7572E-02	.2981E-03	24.88	22.64
15.63	.615	2525	.9914E-02	.3746E-03	25.35	23.07
16.17	.637	2582	.9569E-02	.3767E-03	25.91	23.58
16.99	.669	2668	.9616E-02	.3786E-03	26.43	24.05
17.48	.688	2717	.1432E-01	.5638E-03	26.86	24.46
18.14	.714	2764	.1128E-01	.4441E-03	27.39	24.93
18.80	.740	2823	.1664E-01	.6549E-03	28.22	25.69
20.31	.800	2914	.2299E-01	.9053E-03	29.35	26.71
21.83	.860	2980	.2651E-01	.1044E-02	30.35	27.62
23.88	.940	3027	.2868E-01	.1129E-02	31.28	28.44
24.48	.964	3074				

TABLE D2-11

SPECIMEN NUMBER: U125-2L1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144° K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
MAXIMUM STRESS: 144.8 MPA (24.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2109 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 47.46 MPA SQRT(M) 42.29 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
4.71	.185		.1281E-02	.5043E-04	19.44	17.69
5.11	.201	731	.1779E-02	.6791E-04	21.14	19.24
5.77	.227	1169	.2780E-02	.1094E-03	22.62	20.59
6.73	.264	1457	.4379E-02	.1724E-03	23.96	21.82
7.71	.304	1656	.6300E-02	.2362E-03	24.68	22.46
7.42	.317	1754	.8135E-02	.3242E-03	25.50	23.20
8.17	.328	1824	.6774E-02	.3417E-03	26.37	24.00
8.79	.346	1942	.1317E-01	.5170E-03	27.20	24.75
9.41	.37	1999	.1639E-01	.6436E-03	28.73	25.69
10.18	.401	1974	.1958E-01	.7715E-03	29.39	26.74
11.13	.438	1922	.2356E-01	.8693E-03	30.36	27.63
11.79	.464	1949	.2744E-01	.1093E-02	31.75	28.44
12.57	.494	1977	.3321E-01	.1308E-02	32.49	29.49
13.39	.526	2007	.3394E-01	.1336E-02	33.50	30.49
14.11	.555	2029	.5731E-01	.2256E-02	34.53	31.42
15.03	.591	2045	.5154E-01	.2029E-02	35.37	32.73
16.01	.630	2074	.1143E+00	.4500E-02	37.49	34.11
17.24	.679	2096	.1744E+00	.6867E-02	39.90	35.68
18.25	.718	2107	.3144E+00	.1238E-01	40.40	36.84
20.57	.810	2097	.6333E+00	.2379E-01	42.56	38.72
22.59	.889	2131	.7197E+00	.2833E-01	44.56	40.42
25.15	.990	2134	.8256E+00	.3250E-01	46.73	42.52
26.91	1.059	2108	.9144E+00	.3600E-01	48.97	44.57
29.84	1.175	2117	.4472E+01	.1800E+00	52.41	47.78
34.47	1.356	2134				

TABLE D2-12

SPECIMEN NUMBER: U125-572
SPECIMEN CONFIGURATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS: 2.03 MM (0.080 IN)
PATTERN: 110.3 MPA (16.0 KSI)
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE: 288 CPM
K(MAX) 67 CYCLES PRIOR TO FAILURE: 1966 CYCLES
20.67 MPA SQRT(M) 18.18 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.66	.341	1				
			.1596E-02	.6285E-04	18.93	17.23
9.23	.363	370				
			.1657E-02	.7706E-04	19.56	17.80
9.45	.380	646				
			.3751E-02	.1477E-03	20.24	18.42
10.58	.417	881				
			.4175E-02	.1644E-03	20.92	19.04
11.22	.442	1034				
			.6931E-02	.2729E-03	21.58	19.57
11.79	.464	1117				
			.8051E-02	.3171E-03	22.17	20.16
12.65	.498	1223				
			.1303E-01	.4265E-03	22.99	20.83
13.36	.527	1291				
			.1145E-01	.4506E-03	23.54	21.43
14.12	.556	1355				
			.1571E-01	.6186E-03	24.60	22.39
15.45	.624	1443				
			.2791E-01	.1099E-02	25.84	23.52
17.14	.675	1489				
			.3803E-01	.1520E-02	26.90	24.39
18.26	.719	1910				

TABLE D2-13

SPECIMEN NUMBER: U125-478
SPECIMEN CONFIGURATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS: 2.24 MM (0.088 IN)
PATTERN: 164.9 MPA (23.9 KSI)
R-RATIO:
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 1744 CYCLES
K(MAX) 46 CYCLES PRIOR TO FAILURE: 20.98 MPA SQRT(M) 19.17 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.45	.177	1				
			.1692E-02	.6659E-04	15.41	17.67
5.28	.210	445				
			.2804E-02	.1104E-03	20.71	18.85
5.95	.240	687				
			.4136E-02	.2414E-03	21.48	19.73
6.76	.266	744				
			.9822E-02	.2292E-03	22.51	20.49
8.79	.262	825				
			.9519E-02	.3747E-03	23.67	21.54
7.71	.304	922				
			.2277E-01	.8964E-03	25.16	22.98
9.17	.341	966				
			.3291E-01	.1296E-02	26.72	24.32
9.78	.385	994				

TABLE D2-14

SPECIMEN NUMBER: 125-2LE
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB/DRY
TEST TEMPERATURE: 339.8 K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
MAXIMUM STRESS: 75.2 MPA (10.9 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 76424 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 63.67 MPA SQRT(M) 55.21 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.91	.272	1	.8564E-04	.3527E-05	10.73	9.77
7.42	.292	5696	.7414E-04	.3076E-05	11.19	10.18
8.15	.321	14993	.6739E-04	.2653E-05	11.67	10.62
8.78	.346	24274	.1296E-03	.5103E-05	12.13	11.04
9.53	.374	29845	.1082E-03	.4259E-05	12.56	11.43
10.49	.413	36238	.1861E-03	.7327E-05	12.99	11.82
11.46	.451	39621	.1724E-03	.6794E-05	13.44	12.24
12.35	.486	43432	.1961E-03	.7723E-05	13.90	12.65
13.46	.498	47732	.2711E-03	.1067E-04	14.38	13.09
13.19	.519	50651	.3585E-03	.1411E-04	14.88	13.54
14.17	.558	53374	.3787E-03	.1443E-04	15.32	13.94
14.73	.580	55639	.3772E-03	.1446E-04	15.79	14.37
15.43	.607	58744	.4681E-03	.1835E-04	16.26	14.83
16.72	.658	59766	.6781E-03	.2670E-04	16.75	15.19
17.71	.697	60913	.4467E-03	.1835E-04	17.31	15.53
18.72	.737	62435	.6662E-03	.2623E-04	17.41	15.84
19.31	.760	63457	.8227E-03	.3239E-04	17.37	16.29
20.78	.818	65111	.8844E-03	.3482E-04	18.54	16.41
21.79	.858	66827	.1251E-02	.4926E-04	19.11	17.59
23.63	.930	68737	.1489E-02	.5861E-04	20.32	18.40
25.41	1.000	69737	.1912E-02	.7529E-04	21.34	19.19
27.51	1.083	71644	.2182E-02	.8593E-04	21.90	19.84
29.19	1.149	73493	.2524E-02	.9937E-04	22.49	20.47
30.44	1.198	74545				
32.74	1.289	75561	.2584E-02	.1176E-03	23.12	21.04
33.51	1.319	75977	.4186E-02	.1714E-03	23.60	21.46
35.07	1.381	76716	.3716E-02	.1463E-03	24.20	22.11
36.43	1.434	77344	.4234E-02	.1667E-03	24.94	22.69
38.14	1.501	78072	.5402E-02	.2127E-03	25.65	23.26
39.34	1.549	78642	.5823E-02	.2293E-03	26.17	23.82
41.07	1.617	79466	.7137E-02	.2811E-03	26.90	24.39
41.19	1.635	79729	.5715E-02	.2250E-03	27.41	24.94
44.58	1.739	79918	.4576E-02	.3376E-03	28.07	25.50
46.22	1.795	80279	.9137E-02	.3756E-03	28.64	26.07
47.49	1.870	80524	.1204E-01	.3965E-03	29.24	26.61
49.27	1.939	80749	.1227E-01	.5008E-03	29.84	27.15
50.76	1.998	80927	.1163E-01	.4601E-03	30.44	27.71
51.41	2.044	81041	.1170E-01	.5193E-03	30.97	28.19
53.73	2.138	81265	.1463E-01	.5764E-03	31.49	28.65
54.76	2.183	81368	.1461E-01	.5752E-03	32.19	29.21
56.71	2.213	81436	.1503E-01	.7503E-03	32.69	29.75
F 56.17	2.231	81514	.2356E-01	.9271E-03	33.15	30.35
F 58.34	2.350	81618	.1774E-01	.7010E-03	34.19	31.05
F 62.74	2.470	81823	.2661E-01	.1048E-02	35.09	31.93
F 64.32	2.540	81877	.3556E-01	.1400E-02	36.07	32.83
F 66.29	2.610	81921	.3556E-01	.1400E-02	36.95	33.53
F 68.45	2.695	81971	.4314E-01	.1700E-02	37.93	34.33
F 70.47	2.775	82013	.4833E-01	.2376E-02	38.77	35.28
F 72.92	2.872	82051	.5080E-01	.2000E-02	39.41	36.21
F 75.14	2.959	82083	.7620E-01	.3000E-02	40.46	37.16
F 78.23	3.080	82113	.1016E+00	.4000E-02	42.19	38.39
F 81.33	3.202	82133	.1397E+00	.5500E-02	43.78	39.77
F 82.93	3.265	82144	.1270E+00	.5000E-02	44.97	40.93
F 85.60	3.370	82158	.2667E+00	.1051E-01	46.26	42.18
F 87.50	3.445	82167	.3810E+00	.1500E-01	47.58	43.32
F 88.65	3.490	82168	.3810E+00	.1500E-01	48.53	44.18
			.1206E+01	.4750E-01	49.66	45.18

D2-14 (CON'T.)

F	91.06	3.585	76468	.7498E+08	.3888E-01	51.19	49.58
F	93.34	3.675	76471	.9737E+08	.3833E-01	52.99	48.23
F	96.27	3.790	76474	.1488E+01	.7588E-01	50.77	49.84
F	98.17	3.865	76475	.2667E+01	.1858E+00	50.59	51.48
F	103.04	3.978	76476				

TABLE D2-15

SPECIMEN NUMBER: 125-1L3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: AFGOR
TEST TEMPERATURE: 303.2 K
SPECIMEN THICKNESS: 3.25 MM (.1280 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 7780 CYCLES
K(MAX) 22 CYCLES PRIOR TO FAILURE: 49.70 MPA SQRT(M) (45.23 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.49	.232	1				
6.04	.262	1041	.7322E-03	.2883E-04	15.42	14.40
7.04	.278	1518	.8792E-03	.3461E-04	16.88	15.06
7.69	.301	2024	.9567E-03	.2311E-04	17.15	15.61
8.62	.327	3141	.1129E-02	.4446E-04	17.87	16.26
9.17	.361	3721	.1401E-02	.5516E-04	18.71	17.03
9.91	.386	4241	.1234E-02	.4779E-04	19.49	17.74
10.51	.414	4746	.1729E-02	.6806E-04	20.29	18.41
11.36	.447	5334	.2324E-02	.1033E-03	20.39	18.11
11.91	.469	5736	.1859E-02	.7314E-04	21.57	19.63
12.39	.495	6213	.2797E-02	.1101E-03	22.14	20.15
13.26	.522	6711	.3613E-02	.1422E-03	22.92	20.75
13.98	.550	7249	.3993E-02	.1572E-03	23.42	21.31
14.85	.585	6874	.4471E-02	.1760E-03	24.11	21.94
15.44	.608	8139	.4991E-02	.1964E-03	24.79	22.50
16.04	.632	8339	.5793E-02	.2281E-03	25.37	22.98
16.63	.654	8545	.5197E-02	.2111E-03	25.67	23.36
17.18	.676	8745	.5923E-02	.2332E-03	26.12	23.77
17.67	.696	8911	.7234E-02	.2848E-03	26.66	24.26
18.31	.720	9110	.6931E-02	.2729E-03	27.19	24.67
19.03	.749	9334	.9474E-02	.3859E-03	28.27	25.72
21.85	.860	9834	.1187E-01	.4673E-03	29.34	26.72
23.13	.911	9124	.1417E-01	.5578E-03	30.37	27.64
24.77	.975	7240	.1416E-01	.5573E-03	31.41	28.58
26.17	1.027	7326	.1533E-01	.6038E-03	32.49	29.51
27.48	1.078	7346	.2374E-01	.1171E-02	33.48	30.47
28.96	1.136	7409	.1997E-01	.7871E-03	34.40	31.49
32.05	1.262	7593	.4253E-01	.1675E-02	35.98	32.73
33.04	1.311	7677	.2112E-01	.8277E-03	37.11	33.78
33.53	1.332	7819	.4914E-01	.1934E-02	38.59	34.66
36.79	1.448	7838	.4215E-01	.1657E-02	39.27	35.74
38.34	1.517	7945	.6746E-01	.2656E-02	41.35	36.72
40.66	1.601	7729	.4463E-01	.3481E-02	41.58	37.42
42.43	1.671	7729	.9823E-01	.3869E-02	42.42	38.57
43.79	1.722	7739	.1122E+00	.4417E-02	43.78	39.84
45.49	1.795	7747	.2204E-01	.8734E-03	44.71	40.68
47.15	1.856	7734	.7232E-01	.8760E-03	45.79	41.66
49.71	1.918	7759	.3915E-01	.1541E-01	46.72	42.52

TABLE D2-16

SPECIMEN NUMBER:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

129-3L3
2124-T851
LONGITUDINAL
STIFFENED
AMBIENT
3.68 MM (.145 IN)
329.6 MPA (47.7 KSI)
.05
240 CPM
37,[illegible] CYCLES

KI(MAX) 2 CYCLES PRIOR TO FAILURE: 63.16 MPA SQRT(M) (57.42 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.66	.144	1				
3.98	.157	51	.6072E-02	.2375E-03	23.47	21.36
4.46	.176	142	.5494E-02	.2163E-03	24.68	22.46
4.19	.204	191	.1404E-01	.5529E-03	26.38	24.01
5.58	.220	213	.2017E-01	.7901E-03	27.57	25.37
6.71	.236	236	.1944E-01	.7261E-03	28.92	26.32
6.39	.251	259	.2241E-01	.8824E-03	29.92	27.23
7.12	.276	272	.3339E-01	.1313E-02	31.19	28.33
7.39	.291	284	.3161E-01	.1221E-02	32.28	29.37
8.19	.322	299	.5461E-01	.2229E-02	33.57	30.55
9.03	.378	321	.5271E-01	.2176E-02	35.68	32.47
1...5	.396	331	.6541E-01	.2575E-02	37.54	34.16
10.72	.421	338	.9325E-01	.3671E-02	38.50	35.31
11.42	.45[illegible]	347	.8061E-01	.3175E-02	40.17	36.47
11.99	.47[illegible]	351	.1[illegible]4E+00	.5153E-02	41.20	37.58
12.73	.50[illegible]	356	.1889E+00	.7437E-02	42.31	38.52
13.42	.536	359	.3156E+00	.1243E-01	43.77	39.83
14.44	.54[illegible]	362	.3[illegible]7E+00	.1341E-01	45.57	41.56
14.[illegible]	.56[illegible]	364	.4534E+00	.1785E-01	48.20	43.86
2[illegible].13	.45[illegible]	366	.3666E+01	.1443E+00	54.96	50.01

TABLE D2-17

SPECIMEN NUMBER:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

129-4T9
2124-T851
TRANSVERSE
STIFFENED
AMBIENT
3.24 MM (.128 IN)
74.9 MPA (10.8 KSI)
.05
240 CPM
GRIP FAILURE

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.78	.306	1				
8.32	.328	10383	.5223E-04	.2058E-05	11.27	10.26
8.41	.347	23137	.3933E-04	.1549E-05	11.63	10.58
9.66	.380	24645	.1523E-03	.5999E-05	12.87	10.99
10.90	.429	34185	.2249E-03	.8854E-05	12.75	11.60
11.58	.456	38623	.1257E-03	.4949E-05	13.34	12.14
12.11	.477	43978	.1197E-03	.4713E-05	13.78	12.48
13.42	.528	47638	.3617E-03	.1424E-04	14.23	12.95

TABLE D2-18

SPECIMEN NO.: [illegible] U125-9T12
ALLOY TYPE: [illegible] 2124-T851
SPECIMEN CONFIGURATION: T-L ORIENTATION
CONSTRAINT: STIFFENED
ENVIRONMENT: AIR/GAS
TEST TEMPERATURE: 301.5 K
SPECIMEN THICKNESS: 1.25 MM (.1250 INS)
MAXIMUM STRESS: 110.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 7124 CYCLES
KMAX: [illegible] CYCLES PRIOR TO FAILURE: 58.58 MPA SQRT(M)[illegible] 46.03 KSI SQRT(IN)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.14	.242	1				
	7.29	.287	1437	.7148E-03	.2830E-04	16.38	14.91
	8.23	.327	2957	.6755E-03	.2659E-04	17.68	16.02
	8.97	.353	3976	.1069E-02	.4207E-04	18.54	16.87
	9.61	.378	4894	.1461E-02	.5761E-04	19.24	17.51
	10.12	.398	5640	.1283E-02	.5051E-04	19.78	18.00
	10.69	.421	6419	.1779E-02	.6992E-04	20.38	18.54
	11.37	.447	7212	.1728E-02	.6803E-04	21.34	19.15
	12.07	.472	8074	.2386E-02	.9394E-04	21.66	19.71
	12.77	.503	8739	.2521E-02	.1151E-03	22.31	20.31
	13.37	.522	9892	.3464E-02	.1364E-03	22.49	20.83
	13.97	.549	9129	.4682E-02	.1843E-03	23.41	21.30
	14.44	.568	9133	.4645E-02	.1829E-03	23.91	21.76
	15.11	.595	9240	.6326E-02	.2491E-03	24.42	22.22
	15.53	.615	9356	.4423E-02	.1741E-03	24.92	22.68
	16.41	.646	9460	.7535E-02	.2966E-03	25.45	23.16
	17.14	.675	9574	.6406E-02	.2522E-03	25.96	23.72
	18.11	.713	9697	.1411E-01	.5556E-03	26.71	24.30
	18.98	.747	9798	.1396E-01	.5496E-03	27.42	24.96
	19.71	.777	9859	.1239E-01	.4879E-03	28.57	25.55
	21.31	.839	9959	.1602E-01	.6308E-03	29.94	26.34
	22.99	.905	9926	.2411E-01	.9493E-03	30.12	27.41
	24.43	.962	9979	.2744E-01	.1080E-02	31.23	28.42
	25.41	1.000	7014	.5642E-01	.2221E-02	32.42	29.58
	27.74	1.092	7042	.4701E-01	.1842E-02	33.54	30.52
	28.48	1.121	7052	.1116E+00	.4395E-02	34.36	31.27
	30.20	1.189	7066	.9581E-01	.3764E-02	35.17	32.00
	30.89	1.216	7071	.7995E-01	.2998E-02	35.73	32.51
F	31.75	1.250	7096	.9807E-01	.3546E-02	36.23	32.97
F	34.42	1.355	7099	.1771E+00	.7000E-02	37.46	34.09
F	35.19	1.425	7159	.1777E+00	.7000E-02	38.87	35.37
F	39.23	1.545	7114	.4364E+00	.1600E-01	40.87	36.46
F	40.26	1.585	7118	.5080E+00	.2000E-01	41.34	37.62
F	42.79	1.685	7128	.2316E+01	.4000E-01	42.60	38.77
F	44.27	1.735	7121	.1777E+01	.7000E-01	43.78	39.84
F	47.50	1.870	7122	.3429E+01	.1350E+00	45.39	41.31
F	50.34	1.970	7123	.2540E+01	.1000E+00	47.25	43.00

TABLE D2-19

SPECIMEN NUMBER: 125-3T6
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 300.9 K
SPECIMEN THICKNESS: 3.23 MM (.1272 IN)
MAXIMUM STRESS: 114.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 7493 CYCLES

KIMAX) 93 CYCLES PRIOR TO FAILURE) 33.78 MPA SQRT(M)(33.56 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.51	.217	1	.4183E-03	.1647E-04	15.47	14.15
6.42	.253	2157	.4135E-03	.2482E-04	16.96	15.07
7.11	.280	3591	.1371E-02	.4216E-04	17.43	15.84
8.23	.324	4438	.1359E-02	.5351E-04	18.78	17.19
9.14	.360	5310	.1954E-02	.7501E-04	19.78	18.10
10.14	.399	5878	.1964E-02	.7734E-04	20.62	18.77
11.04	.435	6158	.3927E-02	.1628E-03	21.38	19.48
11.71	.461	6348	.4455E-02	.1754E-03	22.09	20.11
12.57	.495	6541	.5544E-02	.2183E-03	23.01	20.94
13.72	.540	6749	.6667E-02	.2626E-03	23.86	21.72
14.92	.587	6869	.8333E-02	.3163E-03	24.65	22.43
15.56	.613	6948	.1223E-01	.4815E-03	25.67	23.73
16.45	.648	7047	.1411E-01	.5552E-03	26.51	24.12
17.31	.679	7143	.2216E-01	.8724E-03	27.46	24.99
18.09	.712	7232	.2548E-01	.1003E-02	28.50	25.93
2.075	.917	7297	.3304E-01	.1301E-02	29.88	27.17
22.79	.897	7359	.4564E-01	.1796E-02	31.25	28.44
24.67	.971	7411				

TABLE D2-20

SPECIMEN NUMBER: 125-5T1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.4 K
SPECIMEN THICKNESS: 3.35 MM (.1320 IN)
MAXIMUM STRESS: 198.6 MPA (28.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 192 CYCLES

KIMAX) 2 CYCLES PRIOR TO FAILURE) 41.99 MPA SQRT(M)(38.22 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.92	.154	1	.4123E-02	.1584E-03	21.53	19.59
4.47	.176	152	.1207E-01	.4734E-03	23.74	21.60
5.05	.230	256	.2370E-01	.8151E-03	26.48	24.08
6.30	.272	319	.2746E-01	.1098E-02	28.59	26.02
7.68	.312	347	.3441E-01	.1355E-02	30.07	27.37
8.44	.332	366	.4869E-01	.3464E-02	31.66	28.81
9.41	.372	382	.3142E+00	.1237E-01	34.64	31.52
11.37	.449	388	.1073E+01	.4247E-01	38.30	34.86
14.18	.554	393				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D2-21

SPECIMEN NUMBER=
ALLOY TYPE=
SPECIMEN CONFIGURATION=
CONSTRAINT=
ENVIRONMENT=
TEST TEMPERATURE=
SPECIMEN THICKNESS=
MAXIMUM STRESS=
R-RATIO=
FREQUENCY=
CYCLES TO FAILURE=
KEMAN) 4 CYCLES PRIOR TO FAILURE= 59.86 MPA SQRT(M)(54.47 KSI SQRT(IN)

LON
3.20 MM (
75.2 MPA (10.9 KSI)
CYCLES

CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA/STRESS INTENSITY MPA SQRT(M)	KSI SQRT(IN)
11.94	.470	1				
12.64	.497	15877	.4352E-04	.1713E-05	7.41	6.75
13.40	.528	31512	.4822E-04	.1898E-05	7.63	6.95
13.96	.553	38473	.7591E-04	.3146E-05	7.83	7.13
14.72	.580	48011	.7589E-04	.3145E-05	8.02	7.30
15.42	.615	54815	.1314E-03	.5173E-05	8.25	7.51
16.42	.646	62664	.1319E-03	.4813E-05	8.49	7.72
17.32	.682	72135	.9468E-04	.3729E-05	8.72	7.93
18.48	.725	78492	.1667E-03	.6563E-05	8.98	8.17
19.44	.763	91462	.1715E-03	.6751E-05	9.18	8.36
19.77	.779	96712	.1688E-03	.6648E-05	9.35	8.51
21.64	.852	92671	.3244E-03	.1279E-04	9.70	8.82
23.53	.927	101478	.2170E-03	.8329E-05	10.18	9.26
24.68	.979	107734	.4156E-03	.1636E-04	10.53	9.58
26.29	1.035	116445	.5190E-03	.2084E-04	10.85	9.87
27.69	1.047	118937	.5417E-03	.2133E-04	11.16	10.15
28.87	1.137	111059	.5501E-03	.2323E-04	11.44	10.41
31.27	1.192	112639	.9129E-03	.3595E-04	11.74	10.68
31.57	1.2 3	114099	.8711E-03	.3430E-04	12.03	10.95
33.75	1.301	115449	.1062E-02	.4180E-04	12.33	11.22
34.91	1.351	116401	.1139E-02	.4483E-04	12.62	11.49
36.32	1.418	117783	.1445E-02	.5690E-04	12.93	11.77
37.43	1.474	118549	.1845E-02	.7265E-04	13.26	12.07
39.15	1.541	119482	.1944C-02	.7262E-04	13.59	12.37
40.71	1.603	120134	.2180E-02	.8582E-04	13.91	12.68
42.61	1.678	120941	.2655E-02	.1086E-03	14.29	13.08
44.17	1.735	121553	.2374E-02	.9346E-04	14.69	13.32
45.41	1.803	122140	.2662E-02	.1166E-03	14.98	13.62
47.11	1.855	122542	.3248E-02	.1279E-03	15.28	13.98
48.19	1.924	122944	.3554E-02	.1372E-03	15.63	14.19
50.11	1.9.9	123264	.3953E-02	.1556E-03	15.90	14.47
51.48	2.134	123634	.4537E-02	.1794E-03	16.10	14.73
57.18	2.134	123932	.4243E-02	.1670E-03	16.52	15.04
54.74	2.118	124299	.5142E-02	.2024E-03	16.96	15.34
[illegible]	[illegible]	[illegible]	.5354E-02	.2107E-03	17.17	15.62
[illegible]	[illegible]	[illegible]	.5377E-02	.2117E-03	17.49	15.88
[illegible]	[illegible]	[illegible]	.6593E-02	.2567E-03	17.72	16.12
[illegible]	[illegible]	[illegible]	.6641E-02	.2614E-03	18.16	16.44
[illegible]	[illegible]	[illegible]	.7481E-02	.2934E-03	18.43	16.77
[illegible]	[illegible]	[illegible]	.8342E-02	.3284E-03	18.74	17.09
[illegible]	[illegible]	[illegible]	.8385E-02	.3695E-03	19.19	17.43
67.28	2.649	126017	.1114E-01	.4385E-03	19.67	17.91
68.77	2.708	126161	.1139E-01	.4476E-03	20.00	18.20
7..36	2.77.	124311	.1115E-01	.4401E-03	20.37	18.54
72.77	2.865	126413	.2252E-01	.8864E-03	20.97	19.09
73.76	2.904	126511	.1116E-01	.4080E-03	21.37	19.38
7..42	2.915	126613	.2132E-01	.8088E-03	21.69	19.74
77.78	3.037	126715	.1727E-01	.6888E-03	22.24	20.24
9..72	3.17.	126868	.2132E-01	.8088E-03	22.98	20.92
81.18	3.275	126941	.2641E-01	.1042E-02	23.62	21.58
82.97	3.424	127045	.4386E-01	.1726E-02	24.67	22.36
87.47	3.641	127112	.9857E-01	.3881E-02	26.22	23.86
95.45	3.935	127142	.2159E+00	.8500E-02	28.60	26.03

TABLE D2-22

SPECIMEN NUMBER: 123-1112
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: AMBIENT
TEST TEMPERATURE: 311.5 K
SPECIMEN THICKNESS: 3.21 MM (.1266 IN)
MAXIMUM STRESS: 118.4 MPA (17.2 KSI)
R-RATIO: .01
FREQUENCY: 20.0 CPS
CYCLES TO FAILURE: 22769 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 71.33 MPA SQRT(M) 64.92 KSI SQRT(IN)

	CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	KSI SQRT(IN)
	7.49	.295	1	.1458E-03	.5741E-05	9.34	8.50
	8.24	.324	5122	.2320E-03	.9133E-05	9.91	8.93
	9.13	.359	8945	.2771E-03	.1091E-04	10.16	9.25
	9.49	.373	10221	.4072E-03	.1602E-04	10.49	9.54
	10.33	.407	12319	.6797E-03	.2676E-04	11.91	9.93
	11.18	.436	13423	.8129E-03	.3201E-04	11.99	10.36
	12.22	.481	14826	.7444E-03	.2931E-04	11.92	10.75
	12.84	.505	15633	.1102E-02	.4337E-04	12.10	11.01
	13.42	.528	16178	.1128E-02	.4434E-04	12.19	11.27
	14.09	.555	16771	.1115E-02	.4391E-04	12.25	11.55
	14.77	.582	17395	.1584E-02	.6238E-04	13.03	11.66
	15.60	.614	17910	.1715E-02	.6752E-04	13.19	12.17
	16.34	.643	18341	.1818E-02	.7158E-04	13.46	12.43
	16.93	.666	18653	.3422E-02	.1347E-03	13.94	12.68
	17.66	.695	18876	.2674E-02	.1053E-03	14.23	12.95
	18.34	.722	19131	.2855E-02	.1124E-03	14.51	13.28
	19.05	.750	19391	.3386E-02	.1332E-03	14.91	13.57
	20.35	.801	19773	.4477E-02	.1763E-03	15.42	14.04
	21.59	.850	20072	.4128E-02	.1625E-03	15.92	14.49
	22.97	.904	20392	.6153E-02	.2421E-03	16.45	14.97
	24.49	.964	20683	.6636E-02	.2613E-03	16.96	15.42
	25.73	1.012	20912	.6672E-02	.2627E-03	17.42	15.85
	27.12	1.068	21125	.8952E-02	.3524E-03	17.93	16.32
	28.63	1.126	21330	.9022E-02	.3529E-03	18.41	16.75
	30.20	1.211	21514	.9523E-02	.3749E-03	19.06	17.34
	31.74	1.250	21619	.1187E-01	.4674E-03	19.65	17.79
	33.42	1.316	21774	.1243E-01	.4895E-03	20.09	18.27
	34.93	1.374	21893	.1793E-01	.7059E-03	20.62	18.77
	36.71	1.445	21834	.8595E-02	.3384E-03	21.16	19.17
	37.58	1.479	21941	.1639E-01	.6453E-03	21.62	19.68
	39.44	1.553	22111	.1499E-01	.5861E-03	22.14	20.16
	40.71	1.604	22194	.1372E-01	.5404E-03	22.46	20.43
	41.99	1.653	22259	.2721E-01	.1071E-02	22.98	20.93
	43.41	1.709	22314	.1895E-01	.7461E-03	23.31	21.21
	44.63	1.756	22373	.3532E-01	.1390E-02	23.75	21.61
	46.04	1.814	22419	.3171E-01	.1249E-02	24.19	22.01
	47.28	1.861	22434	.3323E-01	.1309E-02	24.69	22.46
	49.11	1.933	22519	.4506E-01	.1774E-02	25.17	22.90
	50.24	1.978	22534	.4181E-01	.1646E-02	25.62	23.31
	51.62	2.032	22572	.4671E-01	.1839E-02	26.09	23.74
F	53.19	2.094	22649	.8256E-01	.3250E-02	26.58	24.19
F	54.74	2.155	22719	.6943E-01	.2733E-02	27.24	24.81
F	57.15	2.250	22849	.6199E-01	.2441E-02	28.27	25.66
F	58.72	2.312	22939	.1101E-01	.4333E-02	29.12	26.41
F	61.45	2.420	22714	.2543E-01	.1001E-01	29.74	27.09
F	64.39	2.535	22774	.3369E-01	.1563E-01	30.92	28.23
F	67.56	2.660	22713	.4424E-01	.1741E-01	31.96	29.08
F	69.49	2.736	22737	.7366E-01	.2901E-01	33.23	30.26
F	73.66	2.900	22743	.7302E-01	.2875E-01	34.36	31.27
F	76.59	3.015	22746	.8255E-01	.3251E-01	35.91	32.14
F	78.23	3.080	22769				

TABLE D2-23

SPECIMEN NUMBER: 125-2L14
ALLOY TYPE: 2[illegible]-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: AMBIENT
TEST TEMPERATURE: 311 K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
MAXIMUM STRESS: 228.4 MPA (33.1 KSI)
R-RATIO: .1
FREQUENCY: 233 CPM
CYCLES TO FAILURE: 1174 CYCLES

K(MAX) 1 CYCLE PRIOR TO FAILURE: 63.02 MPA SQRT(M) (54.8 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.81	.189	1				
	5.67	.223	236	.3879E-02	.1447E-03	14.48	13.18
	6.51	.256	463	.3681E-02	.1449E-03	15.61	14.21
	7.11	.280	544	.7222E-02	.2843E-03	16.61	15.13
	7.44	.293	637	.5606E-02	.2250E-03	17.19	15.64
	8.57	.337	767	.7181E-02	.2827E-03	18.92	16.48
	9.46	.372	844	.1127E-01	.4437E-03	19.37	17.31
	10.12	.399	904	.1098E-01	.4143E-03	19.93	19.46
	11.12	.438	984	.1324E-01	.5213E-03	20.46	18.48
	11.49	.452	1022	.1057E-01	.5934E-03	21.42	19.49
	12.61	.496	1043	.2246E-01	.8841E-03	22.12	20.13
	14.39	.567	1114	.3489E-01	.1374E-02	23.34	21.24
	15.43	.616	1134	.5122E-01	.1977E-02	24.98	22.37
	19.32	.761	1163	.1418E+00	.5583E-02	26.99	24.28
F	21.32	.840	1175	.8354E-01	.3271E-02	28.45	25.89
F	22.13	.871	1176	.1778E+01	.7083E-01	29.48	26.82
F	24.64	.970	1177	.2543E+01	.1000E+00	31.32	28.23

TABLE D2-24

SPECIMEN NUMBER: 125-3T18
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 297 K
SPECIMEN THICKNESS: 3.23 MM (.127 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .10
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 117626 CYCLES
K(MAX) 23 CYCLES PRIOR TO FAILURE: 41.95 MPA SQRT(M) (38.18 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
11.26	.444	1				
			.4163E-04	.1639E-05	7.19	6.55
12.31	.485	25134				
			.6293E-04	.2478E-05	7.48	6.81
13.16	.518	38678				
			.7522E-04	.2993E-05	7.70	7.01
13.41	.528	47155				
			.5465E-04	.2339E-05	7.54	7.16
14.27	.562	55047				
			.1006E-03	.3960E-05	8.03	7.31
14.97	.589	61592				
			.1419E-03	.5572E-05	8.24	7.50
15.41	.622	67914				
			.1144E-03	.4504E-05	8.47	7.71
16.68	.657	75563				
			.1419E-03	.5583E-05	8.66	7.88
17.23	.678	79421				
			.1889E-03	.7436E-05	8.96	8.16
18.44	.747	85668				
			.2E395-03	.1139E-04	9.37	8.52
21.43	.834	94183				
			.3971E-03	.1204E-04	9.72	9.45
21.89	.861	98834				
			.5113E-03	.2.12E-04	10.12	9.21
23.83	.938	1'2713				
			.6498E-03	.2558E-04	10.59	9.55
25.14	.997	1'4642				
			.8124E-03	.3200E-04	11.11	5.44
26.39	1.047	1.6653				
			.1254E-02	.4937E-04	11.12	10.12
27.49	1.094	1.7539				
			.1284E-02	.5054E-04	11.59	10.55
31.45	1.215	1.9E+3				
			.1639E-02	.6449E-04	12.37	10.98
32.65	1.274	111748				
			.1995E-02	.7853E-04	12.47	11.30
34.16	1.345	111664				
			.1922E-02	.7171E-04	12.77	11.63
35.75	1.407	112519				
			.2471E-02	.9455E-04	13.19	11.40
37. 5	1.469	113040				
			.4195E-02	.1612E-03	13.67	12.19
38.49	1.531	113536				
			.2476E-02	.9749E-04	13.79	12.65
40.47	1.609	114127				
			.4452E-02	.1753E-03	14.15	12.98
42.44	1.693	114671				
			.3121E-02	.1199E-03	14.44	13.14
43.64	1.718	115081				
			.9373E-02	.3690E-03	14.42	13.49
46.15	1.817	115343				
			.3442E-02	.1613E-03	15.39	14.11
44.19	1.837	115647				
			.4419E-02	.1818E-03	15.79	14.37
51.6	1.871	116329				
			.8773E-02	.3439E-03	16.06	14.63
51.44	2.033	116512				
			.7839E-02	.3046E-03	16.37	14.90
53.14	2.092	116711				
			.9287E-02	.3574E-03	16.64	15.14
54.13	2.133	116817				
			.1274E-01	.5013E-03	16.97	15.43
55.47	2.192	116933				
			.1151E-01	.4533E-03	17.17	15.63
56.71	2.233	117037				
			.1365E-01	.5375E-03	17.43	15.86
58.17	2.294	117133				
			.2198E-01	.8643E-03	17.74	16.15
59.01	2.347	117233				
			.2374E-01	.8147E-03	18.14	16.55
62.17	2.449	117319				
			.1561E-01	.6147E-03	18.61	16.94
63.53	2.492	117361				
			.1663E-01	.6534E-03	18.78	17.08
64.24	2.529	117444				
			.3161E-01	.1244E-02	19.12	17.40
66.43	2.591	117434				
			.2974E-01	.1132E-02	19.54	17.78
67.44	2.672	117545				
			.4947E-01	.3483E-02	21.17	19.22
69.41	2.732	117588				
			.1151E+00	.4532E-02	25.62	19.76
72.74	2.863	117613				

TABLE D2-25

SPECIMEN NUMBER: 125-4T11
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 394 K
SPECIMEN THICKNESS: 3.24 MM (.1275 IN)
MAXIMUM STRESS: 114.6 MPA (17.2 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 9200 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 48.48 MPA SQRT(M) (44.12 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.94	.313	1				
			.4739E-03	.1854E-04	9.64	8.77
8.42	.347	1862				
			.4599E-03	.1968E-04	10.05	9.19
9.56	.376	3343				
			.7154E-03	.2817E-04	10.51	9.56
10.34	.407	4413				
			.8584E-03	.3419E-04	10.41	9.93
11.18	.438	5290				
			.1214E-02	.4779E-04	11.30	10.28
11.88	.468	5947				
			.1298E-02	.5109E-04	11.66	10.61
12.53	.493	6451				
			.1317E-02	.5184E-04	11.99	10.90
13.21	.520	6956				
			.3044E-02	.1197E-03	12.32	11.21
14.10	.551	7225				
			.2653E-02	.1044E-03	12.70	11.56
14.67	.585	7552				
			.4259E-02	.1676E-03	13.17	11.98
15.34	.628	7805				
			.3912E-02	.1540E-03	13.58	12.36
16.97	.668	8187				
			.5376E-02	.2116E-03	13.98	12.72
17.44	.722	9229				
			.5743E-02	.2261E-03	14.39	13.10
18.99	.748	8430				
			.5865E-02	.2309E-03	14.47	13.53
23.20	.795	8637				
			.1095E-01	.4310E-03	15.18	14.08
21.62	.851	8766				
			.1214E-01	.4778E-03	15.92	14.58
23.58	.928	8928				
			.1445E-01	.5690E-03	16.61	15.12
26.85	.376	9012				
			.2114E-01	.9115E-03	17.19	15.65
26.79	1.055	9098				
			.3429E-01	.1350E-02	17.78	16.18
29.12	1.137	9137				
			.3395E-01	.1337E-02	18.33	16.68
25.55	1.177	9149				
			.3629E-01	.1425E-02	18.94	17.24
31.70	1.248	9219				
			.7981E-01	.3142E-02	19.69	17.91
34.35	1.349	9271				
			.1735E+00	.6812E-02	20.59	18.74
37.19	1.464	9284				
F 38.35	1.535	9290	.8973E+00	.3533E-01	21.18	19.45
F 41.15	1.620	9293	.7197E+00	.2833E-01	22.02	20.04
F 42.42	1.671	9295	.6353E+00	.2500E-01	22.58	20.55
F 45.59	1.795	9297	.1587E+01	.6253E-01	23.31	21.21
F 46.96	1.849	9299	.1273E+01	.5003E-01	24.11	21.87

TABLE D2-26

SPECIMEN NUMBER: 125-5T3
ALLOY TYPE: 2.24-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 3.2.9 K
SPECIMEN THICKNESS: 3.21 MM (.1.2E-3 IN)
MAXIMUM STRESS: 104.8 MPA (28.4 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1704 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 43.14 MPA SQRT(M) (39.24 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
[illegible]	.154	1				
			.2.E3E-02	.911[illegible]E-04	11.[illegible]	10.[illegible]
[illegible]	.147	747				
			.231 E-02	.9[illegible]E-04	12.[illegible]	11.[illegible]
.41	.224	1749				
			.53[illegible]E-02	.1977[illegible]E-03	13.[illegible]	12.[illegible]
[illegible]	.249	2[illegible]				
			.6[illegible]E-02	.2[illegible]E-03	14.71	13.38
7.17	.282	3[illegible]21				
			.2[illegible]E-01	.1[illegible]E-02	15.[illegible]	14.49
9.34	.352	3 [illegible]				
			.11[illegible]E-1	.4[illegible]E-02	17.74	16.[illegible]
9.71	.343	3541				
			.3[illegible]E-01	.12[illegible]E-02	17.93	16.23
[illegible]	.421	3[illegible]				
			.8[illegible]E-01	.3[illegible]E-02	19.27	17.[illegible]
[illegible]	.[illegible]	3[illegible]				
			.64[illegible]E-1	.2[illegible]E-02	19.[illegible]	17.78
[illegible]	.[illegible]	3[illegible]				
			.27 [illegible]	.1 [illegible]	21.[illegible]	19.47
F 13.[illegible]	.[illegible]	3[illegible]				
			.[illegible]E+[illegible]	.2[illegible]E-[illegible]	21.[illegible]	1[illegible]
F 14[illegible]	.[illegible]	3[illegible]				

TABLE D2-27

SPECIMEN NUMBER:
SPECIMEN CONFIGURATION:
CONFIGURATION:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MATERIAL STRENGTH:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

KIMAX) 1 CYCLES PRIOR TO FAILURE: 49.01 MPA SQRT(M)(45.33 KSI SQRT(IN))

CRACK LENGTH IN 0.57	IN .339	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	KSI SQRT(IN)
9.29	.365	7143	.9091E-04	.3894E-05	11.98	10.90
10.26	.396	13847	.1365E-03	.4585E-05	12.47	11.35
10.92	.430	19044	.1654E-03	.6913E-05	13.08	11.83
11.69	.460	23269	.1780E-03	.7648E-05	13.58	12.29
12.75	.502	28098	.2237E-03	.8887E-05	14.05	12.78
13.57	.534	31855	.2192E-03	.8624E-05	14.59	13.27
14.10	.555	33974	.3881E-03	.1213E-04	14.96	13.62
14.74	.580	35342	.3546E-03	.1394E-04	15.78	13.91
15.52	.611	37322	.3991E-03	.1572E-04	15.66	14.25
16.28	.641	39277	.3917E-03	.1542E-04	16.07	14.62
17.18	.672	40903	.4889E-03	.1925E-04	16.47	14.99
17.84	.753	42331	.5372E-03	.2115E-04	16.86	15.35
18.66	.734	43839	.6195E-03	.2439E-04	17.25	15.70
19.45	.766	44681	.9656E-03	.3802E-04	17.64	16.06
20.68	.814	45958	.8195E-03	.3226E-04	18.12	16.49
22.27	.877	47552	.1302E-02	.3946E-04	18.78	17.09
23.49	.933	48796	.1141E-02	.4494E-04	19.47	17.72
25.61	1.024	50155	.1334E-02	.5256E-04	20.18	18.37
26.84	1.068	52426	.1787E-02	.7036E-04	23.98	19.08
28.69	1.127	51736	.2158E-02	.8498E-04	21.54	19.60
30.58	1.204	52833	.2537E-02	.9987E-04	22.31	20.31
32.34	1.273	53651	.3214E-02	.1266E-03	23.08	21.00
34.19	1.346	53945	.3746E-02	.1475E-03	23.81	21.67
36.32	1.431	54011	.4584E-02	.1805E-03	24.61	22.40
38.31	1.509	54434	.4705E-02	.1852E-03	25.43	23.14
39.79	1.567	54731	.4665E-02	.1954E-03	24.12	23.77
41.58	1.641	55032	.6992E-02	.2753E-03	26.78	24.37
43.29	1.702	55138	.7174E-02	.3214E-03	27.45	24.99
44.76	1.761	55363	.9311E-02	.3666E-03	28.08	25.53
46.27	1.822	55539	.9917E-02	.3862E-03	24.68	26.08
47.91	1.886	55657	.1113E-01	.4382E-03	26.28	26.55
49.43	1.946	55765	.1354E-01	.5333E-03	26.98	27.21
50.97	2.007	55844	.1342E-01	.5291E-03	30.51	27.77
52.53	2.068	55934	.1353E-01	.5325E-03	31.09	24.29
54.16	2.132	56037	.1686E-01	.6634E-03	31.71	28.88
55.67	2.191	56138	.1621E-01	.6382E-03	32.41	29.49
57.26	2.254	56228	.2264E-01	.8912E-03	33.14	30.16
58.87	2.317	56324	.2303E-01	.9065E-03	34.07	30.97
60.47	2.380	56440	.2419E-01	.9523E-03	34.83	31.70
F 62.07	2.443	56533	.3172E-01	.1249E-02	35.48	32.58
F 63.74	2.509	56647	.3148E-01	.1239E-02	36.78	33.47
F 65.34	2.572	56747	.3132E-01	.1233E-02	37.46	34.05
F 73.38	2.888	56777	.4374E-01	.1722E-02	39.63	35.97
F 77.46	3.049	56843	.5447E-01	.2143E-02	41.46	37.68
F 79.37	3.124	56883	.7937E-01	.3125E-02	43.18	39.30
F 81.43	3.205	56931	.1270E+00	.5003E-02	44.36	40.37
F 83.31	3.279	56983	.1397E+00	.5500E-02	45.00	41.04
F 87.43	3.442	57063	.1273E+00	.5010E-02	45.73	41.62
F 94.71	3.729	57212	.4445E+00	.1750E-01	48.24	42.88
F 95.11	3.745	57213	.1397E+01	.5500E-01	46.98	42.68

TABLE D2-28

SPECIMEN NUMBER: U125-1L12
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 361° K
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
MAXIMUM STRESS: 112.4 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2379 CYCLES

K(MAX) 26 CYCLES PRIOR TO FAILURE: 39.64 MPA SQRT(M) (36.10 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
6.85	.271	1	.1977E-02	.7784E-04	16.48	15.38
7.39	.291	256	.1814E-02	.7159E-04	17.52	15.94
7.96	.313	497	.4239E-02	.1667E-03	18.31	16.67
8.81	.347	743	.1836E-02	.7224E-04	19.94	17.36
9.35	.368	1097	.3534E-02	.1358E-03	19.43	17.86
9.96	.388	1196	.4763E-02	.1874E-03	20.21	18.39
10.90	.414	1321	.3584E-02	.1537E-03	20.87	18.99
11.19	.441	1497	.7771E-02	.3056E-03	21.68	19.66
12.34	.474	1696	.7422E-02	.2924E-03	22.36	20.35
12.92	.505	1711	.1218E-01	.4796E-03	23.22	21.13
13.95	.549	1834	.7834E-02	.3073E-03	24.35	21.69
14.79	.582	1883	.1243E-01	.4893E-03	24.96	22.52
15.62	.614	1953	.1653E-01	.6507E-03	25.57	23.27
16.22	.638	2021	.2388E-01	.9400E-03	26.46	24.08
17.90	.731	2066	.1894E-01	.7463E-03	27.18	24.74
18.57	.731	2107	.3334E-01	.1313E-02	27.79	25.29
19.37	.763	2131	.2648E-01	.1362E-02	28.47	25.98
20.37	.802	2160	.3503E-01	.1537E-02	29.77	26.64
21.54	.848	2198	.3516E-01	.1542E-02	30.20	27.49
22.95	.904	2234	.3584E-01	.2198E-02	31.35	28.53
24.48	.976	2267	.5423E-01	.2134E-02	32.52	29.59
26.31	1.036	2295	.8134E-01	.3202E-02	33.63	30.61
29.10	1.136	2317	.1099E+00	.4324E-02	34.95	31.71
29.97	1.180	2334	.1294E+00	.4938E-02	35.99	32.75
31.60	1.244	2347	.2234E+00	.8794E-02	37.30	33.75
33.39	1.314	2355				

TABLE D2-29

SPECIMEN NUMBER: U125-4L2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 361° K
SPECIMEN THICKNESS: 3.23 MM (.128 IN)
MAXIMUM STRESS: 224.5 MPA (32.7 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 513 CYCLES

K(MAX) 26 CYCLES PRIOR TO FAILURE: 44.77 MPA SQRT(M) (43.74 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
3.42	.135	1	.5701E-02	.2244E-03	22.99	20.92
3.91	.154	87	.2861E-02	.1126E-03	24.17	22.08
4.19	.165	186	.7344E-02	.2891E-03	25.12	23.05
4.77	.188	255	.1395E-01	.6121E-03	27.26	24.91
5.63	.221	313	.1215E-01	.4783E-03	28.89	26.30
5.97	.235	341	.2386E-01	.9212E-03	30.01	27.31
6.71	.264	369	.2277E-01	.8964E-03	31.47	28.58
7.15	.281	397	.3312E-01	.1186E-02	32.97	30.11
7.92	.311	422	.9351E-01	.1984E-02	34.50	31.39
8.55	.337	435	.4345E-01	.1711E-02	35.81	32.59
9.16	.361	449	.4174E-01	.1616E-02	37.18	33.74
9.42	.387	465	.6178E-01	.2511E-02	38.27	34.83
1.39	.419	474	.1377E+01	.6234E-02	46.71	37.45
12.44	.436	487				

TABLE D2-30

SPECIMEN NUMBER: U125-6T5
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: T-L
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIR
TEST TEMPERATURE: 75 F
SPECIMEN THICKNESS: 3.24 MM (.128 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 49723 CYCLES

KMAX= 97 CYCLES PRIOR TO FAILURE: 34.33 MPA SQRT(M) (31.24 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.53	.336	1				
			.1312E-03	.3986E-06	11.87	10.80
9.31	.367	7779				
			.1256E-03	.4920E-05	12.38	11.27
10.27	.396	14836				
			.1452E-03	.5716E-05	12.85	11.69
10.79	.425	18813				
			.1157E-03	.4554E-05	13.32	12.12
11.61	.457	25840				
			.6361E-03	.2501E-04	13.96	12.70
12.36	.516	27967				
			.2332E-03	.9181E-05	14.53	13.22
13.61	.536	30777				
			.3829E-03	.1388E-04	14.91	13.57
14.15	.565	32474				
			.4726E-03	.1861E-04	15.25	13.87
14.95	.595	34022				
			.5383E-03	.2119E-04	15.53	14.13
15.41	.617	34960				
			.4681E-03	.1843E-04	15.84	14.42
16.17	.633	36769				
			.4193E-03	.1651E-04	16.19	14.74
16.78	.651	38067				
			.6574E-03	.2590E-04	16.56	15.07
17.61	.646	39181				
			.7247E-03	.2853E-04	16.97	15.35
18.13	.716	39836				
			.5585E-03	.2199E-04	17.89	15.55
19.41	.725	40686				
			.9713E-03	.3824E-04	17.36	15.88
19.14	.753	41329				
			.1127E-02	.4049E-04	17.93	16.22
20.79	.813	42549				
			.1232E-02	.4849E-04	18.42	16.76
21.69	.854	43606				
			.1391E-02	.5475E-04	18.96	17.25
22.75	.895	44764				
			.1607E-02	.6307E-04	19.48	17.73
24.05	.947	45179				
			.1945E-02	.7658E-04	20.27	18.27
25.43	1.001	45830				
			.2259E-02	.8894E-04	20.79	18.88
26.91	1.071	46672				
			.3561E-02	.1402E-03	21.63	19.59
29.15	1.147	47218				
			.3444E-02	.1357E-03	22.34	20.24
31.66	1.247	47656				
			.4901E-02	.1929E-03	23.68	20.98
33.15	1.305	48156				
			.6913E-02	.2723E-03	23.62	21.67
34.41	1.355	48492				
			.7763E-02	.3056E-03	24.46	22.21
36.05	1.419	48837				
			.1119E-01	.4401E-03	25.19	22.80
37.72	1.485	48979				
			.7394E-02	.2834E-03	25.57	23.24
38.74	1.525	49095				
			.9355E-02	.3648E-03	25.48	23.55
39.46	1.554	49232				
			.1254E-01	.4896E-03	26.31	23.95
40.91	1.611	49363				
			.1175E-01	.4624E-03	26.91	24.48
41.6	1.638	49427				
			.1745E-01	.6869E-03	27.39	24.87
42.60	1.678	49513				
			.1123E-01	.4774E-03	27.97	25.31
44.26	1.734	49613				
			.1574E-01	.6213E-03	28.78	25.74
45.42	1.788	49721				
			.2134E-01	.8402E-03	29.42	26.23
47.01	1.851	49843				
			.2774E-01	.1092E-02	30.48	26.83
49.22	1.938	49974				
			.3451E-01	.1358E-02	30.14	27.43
51.16	2.014	49511				
			.3837E-01	.1511E-02	30.71	27.95
53.11	2.091	49549				
			.4322E-01	.1593E-02	31.29	28.47
55.17	2.172	49585				
			.5429E-01	.2137E-02	31.77	28.86
56.17	2.211	49535				
			.6121E-01	.2410E-02	31.34	29.07
56.78	2.235	49613				
			.7476E-01	.3103E-02	32.73	29.82
58.34	2.297	49713				
			.8404E-01	.3295E-02	32.59	29.67
59.13	2.328	49736				

TABLE D2-31

SPECIMEN NUMBER: W125-T72
ALLOY, TEMPER: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIR/GAN
TEST TEMPERATURE: 294 K
SPECIMEN THICKNESS: 5.43 MM (.214 IN)
MAXIMUM STRESS: 165.5 MPA (24.0 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 69K CYCLES
KIMAX = 29 CYCLES PRIOR TO FAILURE: 34.62 MPA SQRT(M) (31.52 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(K) RANGE MPA SQRT(M)	DELTA(K) RANGE KSI SQRT(IN)
4.78	.188	1				
			.2297E-02	.9022E-04	18.59	19.68
4.98	.196	359				
			.3657E-02	.1440E-03	23.91	20.83
4.96	.197	442				
			.8555E-02	.3543E-03	22.78	20.73
4.93	.194	477				
			.4282E-02	.3241E-03	24.39	21.93
5.08	.200	571				
			.2152E-01	.8479E-03	25.42	23.13
5.37	.211	737				
			.1661E-01	.6393E-03	26.18	23.76
5.61	.221	835				
			.2521E-01	.1190E-02	26.48	24.47
5.71	.224	922				
			.2132E-01	.8391E-03	27.70	25.21
5.	.228	936				
			.3192E-01	.1213E-02	28.47	25.91
5.97	.234	991				
			.5445E-01	.2144E-02	29.96	27.08
6.14	.241	997				
			.9957E-01	.3686E-02	31.17	28.37
6.	.254	1074				
			.2324E-02	.9153E-02	32.64	29.65
6.32	.249	1078				
			.2527E-01	.9945E-02	33.41	30.77
1.	.	1093				
			.5785E-01	.2277E-01	35.14	32.01
11.58	.456	1092				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D2-32

SPECIMEN NUMBER:	U125-1L10
ALLOY TYPE:	2024-T861
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	DRY AIR
TEST TEMPERATURE:	295. K
SPECIMEN THICKNESS:	3.24 MM (.1275 IN)
MAXIMUM STRESS:	75.2 MPA (10.9 KSI)
R-RATIO:	.05
FREQUENCY:	200 CPM
CYCLES TO FAILURE:	43679 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE:	58.69 MPA SQRT(M) (53.41 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.96	.276	1				
7.51	.296	3196	.2032E-03	.8002E-05	10.74	9.78
8.20	.323	6893	.1851E-03	.7288E-05	11.23	10.22
8.63	.340	8821	.2247E-03	.8846E-05	11.63	10.58
9.45	.372	11846	.2712E-03	.1068E-04	12.06	10.97
10.11	.398	14403	.2602E-03	.1025E-04	12.55	11.42
10.78	.424	16722	.2864E-03	.1128E-04	12.97	11.81
11.37	.448	18215	.3972E-03	.1564E-04	13.36	12.16
12.10	.477	20222	.3645E-03	.1435E-04	13.76	12.53
12.63	.497	21722	.3539E-03	.1393E-04	14.13	12.86
13.32	.525	23142	.4864E-03	.1915E-04	14.49	13.18
14.17	.558	24751	.5233E-03	.2060E-04	14.92	13.57
14.63	.576	25819	.4317E-03	.1699E-04	15.27	13.90
15.21	.599	26759	.6161E-03	.2426E-04	15.55	14.15
15.91	.626	27844	.6485E-03	.2553E-04	15.89	14.46
16.73	.659	29079	.6812E-03	.2683E-04	16.29	14.82
17.30	.681	29957	.6509E-03	.2563E-04	16.64	15.14
17.49	.714	30666	.8347E-03	.3286E-04	16.93	15.41
18.49	.728	31282	.9587E-03	.3774E-04	17.22	15.68
19.23	.757	32097	.9147E-03	.3601E-04	17.55	15.97
19.77	.778	32575	.1127E-02	.4435E-04	17.86	16.25
21.40	.842	34097	.1071E-02	.4218E-04	18.37	16.72
22.36	.880	34921	.1148E-02	.4521E-04	18.97	17.26
23.75	.935	35411	.1432E-02	.5638E-04	19.50	17.75
24.12	.948	36626	.1753E-02	.6903E-04	20.09	18.29
26.29	1.035	37229	.1826E-02	.7191E-04	20.65	18.79
27.72	1.091	38042	.1984E-02	.7812E-04	21.23	19.32
29.16	1.148	38621	.2483E-02	.9775E-04	21.83	19.87
30.66	1.207	39161	.2772E-02	.1091E-03	22.45	20.43
31.98	1.259	39628	.3426E-02	.1349E-03	23.08	21.01
33.27	1.310	40033	.2719E-02	.1071E-03	23.61	21.49
34.93	1.375	40395	.4208E-02	.1657E-03	24.15	21.98
35.86	1.412	40723	.2864E-02	.1130E-03	24.67	22.45
37.47	1.475	41032	.6546E-02	.2577E-03	25.26	22.99
39.42	1.552	41320	.6254E-02	.2462E-03	25.91	23.58
41.54	1.635	41634	.6529E-02	.2570E-03	26.74	24.33
43.18	1.700	41872	.6045E-02	.2380E-03	27.42	24.96
45.48	1.790	42184	.8093E-02	.3186E-03	28.24	25.70
47.73	1.879	42371	.1000E-01	.3939E-03	29.10	26.48
49.12	1.934	42511	.1212E-01	.4771E-03	29.80	27.12
51.47	2.026	42660	.1090E-01	.4292E-03	30.46	27.72
53.11	2.091	42761	.1457E-01	.5737E-03	31.07	28.28
54.41	2.142	42873	.1845E-01	.7263E-03	31.78	28.92
56.29	2.216	43032	.1496E-01	.5890E-03	32.59	29.66
57.38	2.259	43092	.2102E-01	.8275E-03	33.32	30.32
59.44	2.340	43151	.2064E-01	.8126E-03	33.97	30.92
61.40	2.417	43225	.2507E-01	.9872E-03	34.69	31.57
62.84	2.474	43292	.2947E-01	.1160E-02	35.44	32.25
64.35	2.533	43333	.2801E-01	.1103E-02	36.10	32.86
67.07	2.640	43414	.3537E-01	.1393E-02	36.99	33.66
69.17	2.722	43464	.4402E-01	.1733E-02	38.08	34.65
71.65	2.821	43518	.4667E-01	.1837E-02	39.13	35.61
73.54	2.896	43541	.7312E-01	.2879E-02	40.15	36.53
87.25	3.435	43646	.1096E+00	.4314E-02	44.10	40.13
99.55	3.919	43678	.9419E+00	.3708E-01	51.63	46.99

TABLE D2-33

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

LOWER CYCLE:
UNSTIFFENED
WET AIR
[illegible] F
1.24 MM (0.[illegible] IN)
112.6 MPA (17.2 KSI)
.05
200 CPM
8900 CYCLES

KIMAX 1 CYCLES PRIOR TO FAILURE: 67.55 MPA SQRT(M) (61.47 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.39	.211	1				
	5.77	.227	1354	.3126E-03	.1231E-04	14.91	13.57
	6.42	.253	2519	.5501E-03	.2197E-04	15.61	14.21
	7.[illegible]E	.292	3246	.1020E-02	.4017E-04	16.48	15.00
	7.89	.310	3869	.1120E-02	.4409E-04	17.35	15.79
	8.68	.338	4639	.9895E-03	.3896E-04	18.17	16.53
	9.20	.365	5157	.1240E-02	.4881E-04	18.92	17.22
	9.98	.393	5588	.1639E-02	.6439E-04	19.65	17.88
	10.76	.424	5963	.2090E-02	.8227E-04	20.40	18.57
	11.38	.448	6251	.2156E-02	.8490E-04	21.05	19.19
	12.19	.479	6663	.2438E-02	.9599E-04	21.79	19.79
	13.31	.524	6903	.3893E-02	.1415E-03	22.50	20.48
	13.82	.535	6949	.4301E-02	.1693E-03	23.15	21.07
	14.16	.558	7115	.3222E-02	.1269E-03	23.66	21.53
	14.[illegible]5	.569	7335	.3579E-02	.1409E-03	24.24	22.06
	15.[illegible]2	.627	7503	.5779E-02	.2274E-03	24.98	22.73
	16.79	.661	7634	.6577E-02	.2588E-03	25.73	23.42
	17.39	.685	7764	.4673E-02	.1838E-03	26.32	23.95
	18.19	.716	7868	.9449E-02	.3720E-03	26.47	24.46
	19.[illegible]6	.768	7983	.9784E-02	.3852E-03	27.60	25.28
	20.42	.811	8107	.9949E-02	.3684E-03	28.60	26.03
	22.[illegible]5	.868	8221	.1271E-01	.5004E-03	29.54	26.88
	23.11	.910	8312	.1141E-01	.4571E-03	30.44	27.71
	24.[illegible]1	.964	8439	.1717E-01	.6759E-03	31.34	28.52
	24.42	1.[illegible]1	8468	.1[illegible]E-01	.6944E-03	32.78	29.38
	27.[illegible]4	1.[illegible]6	8537	.2252E-01	.8710E-03	33.29	30.23
	28.[illegible]6	1.[illegible]1	8591	.2101E-01	.8274E-03	34.17	31.04
F	32.[illegible]9	1.[illegible]5	8730	.3571E-01	.1406E-02	35.76	32.54
F	36.[illegible]3	1.[illegible]0	8753	.5334E-01	.2100E-02	37.48	34.07
F	37.[illegible]1	1.[illegible]6	8791	.5399E-01	.2125E-02	39.42	35.86
F	38.[illegible]1	1.[illegible]1	8820	.4657E-01	.1833E-02	40.52	36.87
F	41.[illegible]9	1.[illegible]1	8845	.4144E-01	.1630E-02	41.66	37.92
F	42.[illegible]7	1.[illegible]4	8865	.1314E+00	.5170E-02	43.31	39.14
F	44.43	1.[illegible]5	8895	.1361E+00	.5357E-02	44.23	40.25
F	47.12	1.[illegible]5	8930	.2174E+00	.8582E-02	45.57	41.43
F	49.[illegible]1	1.[illegible]4	8980	.2794E+00	.1102E-01	47.11	42.87
F	51.17	2.[illegible]3	9029	.5380E+00	.2000E-01	49.26	44.83
F	57.[illegible]5	2.[illegible]0	9112	.7537E+00	.2966E-01	51.67	46.93
F	61.[illegible]6	2.[illegible]1	9165	.1272E+01	.5003E-01	53.45	48.60
F	64.[illegible]7	2.[illegible]5	9215	.1143E+01	.4500E-01	55.30	50.40
F	66.[illegible]1	2.[illegible]4	9267	.1305E+01	.5137E-01	56.97	51.84
F	69.[illegible]3	2.[illegible]5	9314	.2921E+01	.1150E+00	58.19	52.96
F	73.[illegible]4	2.[illegible]0	9415	.2731E+01	.2650E+00	61.64	56.10

TABLE D2-34

SPECIMEN NUMBER: U125-5L1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 288.2 K
SPECIMEN THICKNESS: 1.40 MM (.1349 IN)
MAXIMUM STRESS: 225.5 MPA (32.7 KSI)
R-RATIO: .05
FREQUENCY: 233 CPM
CYCLES TO FAILURE: 378 CYCLES
K(MAX) 289 CYCLES PRIOR TO FAILURE: 26.46 MPA SQRT(M) (24.02 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.72	.147	1				
			.7231E-02	.2847E-03	24.17	21.96
4.36	.172	19				

TABLE D2-35

SPECIMEN NUMBER: U125-5T4
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 298.7 K
SPECIMEN THICKNESS: 3.21 MM (.1270 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 27364 CYCLES
K(MAX) 518 CYCLES PRIOR TO FAILURE: 29.10 MPA SQRT(M) (26.48 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.52	.339	1				
			.2681E-03	.1056E-04	11.87	10.81
9.23	.363	2270				
			.2665E-03	.1049E-04	12.26	11.15
9.76	.384	4241				
			.3428E-03	.1350E-04	12.62	11.48
11.38	.448	6022				
			.7897E-03	.3109E-04	13.07	11.89
11.20	41	7093				
			.2937E-03	.1156E-04	13.72	12.49
12.54	[illegible]	11638				
			.4116E-03	.1620E-04	14.29	13.00
13.18	[illegible]	13147				
			.6202E-03	.2442E-04	14.65	13.33
13.81	.544	14215				
			.6677E-03	.2629E-04	14.99	13.65
14.45	.569	15166				
			.7367E-03	.2787E-04	15.36	13.98
15.19	.537	16194				
			.6972E-03	.2745E-04	15.74	14.32
15.88	.625	17235				
			.7944E-03	.3135E-04	16.10	14.66
16.65	.654	18114				
			.6533E-03	.2571E-04	16.41	14.93
17.29	.673	18853				
			.1051E-02	.4147E-04	16.71	15.23
17.96	.705	19421				
			.1156E-02	.4551E-04	17.10	15.56
18.59	.732	19933				
			.1170E-02	.4606E-04	17.44	15.87
19.37	.763	20432				
			.1541E-02	.6069E-04	17.89	16.28
20.47	.806	21035				
			.1712E-02	.6741E-04	18.51	16.86
22.19	.874	21776				
			.1958E-02	.7749E-04	19.17	17.45
23.92	.942	22459				
			.2182E-02	.8593E-04	19.75	17.98
24.77	.975	22792				
			.3162E-02	.1246E-03	20.36	18.52
26.42	1.040	23433				
			.3187E-02	.1255E-03	20.94	19.06
27.44	1.080	24063				
			.4146E-02	.1593E-03	21.49	19.55
28.7.	1.131	24496				
			.4174E-02	.1800E-03	22.12	20.04
[illegible]	1.182	25247				
			.5544E-02	.2183E-03	22.84	20.61
31.73	1.249	25536				
			.6723E-02	.2647E-03	23.10	21.02
32.24	1.269	25734				
			.6307E-3	.2483E-03	23.60	21.46
34.19	1.346	26000				
			.7595E-02	.3144E-03	24.28	22.10
35.74	1.407	26147				
			.1004E-01	.3954E-03	24.94	22.61
37.11	1.461	26323				
			.8854E-02	.3384E-03	25.38	23.09
38.48	1.514	26437				
			.1376E-01	.4232E-03	25.95	23.62
39.35	1.549	26631				
			.1271E-01	.4906E-03	26.48	24.09
41.14	1.620	26774				
			.1471E-01	.5792E-03	26.34	24.52
42.14	1.659	26871				
			.2733E-01	.1076E-02	27.41	24.94
43.74	1.714	26916				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D2-36

SPECIMEN NUMBER: U129-6T6
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: MET AIR
TEST TEMPERATURE: 298.7 K
SPECIMEN THICKNESS: 2.24 MM (.1250 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .10
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 6261 CYCLES
K(MAX) 149 CYCLES PRIOR TO FAILURE: 31.83 MPA SQRT(M) (28.96 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.05	.199	1				
5.67	.223	812	.7611E-03	.2996E-04	14.63	13.31
6.20	.244	1478	.8087E-03	.3184E-04	15.48	14.81
6.61	.260	2044	.6702E-03	.2638E-04	16.80	14.96
7.27	.286	2751	.9963E-03	.3883E-04	16.66	15.16
7.95	.311	3344	.1356E-02	.4157E-04	17.42	15.48
8.41	.339	3891	.1316E-02	.5183E-04	18.18	16.54
9.38	.369	4486	.2669E-02	.1027E-03	18.99	17.20
10.02	.394	4686	.2129E-02	.8367E-04	19.72	17.95
10.71	.422	4727	.2851E-02	.1122E-03	20.39	18.56
11.43	.450	4961	.3388E-02	.1216E-03	21.08	19.19
12.16	.479	5143	.2863E-02	.1126E-03	21.73	19.78
12.83	.505	5312	.5962E-02	.2388E-03	22.14	20.36
13.44	.529	5442	.4549E-02	.1791E-03	22.80	20.93
14.18	.558	5641	.3763E-02	.3096E-03	23.59	21.47
15.34	.604	5875	.8788E-02	.3425E-03	24.41	22.22
16.14	.643	5777	.9799E-02	.3858E-03	25.31	23.04
17.46	.717	5890	.1433E-01	.5628E-03	26.37	24.88
19.42	.764	5946	.1521E-01	.5990E-03	27.57	25.09
21.38	.835	6062	.2012E-01	.7921E-03	28.70	26.12
22.79	.877	6114	.2587E-01	.1016E-02	29.74	27.08

TABLE D2-37

SPECIMEN NUMBER: 129-1T1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: MET AIR
TEST TEMPERATURE: 298.7 K
SPECIMEN THICKNESS: 3.61 MM (.1360 IN)
MAXIMUM STRESS: 203.1 MPA (29.44 KSI)
R-RATIO: .10
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 267 CYCLES
K(MAX) 164 CYCLES PRIOR TO FAILURE: 23.78 MPA SQRT(M) (21.67 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.39	.173	133	.6434E-01	.2613E-03	21.70	19.75

TABLE D2-38

SPECIMEN NUMBER: 125-1L6
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.23 MM (.1272 IN)
MAXIMUM STRESS: 118.5 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4245 CYCLES
K(MAX) 347 CYCLES PRIOR TO FAILURE: 44.01 MPA SQRT(M) (40.05 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.45	.293	1				
			.8748E-03	.3443E-04	17.40	16.20
9.17	.329	1151				
			.1153E-02	.4147E-04	18.72	17.04
9.12	.359	1766				
			.1972E-02	.7762E-04	19.49	17.74
9.42	.347	2119				
			.1797E-02	.7074E-04	20.14	18.51
1..79	.425	2699				
			.2154E-02	.9282E-04	21.26	19.35
11.71	.461	3049				
			.3185E-02	.1215E-03	22.18	20.10
12.53	.494	3317				
			.3473E-02	.1367E-03	22.90	20.44
13.5.	.532	3596				
			.1374E-02	.1329E-03	23.65	21.71
14.73	.579	3952				
			.4938E-02	.1944E-03	24.59	22.45
15.94	.627	4231				
			.5567E-02	.2192E-03	26.31	23.67
17.45	.687	4472				
			.6301E-02	.2481E-03	27.05	24.62
18.58	.731	4651				
			.7973E-02	.3122F-03	28.27	25.72
2..62	.812	4911				
			.1313E-01	.3996E-03	29.48	26.83
21.45	.845	5012				
			.1157E-31	.4554E-03	30.54	27.79
23.55	.927	5179				
			.1537E-01	.6050E-03	31.72	28.87
25.23	.993	5288				
			.1743E-01	.6864E-03	32.95	29.99
27.14	1.069	5398				
			.1571E-01	.6184E-03	34.14	31.07
28.76	1.132	5491				
			.2112E-01	.8316E-03	35.23	32.06
3..43	1.198	5592				
			.2444E-01	.9623E-03	36.22	32.96
31.42	1.253	5687				
			.2501E-01	.9846E-03	37.31	33.96
31.63	1.332	5717				
			.2814E-01	.1104E-02	38.48	34.94
35.23	1.387	5767				
			.2975E-01	.1171E-02	39.35	35.81
36.64	1.456	5821				
			.4129E-01	.1626E-02	40.38	36.68
38.28	1.507	5856				
			.4028E-01	.1586E-02	41.28	37.57
39.97	1.574	5898				

TABLE D2-39

SPECIMEN NUMBER: 125-6L1
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.35 MM (.1320 IN)
MAXIMUM STRESS: 196.4 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 775 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 2.8 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.45	.520	1				
				.1903E-31	.7487E-33	38.38	35.47
	7.37	.581	134				
				.2281E-31	.8979E-03	41.92	37.79
	8.26	.631	192				
				.2511E-01	.9844E-03	43.84	39.98
	9.11	.714	251				
				.3881E-31	.1528E-02	46.26	42.10
	1..16	.803	334				
				.3485E-01	.1371E-03	48.77	44.32
	11.1.	.874	394				
				.3356E-01	.1357E-02	50.47	46.29
	11.93	.944	453				
				.4659E-01	.1833E-02	53.05	48.28
	12.99	1..23	546				
				.9991E-01	.3931E-02	65.49	59.78
	23.77	1.471	654				
F	24.73	1.947	675	.2791E+00	.1113E-01	77.74	71.76
F	2..91	2.347	695	.1785E+00	.7024E-32	83.42	73.35
F	24.24	2.224	711	.2113E+00	.9134E-02	84.99	76.71
F	31.11	2.452	729	.3953E+00	.1517E-01	89.24	81.23
F	33.41	2.595	74.	.2253E+00	.8871E-02	94.3E	85.47
F	35.14	2.769	763	.4411E+01	.1744E-01	99.44	89.98
F	37.44	2.913	7..				
F	39.91	3.141	7.5	(NET STRESS GREATER THAN 2.8 FTY)			
F	42.41	3.3..	749	(NET STRESS GREATER THAN ..8 FTY)			
F	43.29	3.364	771	(NET STRESS GREATER THAN ..8 FTY)			
F	46.71	3.674	772	(NET STRESS GREATER THAN ..8 FTY)			
F	49.16	3.871	773	(NET STRESS GREATER THAN ..8 FTY)			
F	5..47	4.144	774	(NET STRESS GREATER THAN ..8 FTY)			

TABLE D2-40

SPECIMEN NUMBER: 125-3T3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.23 MM (.1270 IN)
MAXIMUM STRESS: 116.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 5222 CYCLES
KIMAX: 284 CYCLES PRIOR TO FAILURE: 41.13 MPA SQRT(M) (37.43 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.93	.272	1				
	7.32	.312	833	.1270E-02	.5031E-04	17.22	15.67
	8.03	.347	1498	.1203E-02	.4859E-04	16.30	14.85
	9.77	.393	2157	.1360E-02	.5433E-04	15.27	17.53
	10.49	.429	2659	.2106E-02	.8606E-04	20.73	18.58
	11.78	.464	2963	.3251E-02	.1280E-03	21.73	19.62
	12.96	.511	3261	.4036E-02	.1589E-03	22.32	20.31
	14.21	.559	3531	.4594E-02	.1794E-03	23.41	21.38
	15.08	.594	3644	.5661E-02	.2229E-03	24.31	22.13
	16.23	.639	3859	.6568E-02	.2583E-03	25.16	22.89
	17.44	.687	3984	.9703E-02	.3820E-03	26.11	23.77
	18.18	.716	4096	.6622E-02	.2607E-03	26.89	24.47
	19.13	.749	4199	.8224E-02	.3238E-03	27.58	25.03
	21.61	.851	4433	.1264E-01	.4975E-03	28.79	26.28
	23.34	.937	4606	.1398E-01	.5471E-03	30.25	27.53
	24.47	.963	4694	.1839E-01	.7224E-03	31.27	28.46
	26.27	1.034	4872	.2244E-01	.8845E-03	32.39	29.47
	28.28	1.113	4746	.2712E-01	.1068E-02	33.67	30.65
	30.05	1.183	4835	.3811E-01	.1186E-02	34.93	31.79
	31.84	1.254	4860	.3255E-01	.1282E-02	36.99	32.85
	33.54	1.320	4894	.4994E-01	.1966E-02	37.21	33.87
	35.52	1.402	4938	.4728E-01	.1861E-02	38.42	34.96

TABLE D2-41

SPECIMEN NUMBER: 125-4T3
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.33 MM (.1310 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 518 CYCLES
KIMAX: 1 CYCLES PRIOR TO FAILURE: 82.75 MPA SQRT(M) (75.21 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.59	.448	1				
	7.79	.614	291	.1452E-01	.5717E-03	38.48	35.02
	8.59	.674	322	.5152E-01	.2028E-02	42.52	38.78
	9.76	.769	366	.9336E-01	.2131E-02	45.10	41.04
	11.34	.462	402	.6553E-01	.2579E-02	48.02	43.78
	11.92	.939	427	.7940E-01	.3087E-02	50.68	46.05
	13.19	1.054	447	.1464E+00	.5764E-02	53.41	48.61
	14.15	1.177	472	.1248E+00	.4986E-02	56.77	51.67
	16.14	1.263	480	.2739E+00	.1078E-01	59.64	54.28
	17.14	1.356	489	.2942E+00	.1139E-01	62.18	56.59
	18.42	1.450	493	.5192E+00	.2123E-01	64.67	58.85
	20.16	1.547	502	.3866E+00	.1522E-01	67.98	61.58
	21.11	1.642	514	.9495E+00	.3736E-01	70.34	64.01
F	22.15	1.736	486	.9418E+00	.3705E-01	72.27	65.77
F	23.22	1.828	530	.1165E+01	.4587E-01	74.43	67.74
F	24.67	1.943	589	.2918E+01	.1148E+00	77.12	70.18

TABLE D2-42

SPECIMEN NUMBER: U12E-SL11
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.7 K
SPECIMEN THICKNESS: 3.25 MM (.1280 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 6720 CYCLES
K(MAX) 391 CYCLES PRIOR TO FAILURE: 43.28 MPA SQRT(M) (41.21 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
7.49	.233	1				
			.6768E-03	.2664E-04	17.57	15.99
7.98	.314	791				
			.9925E-03	.3907E-04	18.28	16.63
8.72	.342	1514				
			.1.. 6E-02	.5849E-04	19.00	17.29
9.12	.367	1932				
			.1079E-02	.6594E-04	19.78	17.99
10.16	.430	2434				
			.1713E-02	.6745E-04	20.59	18.78
10.95	.429	2858				
			.2001E-02	.7878E-04	21.37	19.41
11.76	.463	3294				
			.2529E-02	.9953E-04	22.24	20.24
12.44	.525	3721				
			.2946E-02	.1160E-03	23.17	21.04
13.69	.539	4089				
			.4279E-02	.1667E-03	23.47	21.72
14.65	.573	4213				
			.4657E-02	.1833E-03	24.65	22.43
15.53	.611	4423				
			.5572E-02	.2194E-03	25.46	23.16
16.49	.649	4596				
			.6381E-02	.2119E-03	27.26	23.98
17.54	.630	4790				
			.7349E-02	.2893E-03	27.94	25.43
20.41	.919	5236				
			.1343E-01	.4172E-03	29.77	27.10
22.48	.995	5333				
			.1264E-01	.4994E-03	31.09	28.29
24.49	.904	5552				
			.1301E-01	.5122E-03	32.45	29.53
26.41	1.040	5699				
			.1661E-01	.6540E-03	33.76	33.72
28.36	1.116	5817				
			.1497E-01	.5894E-03	34.90	31.76
29.44	1.175	5916				
			.2324E-01	.9152E-03	35.98	32.65
31.37	1.235	5992				
			.2434E-01	.9583E-03	36.46	33.53
32.43	1.293	6042				
			.2744E-01	.1196E-02	38.00	34.58
34.39	1.377	6119				
			.2474E-31	.9741E-33	35.13	35.61
36.41	1.434	6177				
			.3166E-01	.1143E-02	40.16	36.53
38.32	1.545	6237				
			.3441E-01	.1355E-02	41.17	37.47
39.73	1.553	6285				
			.4549E-01	.1791E-02	42.37	38.52
41.31	1.691	6329				

TABLE D2-43

SPECIMEN NUMBER: U12S-4T7
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.24 MM (.1276 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4970 CYCLES
K(MAX) 144 CYCLES PRIOR TO FAILURE: 41.63 MPA SQRT(M) (37.88 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
7.36	.290	1				
			.1105E-02	.4192E-04	17.60	16.01
8.22	.324	934				
			.1363E-02	.5366E-04	17.58	16.91
9.12	.359	1491				
			.1808E-32	.7408E-04	19.60	17.43
10.16	.399	2089				
			.2328E-02	.9159E-04	20.54	18.79
11.15	.437	2499				
			.3124E-02	.1192E-03	21.71	19.76
12.17	.487	2919				
			.3364E-02	.1324E-03	22.79	20.68
13.79	.523	3191				
			.4375E-02	.1722E-03	23.67	21.45
14.74	.582	3419				
			.6227E-32	.2467E-03	24.48	22.25
15.14	.594	3547				
			.5452E-02	.2304E-03	25.37	23.09
16.60	.648	3745				
			.7544E-32	.3124E-03	26.31	23.94
17.68	.696	3930				
			.9866E-02	.3906E-03	27.23	24.78
19.02	.749	4056				
			.1569E-31	.6173E-03	28.30	25.75
20.46	.805	4157				
			.1352E-01	.5356E-03	25.60	26.94
22.38	.881	4295				
			.2274E-01	.8978E-03	31.10	28.38
24.46	.971	4399				
			.2274E-01	.8038E-03	32.76	29.81
27.19	1.070	4523				
			.3537E-01	.1393E-02	34.37	31.23
29.31	1.154	4583				
			.2914E-31	.1147E-02	35.43	32.68
31.79	1.251	4658				
			.4496E-01	.1764E-02	37.12	33.78
33.71	1.311	4702				
			.3671E-01	.1445E-02	38.12	34.69
34.32	1.375	4746				
			.5632E-01	.2217E-02	39.89	35.57
36.19	1.433	4772				

TABLE D2-44

SPECIMEN NUMBER: 125-1L14
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.25 MM (.1280 IN)
MAXIMUM STRESS: 110.5 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 7237 CYCLES
K(MAX) 442 CYCLES PRIOR TO FAILURE: 47.62 MPA SQRT(M) (43.33 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.04	.238	1				
			.1029E-02	.4053E-04	17.58	15.98
4.14	.371	859				
			.1179E-02	.4684E-04	18.48	16.82
4.92	.351	1618				
			.1443E-02	.5669E-04	19.20	17.47
5.47	.373	1949				
			.1967E-02	.6169E-04	19.88	18.09
11.24	.443	244				
			.1435E-02	.5651E-04	20.54	18.70
1..79	.425	2845				
			.2565E-02	.1037E-03	21.17	19.27
11.52	.454	3151				
			.2584E-02	.1179E-03	22.58	20.63
13.76	.542	3933				
			.3344E-02	.1316E-03	23.81	21.68
14.34	.566	4117				
			.3817E-02	.150 .E-03	24.48	22.28
14.29	.612	4357				
			.5342E-02	.1988E-03	25.21	22.95
14.14	.616	4425				
			.5752E-02	.2264E-03	25.95	23.61
17. 9	.677	4631				
			.6595E-02	.2242E-03	26.68	24.28
19.10	.728	4849				
			.5935E-02	.2298E-03	27.31	24.86
14.7[	.736	4895				
			.9511E-02	.3744E-03	27.98	25.35
19.41	.764	5044				
			.6462E-02	.2544E-03	28.56	25.99
2..1[	.811	5225				
			.8298E-02	.3268E-03	29.33	26.67
22.13	.867	5420				
			.1165E-01	.4586E-03	30.61	27.86
23.[1	.929	5634				
			.9364E-02	.3685E-03	31.52	28.68
24.01	.969	5842				
			.1523E-01	.5994E-03	32.38	29.47
26.1[	1..28	5946				
			.1595E-01	.6274E-03	33.38	30.37
27.13	1.346	6082				
			.1314E-01	.5961E-03	34.38	31.28
27. 9	1.145	5933				
			.1884E-01	.7414E-03	35.45	32.26
31.81	1.213	6024				
			.1655E-01	.6515E-03	36.54	33.25
32.43	1.277	6172				
			.1959E-01	.7713E-03	37.53	34.15
33.[1	1.335	6137				
			.2302E-01	.9062E-03	38.58	35.11
35.74	1.408	6274				
			.2193E-01	.8633E-03	39.68	36.12
37.[8	1.484	6338				
			.2715E-01	.1069E-02	40.46	36.81
38.82	1.516	6331				
			.3214E-01	.1267E-02	41.34	37.62
39.93	1.572	6435				
			.3134E-01	.1234E-02	42.23	38.43
41.34	1.629	6441				
			.3112E-01	.1221E-02	43.08	39.18
42.63	1.678	6521				
			.3407E-01	.1339E-02	43.91	39.96
44.11	1.737	6536				
			.4644E-01	.1828E-02	44.80	40.77
45.21	1.792	6535				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D2-45

SPECIMEN NUMBER: 125-0L6
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 3.35 MM (.1320 IN)
MAXIMUM STRESS: 140.9 MPA (20.4 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1225 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	9.37	.423	1				
	7.35	.555	323	.1847E-01	.4123E-03	36.92	33.68
	7.84	.618	422	.1996E-01	.6283E-03	40.91	36.86
	8.41	.693	492	.2753E-01	.1084E-02	42.99	39.03
	9.59	.755	553	.2552E-01	.1005E-02	45.16	41.18
	10.73	.843	633	.2797E-01	.1101E-02	47.93	43.29
	11.59	.913	698	.3238E-01	.1275E-02	49.95	45.46
	12.61	.993	738	.4048E-01	.1594E-02	52.17	47.47
	13.58	1.069	783	.4324E-01	.1703E-02	54.42	49.52
	14.34	1.129	818	.4369E-01	.1720E-02	56.35	51.28
	14.98	1.180	846	.4579E-01	.1803E-02	57.48	52.67
	16.12	1.266	881	.5785E-01	.2278E-02	59.66	54.29
	16.79	1.322	907	.6115E-01	.2408E-02	61.58	56.04
	17.53	1.404	938	.6677E-01	.2629E-02	63.50	57.79
	18.71	1.473	959	.8405E-01	.3309E-02	65.50	59.61
	19.64	1.548	981	.8641E-01	.3402E-02	67.39	61.33
	21.47	1.612	998	.9512E-01	.3745E-02	69.20	62.98
	21.46	1.690	1021	.8617E-01	.3393E-02	71.15	64.66
	22.42	1.755	1035	.1366E+00	.5377E-02	73.15	66.47
	23.21	1.830	1047	.1364E+00	.5371E-02	74.87	68.13
	24.15	1.902	1059	.1532E+00	.6033E-02	76.65	69.76
	25.17	1.990	1073	.1736E+00	.6834E-02	78.86	71.76
	26.19	2.063	1087	.1178E+00	.4643E-02	80.98	73.69
	27.51	2.166	1101	.2314E+00	.9029E-02	83.22	75.73
	28.71	2.260	1114	.2986E+00	.1176E-01	85.47	78.15
F	31.93	2.427	1120	.3545E+00	.1396E-01	89.47	81.42
F	32.22	2.537	1135	.1960E+00	.7723E-02	93.38	84.98
F	34.66	2.731	1150	.3268E+00	.1283E-01	97.79	88.99
F	36.54	2.877	1165	(NET STRESS GREATER THAN 0.9 FTY)			
F	38.68	3.047	1179	(NET STRESS GREATER THAN 0.9 FTY)			
F	41.16	3.235	1190	(NET STRESS GREATER THAN 0.9 FTY)			
F	43.31	3.413	1200	(NET STRESS GREATER THAN 0.9 FTY)			
F	45.39	3.580	1205	(NET STRESS GREATER THAN 0.9 FTY)			
F	47.31	3.717	1213	(NET STRESS GREATER THAN 0.9 FTY)			
F	48.99	3.849	1213	(NET STRESS GREATER THAN 0.9 FTY)			
F	50.39	3.962	1215	(NET STRESS GREATER THAN 0.9 FTY)			
F	51.90	4.087	1217	(NET STRESS GREATER THAN 0.9 FTY)			
F	54.31	4.276	1219	(NET STRESS GREATER THAN 0.9 FTY)			
F	57.76	4.548	1221	(NET STRESS GREATER THAN 0.9 FTY)			
F	59.19	4.662	1222	(NET STRESS GREATER THAN 0.9 FTY)			
F	61.75	4.862	1223	(NET STRESS GREATER THAN 0.9 FTY)			
F	64.42	5.074	1224				

TABLE D2-46

SPECIMEN NUMBER: 125-3T8
ALLOY TYPE: 2024-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 550.0 °F
SPECIMEN THICKNESS: 3.23 MM (.1272 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 4427 CYCLES
K(MAX) 277 CYCLES PRIOR TO FAILURE: 40.62 MPA SQRT(M) (36.96 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
7.09	.279		.1455E-02	.5729E-04	17.26	15.71
7.80	.307	488	.1418E-02	.5582E-04	18.07	16.45
8.52	.335	995	.1724E-02	.6786E-04	18.42	17.13
9.17	.361	1373	.2295E-02	.9036E-04	15.57	17.01
9.93	.391	1735	.2595E-02	.1021E-03	20.77	18.90
11.56	.455	2333	.3249E-02	.1279E-03	21.46	19.49
12.21	.481	2514	.3295E-02	.1297E-03	22.48	20.45
12.95	.510	2741	.4423E-02	.1741E-03	23.07	20.99
13.53	.533	2884	.5269E-02	.2074E-03	23.69	21.56
14.31	.563	3033	.6231E-02	.2455E-03	24.74	22.51
15.98	.629	3351	.9431E-02	.3714E-03	26.27	23.91
18.06	.711	3521	.1323E-01	.4027E-03	28.18	25.65
2..92	.824	3831	.1756E-01	.6923E-03	25.87	27.18
22.63	.891	3938	.1935E-01	.7226E-03	30.95	28.17
23.97	.944	3971	.2234E-01	.8812E-03	32.08	29.20
25.97	1.019	4056	.1782E-01	.7014E-03	33.16	30.17
27.12	1.068	4126	.2692E-01	.1.64E-02	34.21	31.14
23.13	1.143	4137	.3143E-01	.1237E-02	35.49	32.66
12.24	1.209	4249	.3944E-01	.1568E-02	37.31	33.95
33.47	1.318	4329	.4563E-01	.1795E-02	38.14	34.71
34.44	1.372	434.				

TABLE D2-47

SPECIMEN NUMBER: 125-4T10
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 550.0 °F
SPECIMEN THICKNESS: 3.35 MM (.1320 IN)
MAXIMUM STRESS: 195.4 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 233 CPM
CYCLES TO FAILURE: 455 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 46.65 MPA SQRT(M) (42.46 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	7.09	.277		.1603E-01	.6313E-03	37.84	34.44
	6.98	.275	114	.3383E-01	.1206E-02	40.23	36.61
	7.72	.304	144	.4311E-01	.1697E-02	42.52	38.78
	8.73	.344	211	.4463E-01	.1753E-02	45.25	41.18
	9.74	.383	244	.6.87E-01	.2396E-02	47.64	43.35
	11.05	.439	290	.8261E-01	.3252E-02	49.63	45.17
	11.39	.447	314	.1106E+00	.3961E-02	51.74	47.19
	12.65	.498	325	.1329E+00	.4.51E-02	53.94	49.09
	13.43	1.043	342	.1127E+00	.4443E-02	56.04	51.02
	14.35	1.131	362	.1745E+00	.7.26E-02	58.25	53.01
	15.33	1.207	373	.2344E+00	.8213E-02	61.53	55..9
	15.44	1.216	374	.2444E+00	.9794E-02	63.44	57.74
	14.10	1.425	337	.1242E+00	.4891E-02	65.46	60.03
	14.98	1.459	41.	.2366E+00	.9313E-02	67.49	61.79
	19.97	1.572	419	.4178E+00	.1634E-01	73.24	63.92
	21.19	1.669	425	.3962E+00	.1560E-01	73.12	66.54
	22.78	1.794	433	.4563E+00	.1796E-01	74.14	69.51
	24.37	1.919	44.	.6673E+00	.2551E-01	91.3F	73.77
F	27.24	2.1+3	443	.8367E+00	.3373E-01	95.49	77.90
F	28.58	2.250	442	.1375E+01	.5413E-01	99.35	80.40
F	29.35	2.358	434	.1800E+01	.7057E-01	90.54	82.17
F	31.05	2.429	435				

TABLE D2-48

SPECIMEN NUMBER: 125-2L9
ALLOY TYPE: 2.24-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST T MPERATURE: 453.7 K
SPECIMEN THICKNESS: 5.71 MM (.225 IN)
MAXIMUM STRESS: 115.1 MPA (16.7 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 15473 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 1.4 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	8.77	.345	1	.5103E-03	.1993E-04	10.17	9.17
	9.04	.356	1463	.4993E-03	.1952E-04	10.31	9.36
	1.36	.368	3241	.6417E-03	.2526E-04	10.37	9.46
	11.09	.437	4353	.8184E-03	.3223E-04	11.29	10.28
	11.81	.465	5296	.9141E-03	.3601E-04	11.64	10.59
	12.47	.492	6113	.9177E-03	.3574E-04	11.35	10.67
	13.09	.515	6894	.1251E-02	.4927E-04	12.28	11.18
	13.84	.549	7342	.1387E-02	.5461E-04	12.64	11.50
	14.66	.577	7892	.1381E-02	.5439E-04	13.10	11.93
	15.26	.601	8423	.1533E-02	.6044E-04	13.37	12.16
	15.91	.642	9011	.1915E-02	.7541E-04	13.71	12.49
	17.25	.679	9531	.2461E-02	.9693E-04	14.22	12.95
	18.72	.737	10131	.2437E-02	.9596E-04	14.70	13.38
	19.61	.772	10466	.3224E-02	.1270E-03	15.12	13.76
	21.43	.843	10963	.3423E-02	.1348E-03	15.64	14.27
	22.49	.886	11326	.3654E-02	.1439E-03	16.21	14.76
	23.62	.930	11636	.4677E-02	.1842E-03	16.76	15.26
	25.43	1.001	12134	.4675E-02	.1841E-03	17.33	15.77
	26.96	1.061	12525	.5441E-02	.2142E-03	17.91	16.32
	28.12	1.107	12861	.6819E-02	.2685E-03	18.74	17.06
	29.37	1.156	12737	.5584E-02	.2199E-03	18.78	17.12
	30.74	1.210	13014	.6299E-02	.2480E-03	19.15	17.43
	31.93	1.257	13142	.4.56E-02	.3563E-03	19.51	17.44
	33.23	1.308	13354	.8827E-02	.3513E-03	20.11	18.31
	34.35	1.352	13517	.9114E-02	.3905E-03	20.93	18.68
	35.6	1.401	13697	.9894E-02	.3727E-03	20.37	18.54
	37.35	1.471	13967	.1273E-01	.5013E-03	21.34	19.42
	38.55	1.518	13883	.9574E-02	.3771E-03	21.79	19.83
	40.3	1.579	14044	.1.62E-1	.4103E-03	22.45	20.38
	42.27	1.664	14264	.1617E-01	.6367E-03	23.01	2..94
	43.45	1.737	14347	.1195E-1	.4704E-03	23.57	21.45
	45.7	1.798	14413	.1674E-1	.6591E-03	24.15	21.97
	47.41	1.867	14517	.1423E-01	.5602E-03	24.75	22.53
	49.36	1.943	14734	.1745E-01	.6871E-03	25.33	23.05
	5..42	2.0.6	14843	.1974E-01	.7773E-03	25.91	23.58
	52.31	2.096	14943	.2340E-01	.9213E-03	26.57	24.18
	54.41	2.158	15025	.2294E-01	.8253E-03	27.19	24.75
	5n.62	2.229	15111	.2403E-01	.9464E-03	27.78	25.29
	54.29	2.294	1514.	.2444E-01	.9716E-03	28.45	25.89
	6..45	2.340	15254	.2277E-01	.8964E-03	29.11	26.49
	62..8	2.444	15342	.2495E-01	.9824E-03	29.73	27.06
	n1.93	2.517	15414	.2341E-01	.9217E-03	31.35	27.65
	64.71	2.547	15446	.3216E-01	.1266E-02	31.12	28.32
	n7.3.	2.673	15548	.3227E-01	.1271E-02	31.47	28.49
	69.64	2.742	15612	.5522E-01	.2174E-02	33.45	30.44
F	7n..7	2.335	15729	.4164E-01	.1639E-02	35.19	32.02
F	7n.11	3.275	15779	.3663E-01	.1442E-02	35.38	32.74
F	73.76	3.141	15824	.7911E-01	.3115E-02	36.59	33.30
F	7 .01	3.134	15854	.3513E-01	.1383E-02	37.11	33.77
F	42..4	3.234	15884	.9925E-01	.3907E-02	37.41	34.41
F	83.95	3.3.5	15914	.6361E-01	.2504E-02	38.56	35.09
F	85.32	3.356	15924	.9602E-01	.3780E-02	39.46	35.91
F	87.63	3.451	15949	.5584E-01	.2199E-02	40.42	36.78
F	89..3	3.515	15974	.7621E-01	.3001E-02	41.28	37.57
F	9..93	3.56.	15998	.1271E+00	.5003E-02	42.49	38.67
F	93.47	3.681	16019	.1141E+01	.4493E-02	43.54	39.62

D2-48 (CON'T.)

F	94.61	3.725	16629					
F	96.39	3.795	16639	.1778E+00	.7880E-02	44.48		40.41
F	97.79	3.850	16649	.1397E+00	.6980E-02	49.36		41.29
F	99.82	3.930	16659	.2032E+00	.8680E-02	48.47		42.29
F	81.73	4.885	16669	(NET STRESS GREATER THAN 8.9 FTY)				
F	83.76	4.885	16674	(NET STRESS GREATER THAN 8.9 FTY)				
F	89.16	4.148	16677	(NET STRESS GREATER THAN 8.9 FTY)				

TABLE D2-49

SPECIMEN NUMBER: 129-1L7
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 F
SPECIMEN THICKNESS: 3.23 MM (.1270 IN)
MAXIMUM STRESS: 195.0 MPA (28.4 KSI)
R-RATIO: .10
FREQUENCY: 20
CYCLES TO FAILURE: 290 CPM
KMAX: 33 CYCLES PRIOR TO FAILURE: 2748 CYCLES
95.61 MPA SQRT(M)(I 86.46 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
7.46	.294	1				
8.17	.322	214	.3041E-02	.1197E-03	15.36	13.98
8.77	.345	413	.2959E-02	.1164E-03	16.23	14.77
13.15	.517	823	.3537E-02	.1392E-03	17.12	15.58
13.79	.543	941	.5962E-02	.2308E-03	17.78	16.18
14.74	.580	1105	.6796E-02	.2292E-03	19.47	16.81
12.49	.492	1232	.7725E-02	.3041E-03	19.17	17.45
13.41	.528	1342	.9115E-02	.3586E-03	19.91	18.12
14.71	.579	1421	.7540E-02	.2966E-03	21.57	18.72
15.08	.594	1511	.9035E-02	.3872E-03	21.12	19.22
15.65	.616	1597	.1101E-01	.3936E-03	21.65	19.78
16.31	.642	1622	.1175E-01	.4627E-03	22.58	20.18
16.17	.636	1676	.1277E-01	.5029E-03	22.55	20.92
17.42	.686	1714	.1347E-01	.5302E-03	23.38	21.08
18.16	.715	1742	.1468E-01	.5780E-03	23.61	21.49
19.62	.772	1765	.1338E-01	.5270E-03	24.14	21.97
20.38	.802	1800	.2152E-01	.8472E-03	24.90	22.57
21.47	.845	1869	.2313E-01	.9106E-03	25.62	23.32
23.17	.912	2035	.1914E-01	.7535E-03	25.44	24.08
24.71	.973	2191	.2565E-01	.1010E-02	27.28	24.83
25.93	1.021	2318	.2484E-01	.9778E-03	28.08	25.55
27.19	1.071	2476	.3305E-01	.1301E-02	28.91	26.22
29.00	1.141	2722	.2415E-01	.9508E-03	29.54	26.98
F 31.11	1.225	2798	.1924E-01	.1479E-02	39.84	27.48
F 34.67	1.365	2334	.3556E-01	.1400E-02	32.49	25.83
F 36.46	1.435	2418	.4446E-01	.1750E-02	33.91	30.46
F 38.19	1.503	2478	.4762E-01	.1875E-02	34.92	31.78
F 39.75	1.565	2513	.3991E-01	.1571E-02	39.91	32.59
F 41.53	1.635	2549	.5527E-01	.2333E-02	38.67	33.37
F 43.31	1.705	2573	.5527E-01	.2333E-02	37.63	34.24
F 44.19	1.775	2594	.7112E-01	.2800E-02	38.59	35.12
F 46.77	1.824	2623	.1471E+00	.5900E-02	40.86	36.46
F 51.56	2.031	2744	.1119E+00	.4403E-02	41.42	38.26
F 53.49	2.175	2823	.9652E-01	.3800E-02	43.25	39.76
F 55.53	2.195	2841	.1524E+00	.6000E-02	44.74	40.35
F 57.15	2.251	2849	.1101E+00	.4333E-02	45.77	41.16
F 61.32	2.375	2748	.1587E+00	.6250E-02	46.59	42.48

TABLE D2-50

SPECIMEN NUMBER: 125-6TJ
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
CAVITY ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 405 K
SPECIMEN THICKNESS: 3.25 MM (.128 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPS
CYCLES TO FAILURE: 12252 CYCLES
KMAX) 1 CYCLES PRIOR TO FAILURE: 93.94 MPA SQRT(M)(82.76 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	8.74	.344	1				
	9.19	.362	1154	.5625E-03	.2216E-04	10.03	9.13
	9.58	.377	2314	.6882E-03	.2709E-04	10.37	9.44
	10.08	.397	3474	.9961E-03	.7914E-04	10.74	9.77
	10.36	.408	4634	.8677E-03	.3416E-04	11.25	10.24
	10.87	.428	5794	.1385E-02	.5455E-04	11.78	10.71
	11.17	.440	6954	.1315E-02	.5177E-04	12.12	11.03
	11.47	.452	8114	.1455E-02	.5731E-04	12.43	11.31
	11.79	.464	9274	.1995E-02	.7852E-04	12.79	11.64
	12.22	.481	10434	.1522E-02	.7866E-04	13.19	12.00
	12.52	.493	11594	.2432E-02	.9573E-04	13.70	12.47
	12.93	.509	12754	.2562E-02	.9852E-04	14.23	12.95
	13.31	.524	13914	.3593E-02	.1415E-03	14.64	13.32
	13.51	.532	14631	.2751E-02	.1477E-03	15.19	13.82
	13.79	.543	15074	.6536E-02	.1785E-03	15.93	14.48
	14.05	.553	15714	.4234E-02	.1669E-03	16.46	14.97
	14.61	.575	16874	.5273E-02	.2078E-03	17.14	15.58
	15.24	.600	18034	.5374E-02	.2098E-03	17.44	16.65
	15.79	.622	19194	.4614E-02	.2809E-03	18.38	16.73
	16.21	.638	20354	.7481E-02	.3691E-03	19.27	17.36
	16.76	.660	21514	.8004E-02	.3151E-03	19.59	17.82
	17.16	.676	22674	.9234E-02	.3638E-03	20.15	18.34
	17.75	.699	23834	.1154E-01	.4545E-03	20.96	18.90
	18.21	.717	24994	.1249E-01	.4919E-03	21.39	19.47
	18.85	.742	26154	.1469E-01	.5781E-03	22.17	20.09
	19.41	.764	27314	.1584E-01	.6238E-03	22.71	20.66
	19.91	.784	28474	.1784E-01	.7023E-03	23.46	21.35
	20.38	.802	29634	.2177E-01	.8573E-03	24.27	22.09
	20.91	.823	30794	.2337E-01	.9200E-03	24.92	22.68
	21.49	.846	31954	.2394E-01	.9424E-03	25.42	23.30
	22.15	.872	33114	.3674E-01	.1446E-02	26.46	24.08
	22.94	.903	34274	.3972E-01	.1564E-02	27.40	24.93
	23.64	.931	35434	.4159E-01	.1598E-02	28.14	25.62
	24.33	.958	36594	.4460E-01	.1756E-02	29.29	26.66
F	25.07	.987	37754	.4902E-01	.1903E-02	30.14	27.43
F	25.81	1.016	38914	.5925E-01	.2753E-02	30.96	28.16
F	26.67	1.050	40074	.1270E+00	.5000E-02	31.77	28.92
F	27.71	1.091	41234	.2705E+00	.1065E-01	33.07	30.08
F	28.95	1.140	42394	.3349E+00	.1200E-01	34.49	31.38
F	30.35	1.195	43554	.2286E+00	.9000E-02	35.41	32.48
F	31.74	1.250	44714	.2794E+00	.1100E-01	36.72	33.42
F	33.17	1.306	45874	.4164E+00	.1638E-01	37.82	34.42
F	34.67	1.365	47034	.7620E+00	.3000E-01	39.27	35.69
F	35.79	1.409	48194	.6350E+00	.2500E-01	40.66	37.68
F	37.29	1.468	49354	.7493E+00	.2950E-01	43.22	39.34

TABLE D2-51

SPECIMEN NUMBER: 125-177
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: T-L
CONFIGURATION: STRINGER
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 288 K
SPECIMEN TO STRESS: 1.21 MM (.1205 IN)
MAKEUP STRESS: 195.5 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1756 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 62.93 MPA SQRT(M) 57.27 KSI SQRT(IN)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	7.44	.293	1				
	7.47	.294	113	.3692E-02	.1532E-03	15.21	13.84
	7.91	.311	245	.3672E-02	.1446E-03	14.73	14.32
	9.25	.364	458	.4302E-02	.1694E-03	16.39	14.92
	9.71	.382	684	.4357E-02	.1715E-03	17.03	15.98
	11.24	.442	671	.5920E-02	.2331E-03	17.49	15.91
	11.99	.472	760	.7644E-02	.3009E-03	17.95	16.34
	12.32	.485	821	.1547E-01	.6093E-03	18.68	17.00
	12.81	.504	891	.1674E-01	.6591E-03	19.42	17.68
	13.46	.530	979	.1684E-01	.6631E-03	19.49	18.19
	14.19	.559	1067	.1736E-01	.6833E-03	20.52	18.67
	14.92	.587	1032	.2374E-01	.9171E-03	21.36	19.17
	15.35	.604	1092	.2368E-01	.9130E-03	21.71	19.75
	16.17	.636	1077	.4103E-01	.1614E-02	22.44	20.42
	16.15	.714	1191	.1992E-01	.6239E-03	23.20	21.11
	19.34	.761	1191	.2584E-01	.1175E-02	24.80	21.84
	21.51	.846	1239	.4913E-01	.1933E-02	25.89	22.84
F	22.44	.883	1279	.3482E-01	.1339E-02	26.21	23.85
F	23.79	.936	1298	.5527E-01	.2333E-02	26.90	24.48
F	26.90	1.059	1323	.1116E-03	.4088E-02	28.89	25.56
F	28.96	1.140	1344	.9596E-01	.3562E-02	29.62	26.96
F	31.11	1.225	1349	.4318E+00	.1700E-01	38.85	28.80

TABLE D2-52

SPECIMEN NUMBER: U125-6L2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
EXCURSIONENT: CAR AIR
TEST TEMPERATURE: 550.0 °F
*PRECRACK THICKNESS: 1.35 MM (.0528 IN)
MAXIMUM STRESS: 165.4 MPA (24.0 KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPS
CYCLES TO FAILURE: 1068 CYCLES
K(MAX) 1 CYCLES FACTOR TO FAILURE: (NET STRESS GREATER THAN 3.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	4.82	.302	1	.9193E-02	.3604E-03	32.56	29.63
	5.11	.472	112	.1349E-01	.6175E-03	35.10	31.96
	5.15	.494	245	.1472E-01	.5799E-03	37.50	34.13
	5.47	.525	716	.1417E-01	.7156E-03	39.12	35.79
	5.97	.592	994	.2117E-01	.8333E-03	41.37	37.68
	6.10	.637	462	.3187E-01	.1253E-02	43.19	39.25
	6.75	.644	537	.3419E-01	.1345E-02	44.72	40.69
	7.71	.733	536	.2562E-01	.1165E-02	46.56	42.36
	10.23	.803	596	.4607E-01	.1812E-02	48.59	44.22
	10.39	.906	631	.4387E-01	.1656E-02	50.34	45.81
	11.07	.919	662	.6372E-01	.2391E-02	52.22	47.34
	12.43	.979	897	.4627E-01	.1822E-02	53.94	49.09
	13.19	1.041	727	.7134E-01	.2778E-02	55.83	50.81
	14.13	1.112	749	.6341E-01	.2504E-02	57.48	52.31
	14.96	1.170	772	.6785E-01	.2659E-02	59.08	53.69
	15.83	1.223	737	.6591E-01	.2595E-02	60.63	55.08
	16.79	1.243	815	.7122E-01	.2803E-02	62.22	56.62
	17.13	1.349	838	.4026E-01	.3567E-03	63.81	58.07
	17.91	1.403	853	.1371E+00	.4218E-02	65.41	59.53
	19.67	1.470	865	.1229E+01	.4837E-02	68.13	62.00
	20.45	1.618	898	.1474E+00	.5803E-02	70.71	64.35
	21.19	1.668	908	.1497E+01	.5895E-02	72.31	65.81
	22.31	1.733	919	.2185E+00	.8209E-02	74.01	67.35
	23.45	1.719	927				
	24.40	1.921	941	.2214E+01	.8714E-02	76.48	69.57
F	24.45	2.240	977	.2191E+00	.8626E-02	82.26	74.86
F	35.41	2.820	1023	.3271E+00	.1288E-01	94.57	86.15
F	38.14	3.334	1033	(NET STRESS GREATER THAN 0.9 FTY)			
F	40.37	3.228	1043	(NET STRESS GREATER THAN 0.9 FTY)			
F	43.13	3.459	1051	(NET STRESS GREATER THAN 0.9 FTY)			
F	45.31	3.615	1055	(NET STRESS GREATER THAN 0.9 FTY)			
F	47.79	3.763	1058	(NET STRESS GREATER THAN 0.9 FTY)			
F	49.96	3.928	1061	(NET STRESS GREATER THAN 0.9 FTY)			
F	52.01	4.014	1063	(NET STRESS GREATER THAN 0.9 FTY)			
F	53.71	4.228	1064	(NET STRESS GREATER THAN 0.9 FTY)			
F	55.60	4.379	1065	(NET STRESS GREATER THAN 0.9 FTY)			
F	57.65	4.555	1066	(NET STRESS GREATER THAN 0.9 FTY)			
F	61.75	4.744	1067				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D2-53

SPECIMEN NUMBER: U125-2L0
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 660.0 K
SPECIMEN THICKNESS: 3.23 MM (.1272 IN)
MAXIMUM STRESS: 110.8 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 7071 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 91.64 MPA SQRT(M) (83.42 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	8.36	.329	820	.8343E-03	.3559E-04	17.57	15.99
	9.11	.359	1623	.1136E-02	.4471E-04	18.49	16.83
	9.64	.377	2130	.1291E-02	.4727E-04	19.29	17.55
	10.71	.422	2639	.2114E-02	.8321E-04	20.17	19.35
	11.57	.456	3139	.1837E-02	.7232E-04	21.15	19.25
	12.56	.494	3595	.2280E-02	.8975E-04	22.32	20.04
	13.48	.531	3946	.3803E-02	.1182E-03	22.99	21.03
	14.35	.565	4214	.7593E-02	.1414E-03	23.88	21.73
	15.74	.621	4749	.5334E-02	.2100E-03	24.99	22.68
	17.27	.680	4751	.5627E-02	.2215E-03	26.05	23.70
	18.57	.731	4991	.6114E-02	.2408E-03	27.16	24.72
	19.64	.773	5217	.7472E-02	.3099E-03	27.98	25.37
	21.11	.831	5191	.8467E-02	.3333E-03	28.93	26.24
	23.12	.910	5390	.9154E-02	.3565E-03	30.36	27.35
	24.62	.969	5734	.1185E-01	.4681E-03	31.29	28.48
	26.46	1.037	5730	.1447E-01	.5699E-03	32.53	29.49
	28.16	1.117	6796	.1177E-01	.5422E-03	33.49	30.45
	29.98	1.194	5932	.1576E-01	.6204E-03	34.93	31.79
	32.2	1.261	6005	.2149E-01	.8618E-03	36.12	32.87
	33.92	1.335	6005	.2191E-01	.8233E-03	37.19	34.02
	35.61	1.402	6153	.2508E-01	.9868E-03	38.52	35.05
	36.99	1.456	6230	.1791E-01	.7045E-03	39.49	35.94
	38.33	1.517	6243	.2439E-01	.1145E-02	40.40	36.77
	40.49	1.593	6347	.2581E-01	.1174E-02	41.48	37.75
	41.77	1.644	6392	.2561E-01	.1156E-02	42.48	38.66
	43.28	1.714	6447	.2774E-01	.1094E-02	43.17	39.47
	44.91	1.768	6496	.3102E-01	.1330E-02	44.35	40.36
	46.73	1.840	6551	.3389E-01	.1303E-02	45.41	41.33
	48.53	1.911	6611	.3589E-01	.1413E-02	46.54	42.35
	50.34	1.979	6667	.4214E-01	.1660E-02	47.64	43.35
F	55.12	2.170	6711	.8242E-01	.3245E-02	49.71	46.24
F	57.76	2.275	6751	.5334E-01	.2100E-02	52.12	47.43
F	61.27	2.365	6791	.5715E-01	.2250E-02	53.74	48.91
F	61.98	2.440	6831	.4763E-01	.1875E-02	55.13	50.17
F	64.13	2.525	6861	.7197E-01	.2833E-02	56.58	51.42
F	66.42	2.615	6896	.6531E-01	.2571E-02	58.33	52.81
F	68.31	2.689	6921	.7112E-01	.2800E-02	59.66	54.11
F	70.49	2.775	6946	.1067E+00	.4200E-02	61.44	55.57
F	73.41	2.890	6971	.1016E+00	.4000E-02	62.95	57.32
F	76.46	3.011	6996	.1219E+00	.4803E-02	65.13	59.27
F	79.47	3.129	7016	.1207E+00	.4750E-02	67.31	61.25
F	82.52	3.250	7031	.1101E+00	.4333E-02	69.98	63.78
F	82.93	3.265	7041	.2413E+00	.9500E-02	70.71	64.36
F	84.84	3.340	7048	.2721E+00	.1071E-01	72.67	66.09
F	86.48	3.405	7054	.2752E+00	.1083E-01	74.25	67.67
F	89.41	3.520	7059	.5842E+00	.2300E-01	76.42	69.54
F	91.92	3.619	7064	.4826E+00	.1900E-01	79.08	71.98
F	94.36	3.715	7067	.8467E+00	.3333E-01	81.69	74.34
F	96.27	3.790	7069	.9525E+00	.3750E-01	84.15	76.58
F	97.96	3.856	7070	.1524E+01	.6000E-01	86.15	78.40

TABLE D2-54

SPECIMEN NUMBER: 125-2T5
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.23 MM (.1272 IN)
MAXIMUM STRESS: 119.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4704 CYCLES
KI(MAX) 326 CYCLES PRIOR TO FAILURE: 48.67 MPA SQRT(M) (44.31 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.17	.282	1	.1321E-02	.5205E-04	17.49	15.91
8.12	.320	726	.1499E-02	.5897E-04	18.46	16.80
8.91	.351	1749	.1910E-02	.7527E-04	19.46	17.70
9.97	.393	1839	.2162E-02	.8511E-04	20.16	18.53
11.09	.421	2166	.3823E-02	.1505E-03	21.44	19.51
12.72	.480	2503	.4487E-02	.1767E-03	22.57	20.54
13.13	.517	2754	.5699E-02	.2244E-03	23.58	21.44
14.02	.552	2954	.5794E-02	.2282E-03	24.62	22.32
15.37	.605	3149	.6751E-02	.2659E-03	25.58	23.17
16.07	.644	3311	.8396E-02	.3306E-03	26.18	23.82
17.43	.686	3425	.9223E-02	.3631E-03	27.74	24.81
18.49	.728	3551	.9716E-02	.3825E-03	27.95	25.30
19.41	.764	3645	.1347E-01	.5303E-03	29.71	26.13
21.12	.827	3755	.1411E-01	.5555E-03	29.92	27.14
22.43	.883	3859	.1572E-01	.6190E-03	30.92	28.14
24.14	.949	3961	.1473E-01	.7372E-03	32.79	29.20
25.78	1.015	4051	.2314E-01	.9127E-03	33.47	30.46
26.19	1.031	4133	.2716E-01	.1069E-02	34.99	31.75
27.7	1.090	4224	.3356E-01	.1321E-02	36.14	32.59
31.48	1.239	4331	.3604E-01	.1421E-02	37.21	33.46
33.39	1.315	4221	.3484E-01	.1372E-02	38.15	34.72
34.93	1.376	4354				

TABLE D2-55

SPECIMEN NUMBER: U125-2T2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 3.24 MM (.1290 IN)
MAXIMUM STRESS: 195.8 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1041 CYCLES
KI(MAX) 2 CYCLES PRIOR TO FAILURE: 97.20 MPA SQRT(M) (88.45 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.52	.354	1	.9086E-02	.3569E-03	35.44	32.25
6.47	.504	546	.1738E-01	.6844E-03	40.19	36.58
7.71	.607	631	.1581E-01	.7799E-03	42.29	38.49
8.51	.664	715	.2835E-01	.1116E-02	44.54	40.57
9.46	.745	778	.4377E-01	.1736E-02	46.95	42.72
10.17	.817	820	.3705E-01	.1459E-02	48.93	44.53
11.75	.873	866	.5686E-01	.2238E-02	50.46	46.29
12.60	.945	891	.9142E-01	.3599E-02	52.91	48.19
12.97	1.013	911	.8631E-01	.3399E-02	54.77	49.84
13.65	1.075	929	.1146E+00	.4117E-02	57.01	51.88
14.30	1.173	952	.1754E+00	.6713E-02	59.19	53.87
15.57	1.234	961	.1602E+00	.6307E-02	61.29	55.77
16.47	1.324	975	.1483E+00	.5843E-02	63.49	57.77
17.76	1.398	984	.2121E+00	.8352E-02	66.06	60.12
19.75	1.574	1003	.2479E+00	.9758E-02	68.59	62.42
21.22	1.592	1013	.3552E+00	.1399E-01	70.94	64.55
21.64	1.734	1018	.4425E+00	.1742E-01	75.11	68.35
24.17	1.913	1030	.8938E+00	.3616E-01	79.22	72.09
25.44	2.219	1033	.1407E+01	.5521E-01	83.54	76.03
28.44	2.239	1037	.2664E+01	.1049E+00	85.40	61.36
31.17	2.449	1039				

TABLE D2-56

SPECIMEN NUMBER: 129-1L6
ALLOY TYPE: 2.4-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 3.23 MM (.270 IN)
MAXIMUM STRESS: 110.4 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20
CYCLES TO FAILURE: 6359 CYCLES
KMAX) 496 CYCLES PRIOR TO FAILURE: 47.46 MPA SQRT(MI) 43.19 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.91	.393	867	.1163E-02	.4859E-04	18.12	16.49
10.15	.368	1217	.1940E-02	.7243E-04	19.03	17.32
10.44	.411	1870	.1739E-02	.6845E-04	19.06	17.16
11.16	.447	2352	.1734E-02	.6831E-04	20.95	19.06
12.34	.486	2755	.2967E-02	.1193E-03	21.93	19.87
13.19	.519	3015	.3253E-02	.1281E-03	22.67	21.63
14.14	.566	3341	.3654E-02	.1439E-03	23.58	21.46
15.19	.612	3557	.4163E-02	.1639E-03	24.48	22.27
16.16	.652	3761	.3798E-02	.1495E-03	25.17	22.91
17.14	.659	3835	.5144E-02	.2.26E-03	25.77	23.45
17.82	.702	4066	.4283E-02	.2476E-03	26.48	24.10
18.44	.748	4199	.4971E-02	.3492E-03	27.34	24.90
19.43	.820	4421	.5607E-02	.2239E-03	28.50	25.94
20.19	.874	4565	.1314E-01	.3991E-03	29.88	27.41
20.73	.945	4814	.1122E-01	.4419E-03	30.91	28.04
21.43	1.011	4959	.9931E-02	.3871E-03	31.93	29.06
22.12	1.054	5041	.1324E-01	.5213E-03	32.97	30.00
22.99	1.143	5213	.1519E-01	.5981E-03	34.18	31.11
23.66	1.221	5317	.1931E-01	.6421E-03	35.35	32.17
24.26	1.292	5397	.1884E-01	.7419E-03	36.33	33.07
24.73	1.328	5474	.1921E-01	.7567E-03	37.34	33.99
25.78	1.468	5514	.2527E-01	.9953E-03	38.51	35.06
27.45	1.478	5533	.2202E-01	.8671E-03	39.71	36.14
28.03	1.537	5594	.3018E-01	.1188E-02	40.74	37.07
40.57	1.597	5731	.3270E-01	.1287E-02	41.89	37.96
42.73	1.682	5777	.4693E-01	.1848E-02	42.84	38.99
43.63	1.718	5814	.2420E-01	.9527E-03	43.78	39.85
45.28	1.782	5863	.3367E-01	.1326E-02	44.97	40.56

TABLE D2-57

SPECIMEN NUMBER: 125-1L5
ALLOY TYPE: 2[illegible]-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 3.35 MM (.1327 IN)
MAXIMUM STRESS: 195.4 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 956 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.0 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.97	.438	I				
	6.94	.546	226	.1221E-01	.4808E-03	37.74	33.71
	8.15	.642	362	.1919E-01	.7555E-03	40.77	37.10
	9.49	.747	518	.2964E-01	.1164E-02	43.52	39.60
	3.93	.776	449	.4283E-01	.1686E-02	45.71	41.40
	10.75	.847	532	.7385E-01	.1333E-02	47.31	43.60
	11.74	.924	544	.4676E-01	.1841E-02	50.15	45.65
	12.73	1.003	542	.5247E-01	.2066E-02	52.49	47.74
	13.69	1.169	615	.5142E-01	.2025E-02	54.35	49.44
	14.61	1.193	642	.7393E-01	.2994E-02	56.63	51.53
	15.49	1.217	670	.6746E-01	.2656E-02	58.64	53.38
	16.35	1.287	696	.6885E-01	.2711E-02	61.52	55.68
	17.15	1.366	719	.8713E-01	.3431E-02	63.52	56.90
	18.79	1.447	742	.8917E-01	.3511E-02	64.64	58.83
	19.10	1.534	757	.9647E-01	.3798E-02	66.45	60.48
	19.99	1.566	749	.1303E+00	.5131E-02	69.31	63.09
	21.09	1.641	786	.1419E+00	.5588E-02	70.09	63.75
	22.[illegible]	1.732	733	.1397E+00	.5501E-02	72.21	65.72
	23.25	1.831	813	.1794E+00	.7061E-02	74.47	67.73
	24.14	1.903	823	.1771E+00	.6949E-02	76.67	69.74
	25.17	1.992	832	.2289E+00	.9011E-02	78.63	71.53
	26.41	2.079	845	.1898E+00	.7471E-02	80.98	73.67
	27.47	2.163	856	.2387E+00	.9399E-02	83.17	75.67
	29.80	2.347	864	.3682E+00	.1449E-01	87.01	79.17
F	31.84	2.51[illegible]	876	.4142E+00	.1631E-01	91.41	83.15
F	34.42	2.75[illegible]	891	.4.67E+00	.1839E-01	97.65	88.86
F	35.36	2.91[illegible]	916			(NET STRESS GREATER THAN 0.0 FTY)	
F	39.24	3.03[illegible]	916			(NET STRESS GREATER THAN 0.0 FTY)	
F	42.[illegible]	3.31[illegible]	926			(NET STRESS GREATER THAN 0.0 FTY)	
F	45.89	3.44[illegible]	93[illegible]			(NET STRESS GREATER THAN 0.0 FTY)	
F	49.23	3.64[illegible]	936			(NET STRESS GREATER THAN 0.0 FTY)	
F	44.[illegible]	3.79[illegible]	941			(NET STRESS GREATER THAN 0.0 FTY)	
F	5[illegible].87	3.99[illegible]	945			(NET STRESS GREATER THAN 0.0 FTY)	
F	53.35	4.2[illegible]	949			(NET STRESS GREATER THAN 0.0 FTY)	
F	57.[illegible]3	4.49[illegible]	952			(NET STRESS GREATER THAN 0.0 FTY)	
F	61.[illegible]	4.75[illegible]	954			(NET STRESS GREATER THAN 0.0 FTY)	
F	62.48	4.[illegible]60	956			(NET STRESS GREATER THAN 0.0 FTY)	

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D2-58

SPECIMEN NUMBER: 125-5T7
ALLOY TYPE: 2.24-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: STIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 3.25 MM (.1259 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .1
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 4219 CYCLES
KMAX) 462 CYCLES PRIOR TO FAILURE: 41.17 MPA SQRT(M) (37.41 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.68	.303	1				
8.99	.354	437	.2427E-02	.9556E-04	18.21	16.57
9.93	.391	1021	.1941E-02	.7643E-04	19.46	17.68
11.47	.452	1234	.2685E-02	.1.49E-04	20.91	19.39
11.30	.445	1574	.2947E-02	.1114E-04	20.30	19.22
13.13	.517	2014	.3781E-02	.1449E-04	22.18	20.16
13.86	.546	2178	.4316E-02	.1698E-04	23.31	21.21
14.62	.572	2349	.5489E-02	.2161E-04	23.91	21.76
15.36	.605	2446	.6719E-02	.2252E-04	24.55	22.35
16.31	.630	2551	.6252E-02	.2462E-04	25.19	22.91
17.32	.682	2711	.8117E-02	.3196E-04	25.97	23.64
18.13	.714	2811	.6377E-02	.3196E-04	26.81	24.40
19.27	.759	2834	.1374E-01	.5413E-04	27.57	25.09
20.34	.824	3017	.1359E-01	.5352E-04	28.63	26.55
22.34	.551	3137	.1204E-01	.4742E-04	29.77	27.09
23.60	.929	3233	.1277E-01	.5033E-04	30.72	27.96
25.33	.995	3292	.2904E-01	.1145E-02	31.66	28.80
26.91	1.059	3372	.2093E-01	.8239E-03	32.79	29.84
28.65	1.128	3472	.1774E-01	.6985E-03	34.01	30.95
30.37	1.196	3538	.2534E-01	.9985E-03	35.15	31.99
31.59	1.244	3545	.2198E-01	.8259E-03	36.11	32.86
32.93	1.299	3644	.2921E-01	.1152E-02	36.95	33.62
34.57	1.361	3684	.3943E-01	.1551E-02	37.90	34.49
35.69	1.406	3717	.3166E-01	.1223E-02	38.72	35.24

TABLE D2-59

SPECIMEN NUMBER: 129-S79
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: T-L
CONSTRAINT: THICKNESS
ENVIRONMENT: STIFFENED
TEST TEMPERATURE: CAN AIR
SPECIMEN THICKNESS: 4.70 MM
MAX-UP STRESS: 3.25 MPA (.1240 KSI)
R-RATIO: 195.8 MPA (28.4 KSI)
FREQUENCY: .05
CYCLES TO FAILURE: 700 CPM
KMAX 1 CYCLES PRIOR TO FAILURE: 700 CYCLES
(NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.51	.441	1				
	6.32	.498	112	.1417E-01	.5578E-03	38.16	32.98
	7.25	.571	190	.1545E-01	.7657E-03	38.62	35.15
	9.14	.641	240	.3546E-01	.1396E-02	41.19	37.48
	9.76	.714	291	.4303E-01	.1693E-02	43.62	39.69
	10.65	.792	335	.4503E-01	.1772E-02	46.97	41.92
	10.97	.693	383	.3227E-01	.1271E-02	48.24	43.98
	11.64	.318	415	.5259E-01	.1992E-02	50.14	45.63
	12.27	1.200	451	.5875E-01	.2313E-02	52.71	47.68
	13.35	1.251	465	.9307E-01	.3664E-02	54.25	49.37
	13.42	1.334	496	.4604E-01	.1813E-02	55.59	50.59
	13.12	1.142	538	.1282E+00	.5046E-02	57.53	52.35
	14.19	1.275	591	.9317E-01	.3667E-02	59.99	54.60
	14.11	1.346	645	.1303E+00	.5129E-02	62.19	56.51
	14.76	1.437	693	.1274E+00	.5017E-02	64.25	58.47
	15.31	1.538	745	.1479E+00	.5824E-02	66.74	60.74
	15.93	1.631	791	.2179E+00	.8585E-02	69.26	63.03
	17.34	1.739	841	.1641E+00	.6463E-02	72.17	65.68
	18.56	1.938	933	.2140E+00	.8433E-02	76.16	69.31
	20.12	2.097	1043	.3366E+00	.1287E-01	80.05	72.86
	21.61	2.149	1093	.4881E+00	.1890E-01	83.42	75.92
	22.42	2.315	1165	.6402E+00	.2520E-01	86.91	79.10
F	22.17	2.513	1263	.6921E+00	.2725E-01	91.69	83.44
F	24.35	2.744	1373	.9353E+00	.2106E-01	97.89	89.09
F	27.71	2.909	1491				
F	42.41	3.340	1696				
F	44.59	3.511	1793				
F	47.21	3.718	1833				
F	53.25	3.953	1935				
F	51.33	4.319	1936				
F	54.53	4.252	1937				

(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 1.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 1.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)

TABLE D2-60

SPECIMEN NUMBER: U125-1L15
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB. AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 3.24 MM (.1275 IN)
PARIMUP STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 5852 CYCLES
K(MAX) 429 CYCLES PRIOR TO FAILURE: 50.34 MPA SQRT(M)(45.81 KSI SQRT(IN))

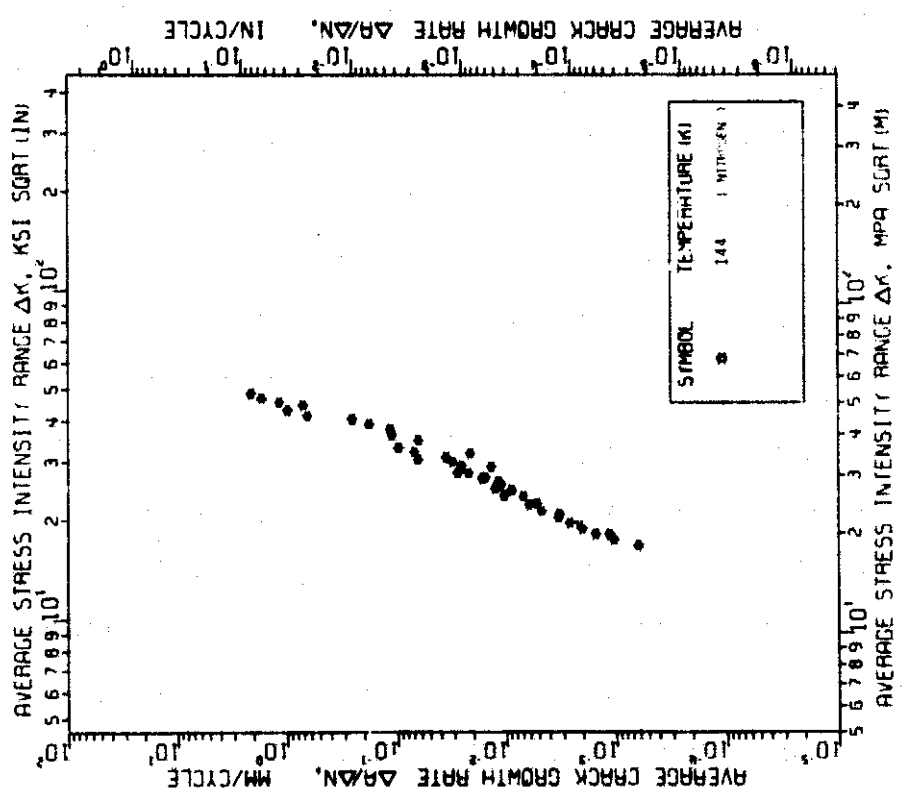
CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.76	.306	0				
			.1315E-02	.5176E-04	17.96	16.35
8.15	.321	429				
			.1474E-02	.5803E-04	18.67	16.99
8.59	.338	926				
			.2144E-02	.8442E-04	19.43	17.68
9.77	.385	1247				
			.2114E-02	.8321E-04	20.08	18.27
10.35	.407	1521				
			.1965E-02	.7580E-04	20.68	18.82
10.98	.432	1851				
			.2985E-02	.1175E-03	21.32	19.40
11.68	.460	2245				
			.2823E-02	.1112E-03	21.97	20.00
12.36	.487	2527				
			.4308E-02	.1717E-03	22.70	20.66
13.27	.523	2537				
			.3285E-02	.1293E-03	23.53	21.41
14.22	.560	2928				
			.4880E-02	.1921E-03	24.27	22.09
15.35	.595	2994				
			.6101E-02	.2402E-03	24.98	22.73
15.95	.628	3132				
			.5684E-02	.2238E-03	25.87	23.55
17.15	.677	3385				
			.7726E-02	.3042E-03	27.01	24.58
18.77	.739	3763				
			.8269E-02	.3232E-03	27.92	25.41
19.64	.773	3860				
			.8205E-02	.3230E-03	28.77	26.18
21.12	.828	3998				
			.1018E-01	.4007E-03	29.85	27.16
22.51	.886	3994				
			.1087E-01	.4279E-03	30.95	28.17
24.13	.950	4133				
			.1182E-01	.4653E-03	32.02	29.14
25.58	1.006	4054				
			.1249E-01	.4919E-03	33.26	30.28
27.18	1.070	4784				
			.1398E-01	.5463E-03	34.05	30.98
28.35	1.122	4429				
			.1431E-01	.5635E-03	34.97	31.83
29.66	1.191	4643				
			.1652E-01	.6506E-03	35.92	32.69
31.41	1.237	4669				
			.2325E-01	.7974E-03	37.81	33.68
33.15	1.313	4769				
			.1629E-01	.6620E-03	38.17	34.69
34.31	1.375	4867				
			.1866E-01	.7345E-03	39.17	35.61
35.76	1.438	4954				
			.2262E-01	.8869E-03	40.37	36.66
37.35	1.469	5016				
			.2104E-01	.8285E-03	41.31	37.32
38.99	1.536	5095				
			.2389E-01	.9019E-02	41.91	38.14
40.79	1.606	5142				
			.2574E-01	.1013E-02	42.79	39.04
42.43	1.670	5226				
			.3361E-01	.1205E-02	43.71	39.78
43.74	1.722	5249				
			.3395E-01	.1218E-02	44.70	40.68
45.30	1.783	5330				
			.3639E-01	.1432E-02	45.62	41.52
46.71	1.839	5340				
			.3751E-01	.1477E-02	46.50	42.32
48.47	1.908	5389				
			.3355E-01	.1321E-02	47.42	43.16
49.05	1.931	5423				

TABLE D2-61

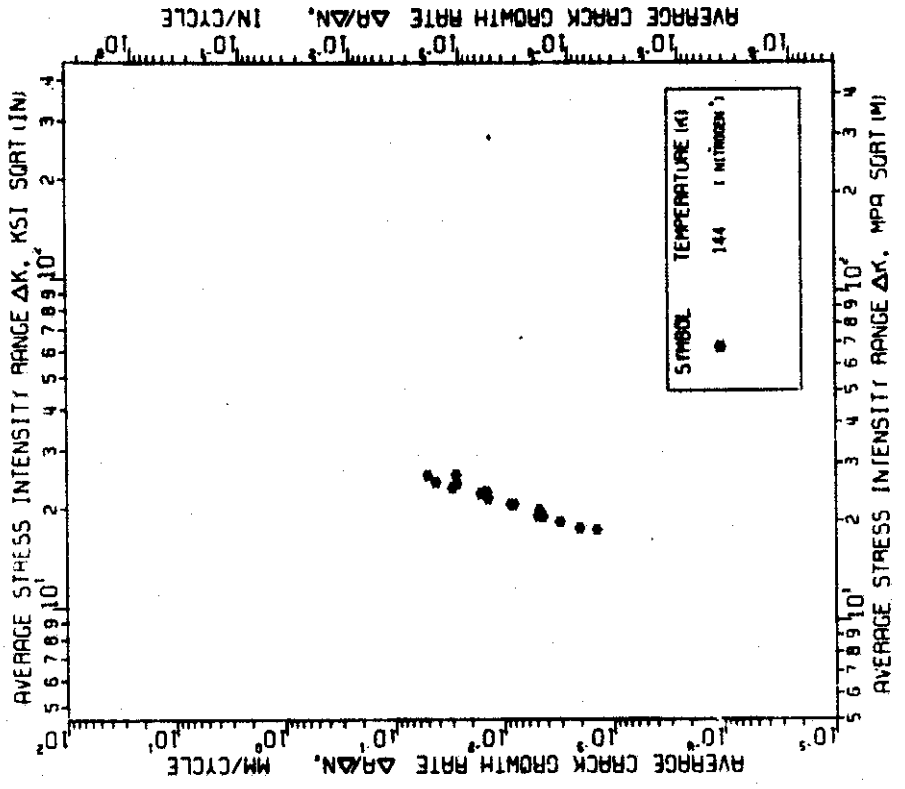
SPECIMEN NUMBER: U125-5T11
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 3.25 MM (.1280 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 5281 CYCLES
K(MAX) 736 CYCLES PRIOR TO FAILURE: 42.83 MPA SQRT(M) (38.99 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.36	.329					
		561	.1447E-02	.5696E-04	19.73	17.05
9.17	.361		.3102E-02	.1221E-03	19.66	17.49
10.11	.398	864				
		1305	.1579E-02	.6179E-04	20.48	18.64
13.03	.425		.2604E-02	.1025E-03	21.78	19.82
12.40	.504	2075				
		2428	.3979E-02	.1565E-03	23.33	21.23
14.21	.559		.4451E-02	.1752E-03	24.36	22.17
15.19	.598	2648				
		2872	.4764E-02	.1877E-03	25.21	22 95
16.25	.640		.7691E-02	.3028E-03	25.99	23.65
17.09	.673	2988				
		3114	.6464E-02	.2545E-03	26.66	24.26
17.95	.707		.7233E-02	.2848E-03	27.26	24.81
18.62	.733	3236				
		3347	.8593E-02	.3383E-03	27.98	25.46
19.83	.781		.5223E-02	.2056E-03	28.78	26.19
20.76	.817	3525				
		3678	.1993E-01	.6272E-03	29.97	27.27
23.37	.908		.1450E-01	.5709E-03	31.29	28.48
24.49	.964	3768				
		3882	.1761E-01	.6934E-03	32.48	29.56
26.50	1.043		.1256E-01	.4946E-03	33.63	30.61
27.98	1.899	3994				
		4078	.1695E-01	.6673E-03	34.56	31.45
29.28	1.153		.2211E-01	.8705E-03	35.57	32.37
31.08	1.221	4153				
		4249	.1619E-01	.6375E-03	36.64	33.34
32.56	1.282		.2209E-01	.8860E-03	37.84	34.43
34.76	1.368	4349				
		4422	.2359E-01	.9288E-03	39.88	35.96
36.48	1.436		.3810E-01	.1500E-02	48.15	36.94
38.19	1.504	4467				

(a) Longitudinal



(b) Transverse

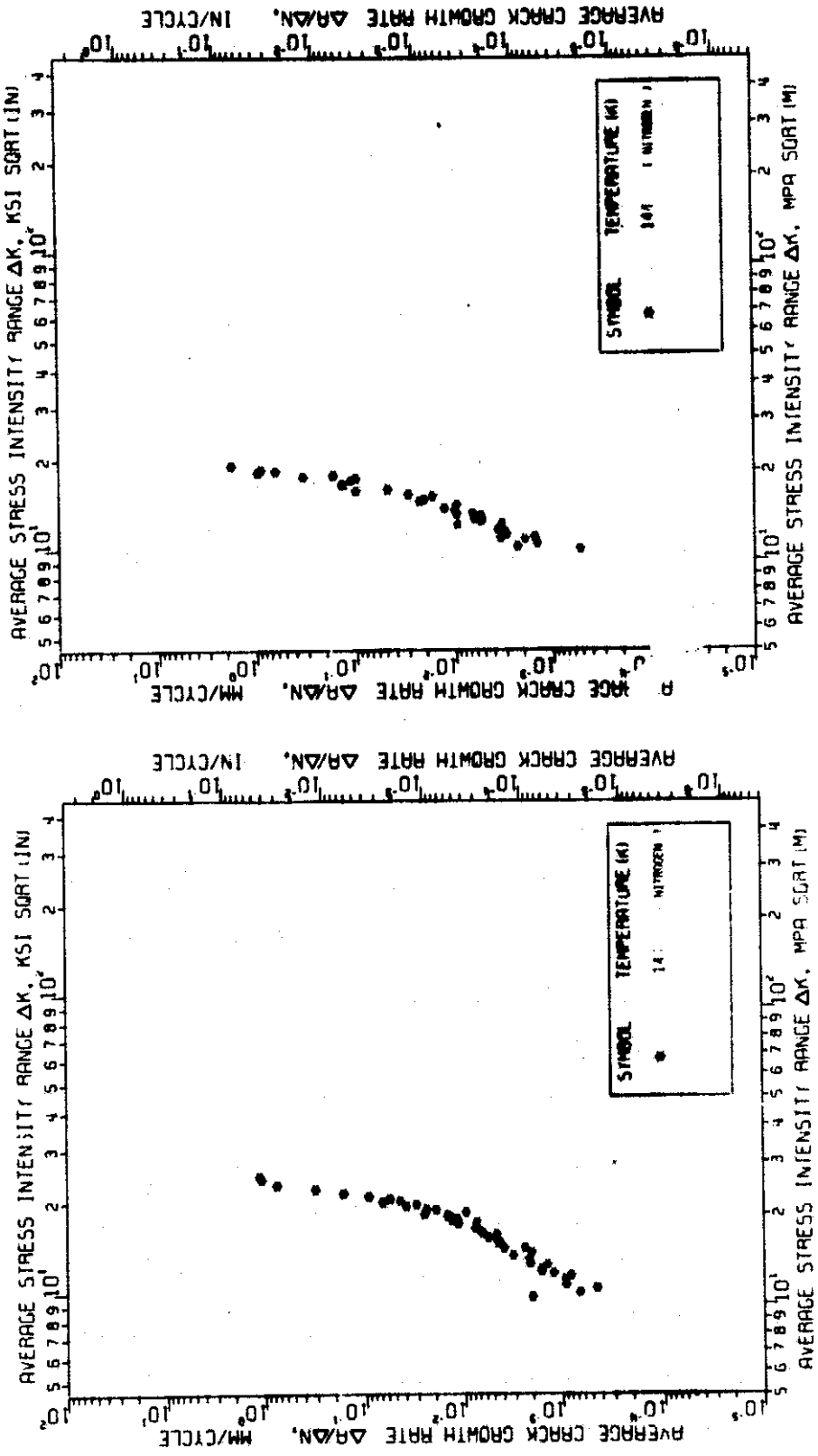


Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 3.18 mm (.125 inch) **Constraint:** Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-1

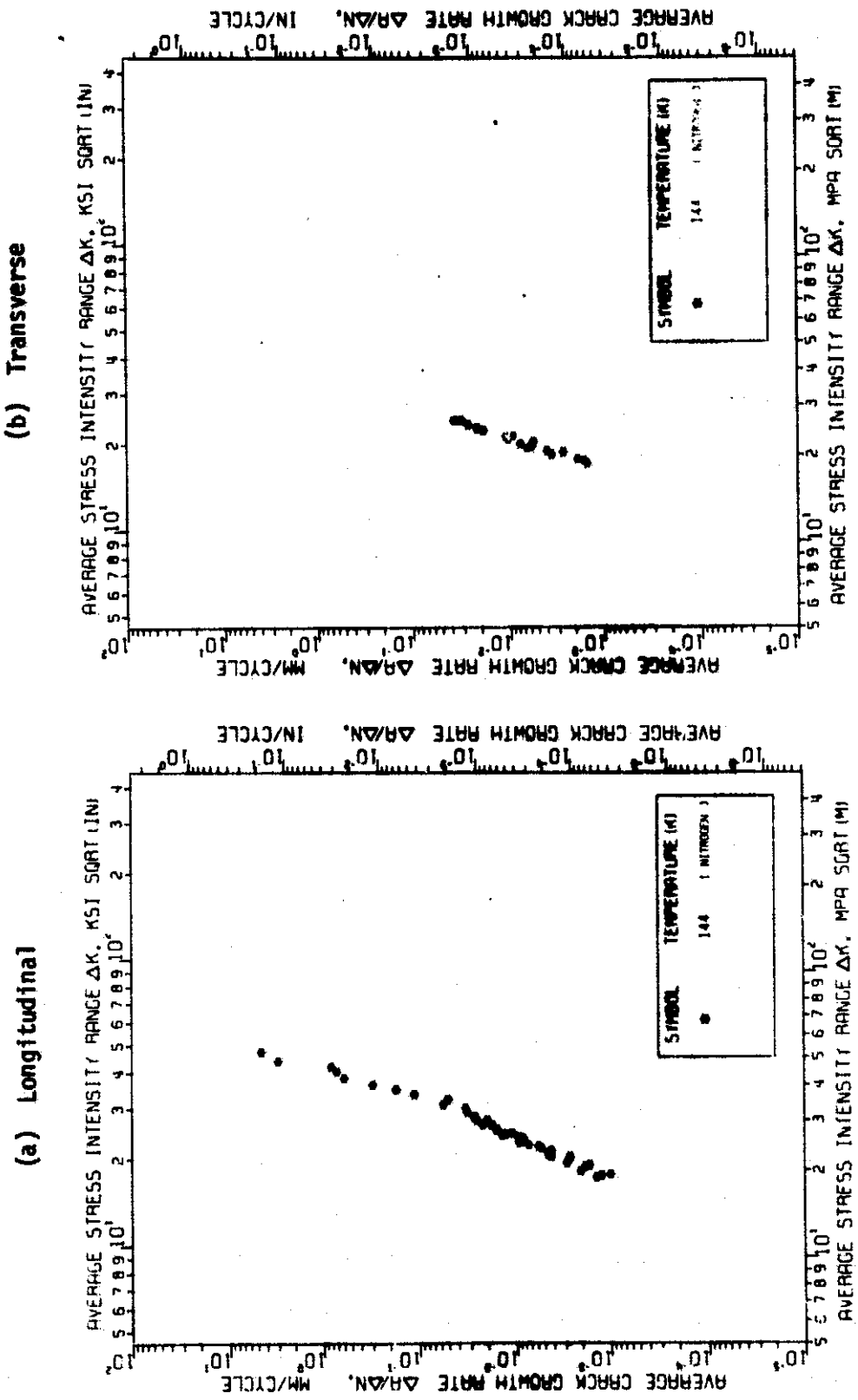


Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 3.18 mm (.125 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-2

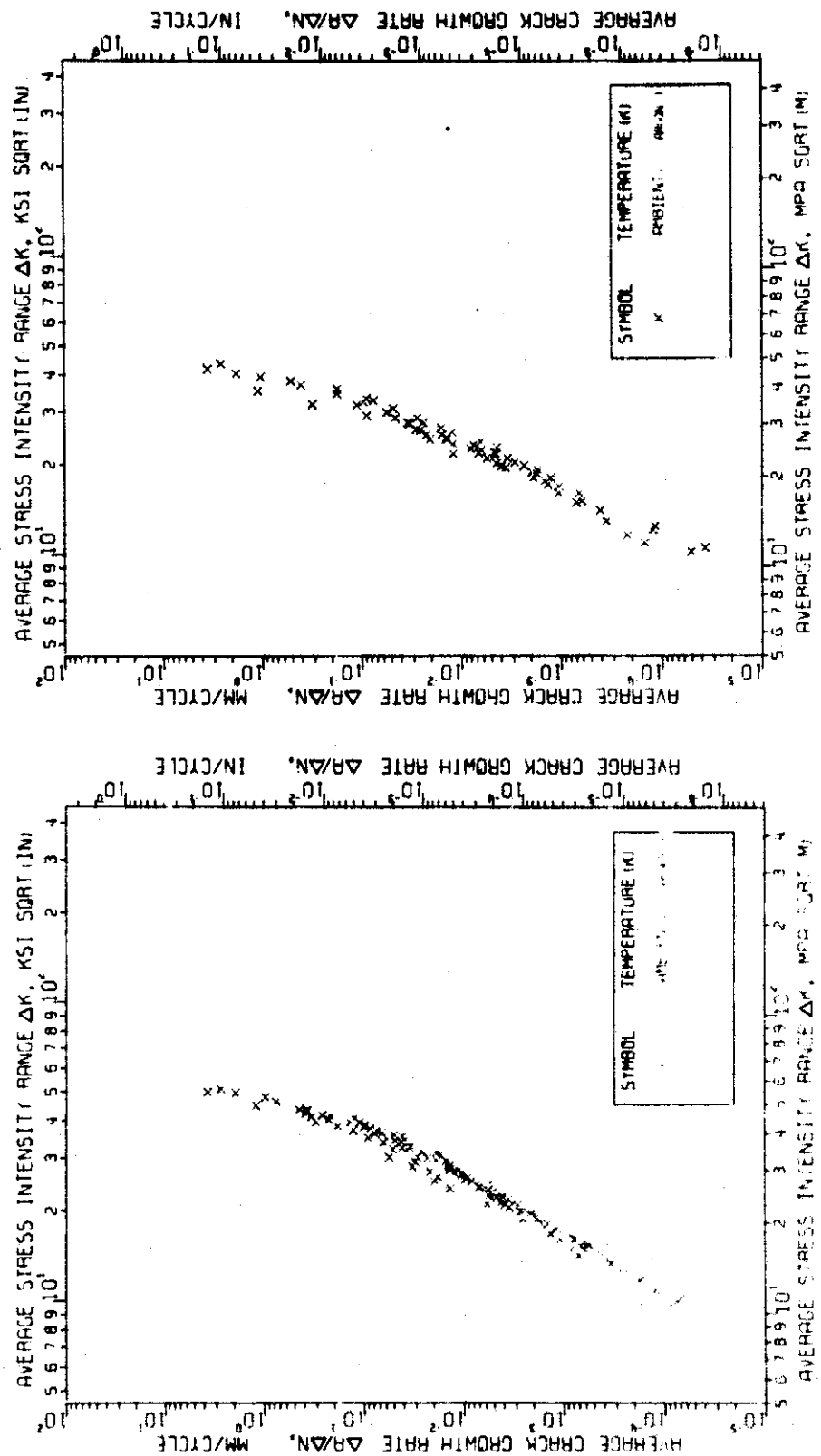


Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 3.18 mm (.125 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-3



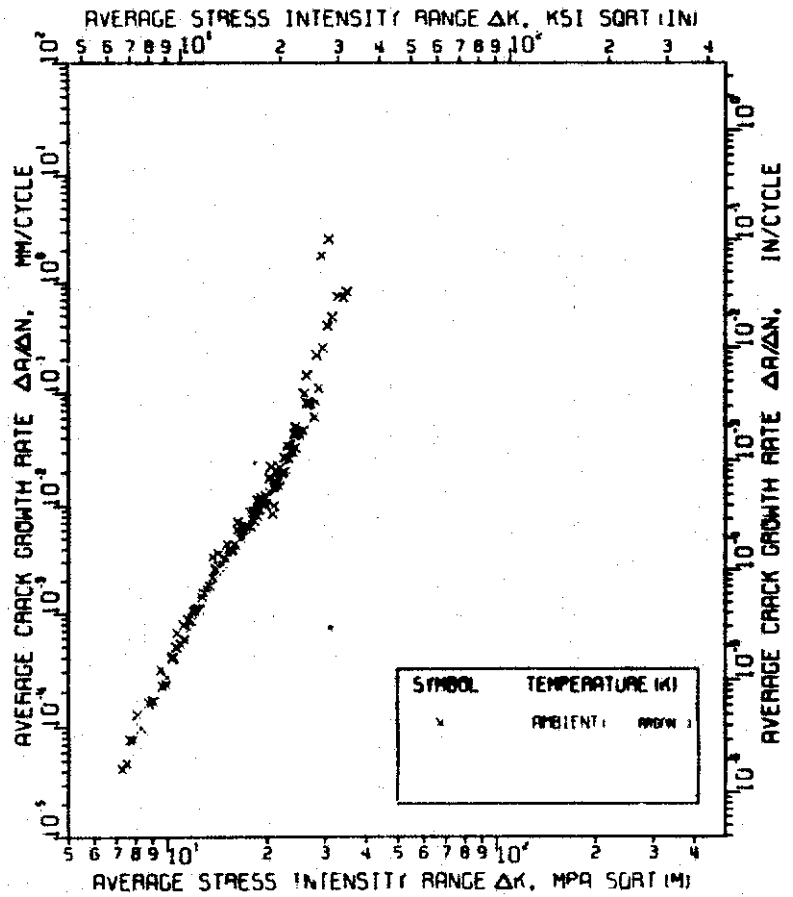
Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 3.18 mm (.125 inch) Constraint: Stiffened

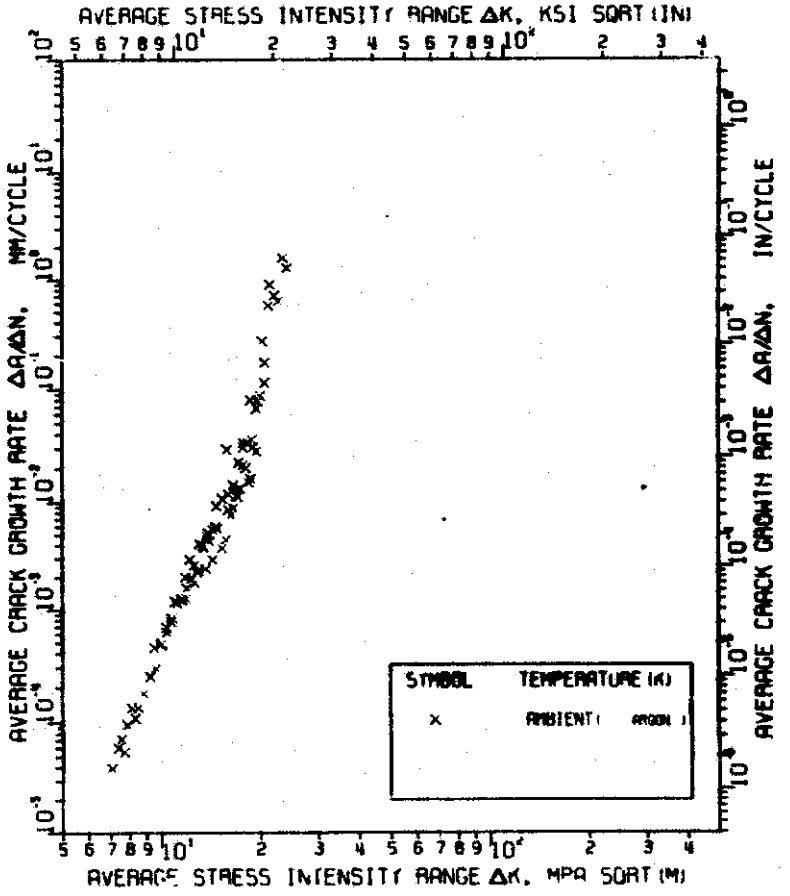
AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-4

(a) Longitudinal



(b) Transverse

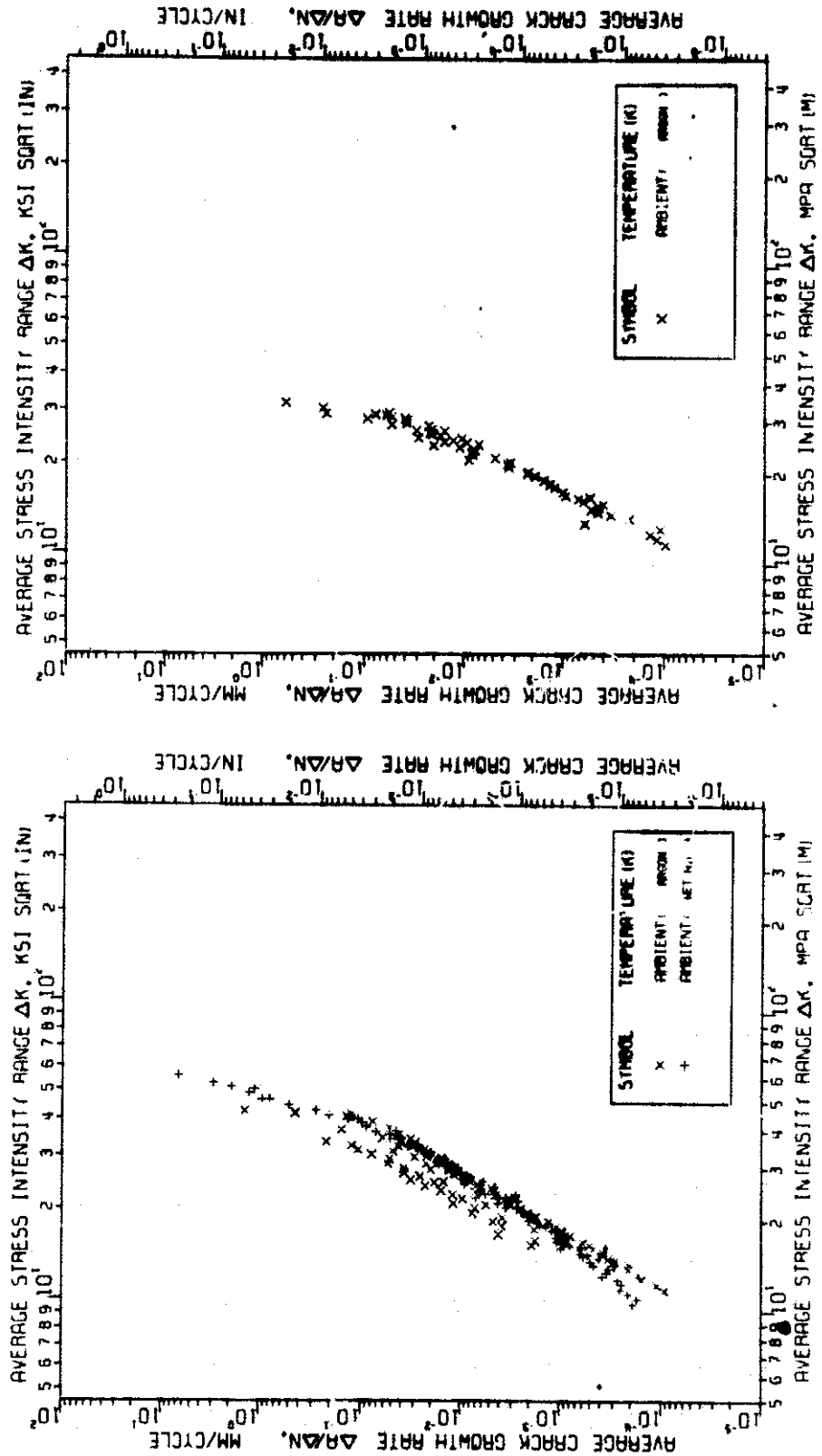


Alloy: 2024-T861 **Stress Ratio:** .50 **Frequency:** 200 cpm

Thickness: 3.18 mm (.125 inch) **Constraint:** Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-5

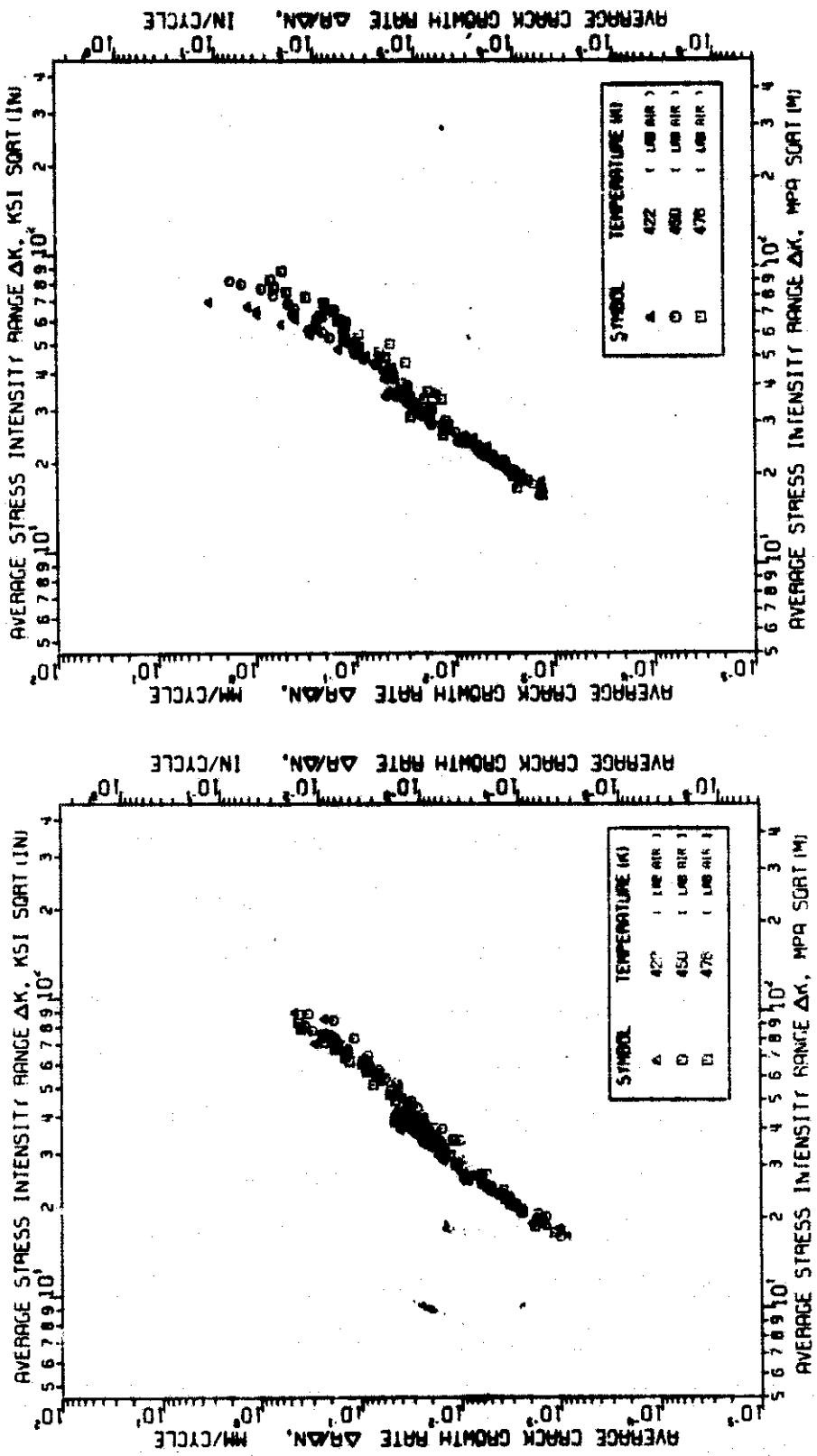


Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 3.18 mm (.125 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-6

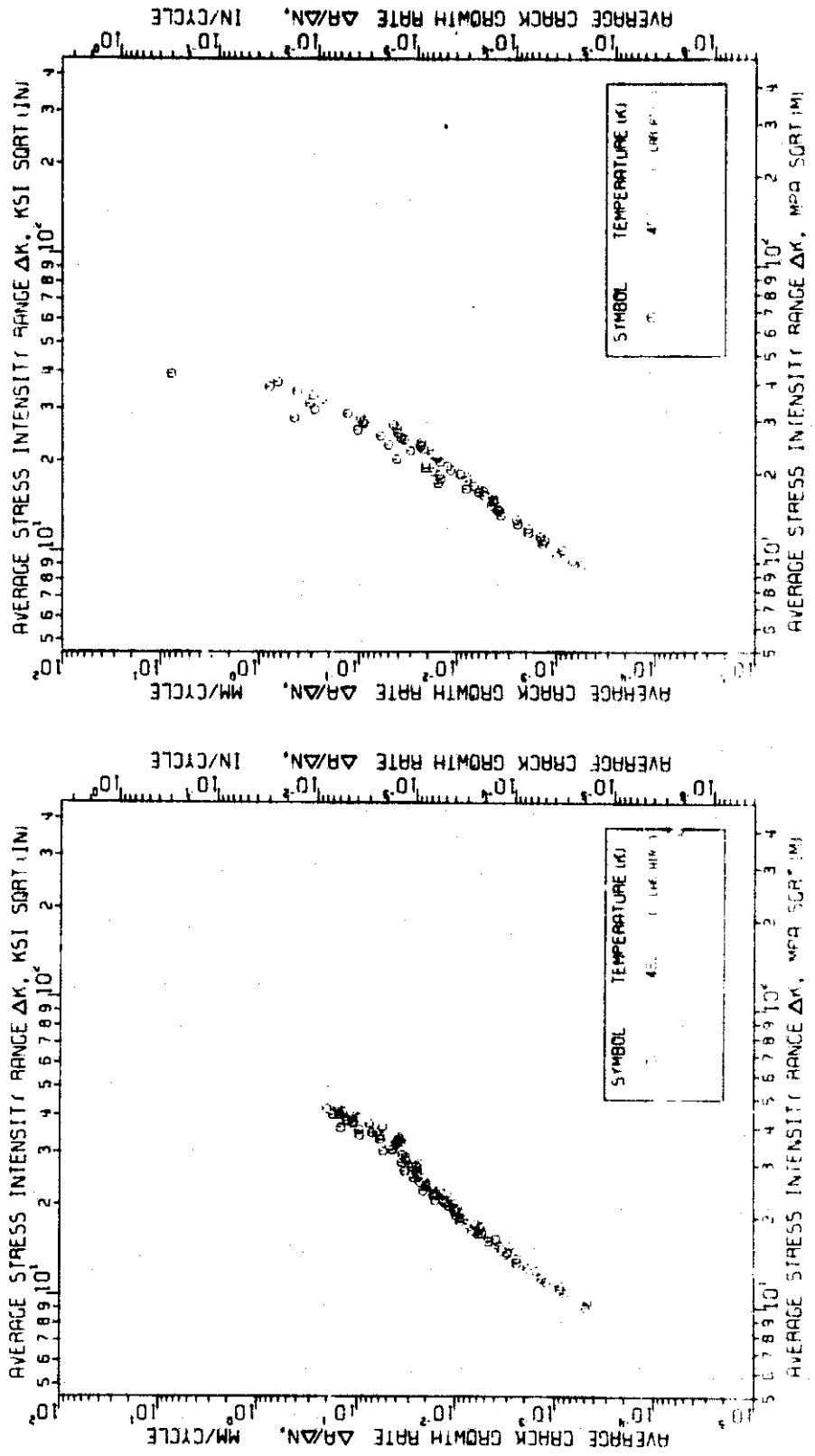


Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 3.18 mm (.125 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-7

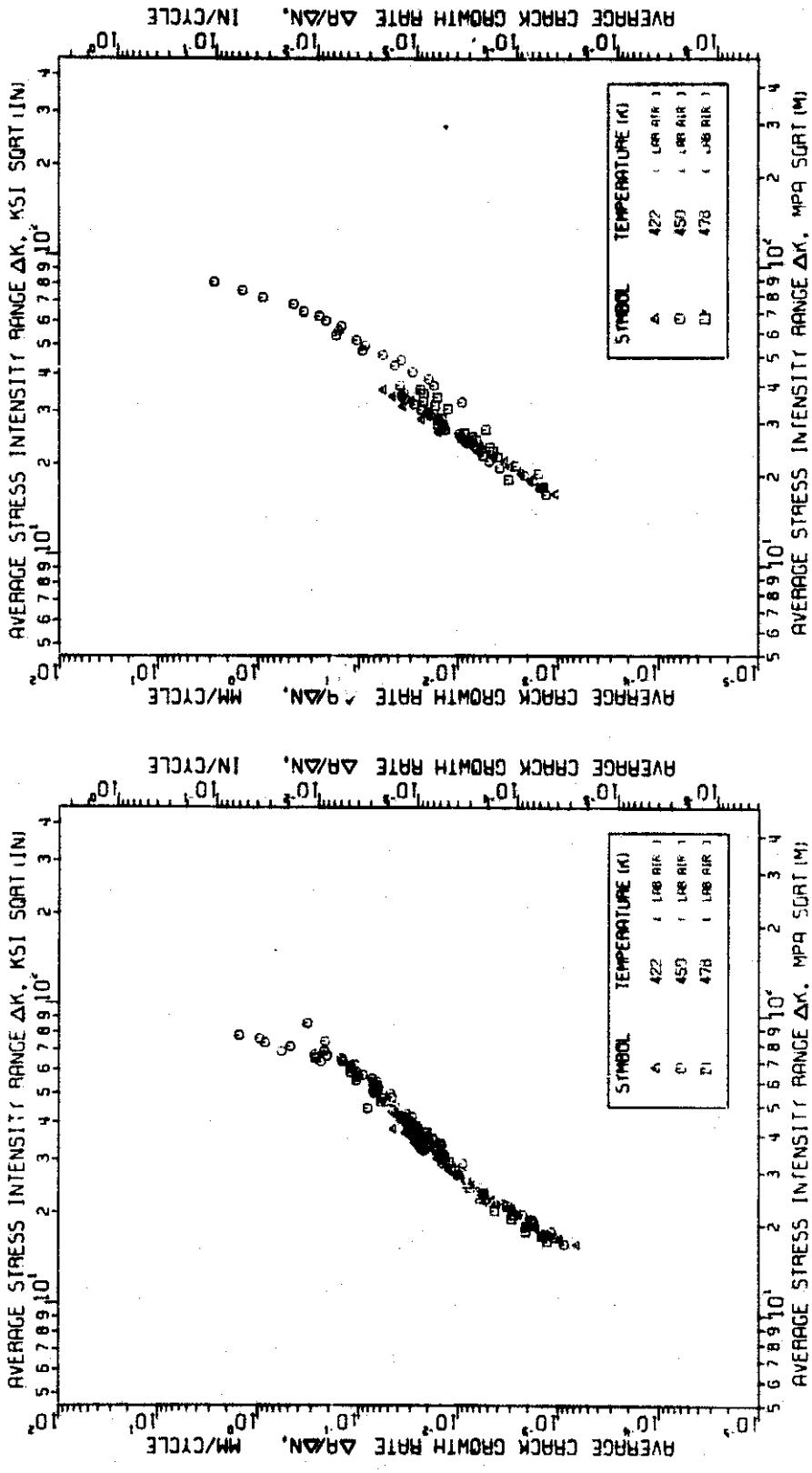


Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 3.18 mm (.125 inch) Constraint: Stiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D2-8



AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 3.18 mm (.125 inch) **Constraint:** Unstiffened

FIGURE D2-9

SECTION D3 - - FLAW GROWTH RATE DATA
FOR 6.35 mm (.250 INCH) THICK 2024-T861

PRECEDING PAGE BLANK NOT FILMED

TABLE D3-1. SUMMARY OF SPECIMEN TEST CONDITIONS FOR 200 CPM TESTS OF 6.35 mm (.250 INCH) THICK 2024-T861

Test Temperature (°K)	Stress Ratio	Test Direction	Specimen I.D.	Data Table No.	Figure No.
144 (N_2)	.05	L	250-1L4	D3-2	D3-1(a)
			250-2L1	D3-3	D3-1(a)
		T	250-1T3	D3-4	D3-1(b)
			250-2T4	D3-5	D3-1(b)
298 (Argon)	.05	L	250-4L3	D3-6	D3-2(a)
			250-3L1	D3-7	D3-2(a)
		T	250-2T1	D3-8	D3-2(b)
			250-2T9	D3-9	D3-2(b)
			250-2T5	D3-10	D3-2(b)
	.50	L	250-3L9	D3-11	D3-3
298 (Wet Air)	.05	L	250-3L3	D3-12	D3-4(a)
			250-1L3	D3-13	D3-4(a)
			250-2L2	D3-14	D3-4(a)
		T	250-2T11	D3-15	D3-4(b)
			250-1T9	D3-16	D3-4(b)
			250-3T2	D3-17	D3-4(b)
422	.05	L	250-1L1	D3-18	D3-5(a)
			250-4L2	D3-19	D3-5(a)
		T	250-1T5	D3220	D3-5(b)
450	.05	L	250-3L13	D3-21	D3-5(a)
			250-3L5	D3-22	D3-5(a)
		T	250-4T2	D3-23	D3-5(b)
			250-4T3	D3-24	D3-5(b)
478	.05	L	250-3L11	D3-25	D3-5(a)
		T	250-1T7	D3-26	D3-5(b)

TABLE D3-2

SPECIMEN NUMBER: 251-1L4
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.2 K
SPECIMEN THICKNESS: 6.27 MM (.247 IN)
MAXIMUM STRESS: 114.4 MPA (17.2 KSI)
R-RATIO: .15
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 3367 CYCLES
K(MAX) 42 CYCLES PRIOR TO FAILURE: 32.12 MPA SQRT(M) (29.23 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.77	.345	1				
			.9564E-03	.3767E-04	18.11	17.39
9.46	.372	719				
			.1213E-02	.4766E-04	19.87	18.18
10.23	.403	1359				
			.1187E-02	.4673E-04	20.89	19.74
10.90	.429	1924				
			.1879E-02	.7397E-04	21.23	19.32
11.54	.454	2244				
			.2451E-02	.1123E-03	21.87	19.91
12.27	.483	2514				
			.4774E-02	.1879E-03	22.63	20.60
13.20	.521	2719				
			.3478E-02	.1369E-03	23.44	21.33
14.06	.554	2962				
			.1401E-01	.5513E-03	24.29	22.11
14.14	.498	3042				
			.9794E-02	.3856E-03	25.01	22.76
15.76	.621	3111				
			.1779E-01	.7003E-03	25.81	23.22
16.42	.646	3134				
			.1451E-01	.5714E-03	25.98	23.65
16.93	.666	3171				
			.1659E-01	.6533E-03	26.39	24.01
17.43	.686	3211				
			.2742E-01	.1079E-02	26.94	24.52
18.33	.722	3238				
			.3182E-01	.1253E-02	27.72	25.23
19.44	.766	3271				
			.4543E-01	.1787E-02	28.55	25.98
20.53	.808	3295				
			.6985E-01	.2750E-02	29.21	26.58
21.23	.836	3315				
			.4665E-01	.1837E-02	29.72	27.05
21.91	.863	3323				
			.1513E+00	.5953E-02	30.25	27.53
22.49	.893	3329				

TABLE D3-3

SPECIMEN NUMBER: 251-2L1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.2 K
SPECIMEN THICKNESS: 6.45 MM (.254 IN)
MAXIMUM STRESS: 148.1 MPA (24.5 KSI)
R-RATIO: .15
FREQUENCY: 203 CPM
CYCLES TO FAILURE: 1644 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 41.02 MPA SQRT(M) (37.33 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.90	.154	1				
				.9296E-03	.3663E-04	18.71	17.05
	4.77	.188	931				
				.2115E-02	.8329E-04	20.10	18.29
	5.21	.205	1139				
				.2549E-02	.1002E-03	21.12	19.22
	5.80	.228	1372				
				.1711E-02	.6737E-04	21.81	19.87
	5.96	.235	1487				
				.1471E-01	.5795E-03	22.81	20.76
	6.87	.271	1529				
				.1584E-01	.6157E-03	24.29	22.11
	7.67	.302	1580				
				.1871E-01	.7365E-03	25.68	23.37
	8.57	.337	1628				
				.5228E-01	.2058E-02	27.11	24.67
	9.51	.374	1646				
				.1123E+00	.4422E-02	29.81	27.13
F	12.32	.485	1671				
				.1778E+00	.7000E-02	32.85	29.89
F	14.13	.556	1681				
				.5083E+00	.2000E-01	34.89	31.75
F	15.62	.615	1684				
				.6350E+00	.2500E-01	36.57	33.25
F	16.89	.665	1686				
				.1524E+01	.6000E-01	38.12	34.69
F	18.41	.725	1687				

TABLE D3-4

SPECIMEN NUMBER: 250-173
ALLOY TYPE: 2.24-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.5 K
SPECIMEN THICKNESS: 6.50 MM (.2559 IN)
MAXIMUM STRESS: 117.2 MPA (17.1 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 3682 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 33.78 MPA SQRT(M) (30.74 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
5.59	.218	1	.5633E-03	.2218E-04	15.28	13.90
6.68	.268	1967	.7939E-03	.3126E-04	16.43	14.96
7.39	.291	2954	.1488E-02	.5837E-04	17.47	15.90
8.42	.332	3690	.2684E-02	.1029E-03	18.41	16.74
9.29	.356	3947	.4133E-02	.1627E-03	18.99	17.28
9.56	.377	4061	.3246E-02	.1278E-03	19.57	17.81
10.23	.403	4266	.7806E-02	.2750E-03	20.32	18.49
11.08	.436	4388	.9848E-02	.3494E-03	21.31	19.39
12.34	.486	4515	.2838E-01	.1117E-02	22.25	20.25
13.16	.518	4544	.4623E-01	.1821E-02	22.92	21.46
13.86	.545	4559	.7019E-01	.2762E-02	23.84	21.69
15.33	.603	4583	.8865E-01	.3491E-02	24.63	22.41
15.77	.621	4589	.2134E+00	.8400E-02	24.98	22.73
16.28	.638	4587	.5447E+00	.2193E-01	25.59	23.28
17.29	.681	4589	.3269E+00	.1299E-01	26.65	24.25
18.94	.746	4594	.9131E+00	.3595E-01	27.95	25.43
20.76	.817	4596	.2318E+00	.9125E-02	28.78	26.19
21.23	.836	4598	.1142E+01	.4455E-01	29.37	26.72
22.41	.882	4599	.3084E+01	.1214E+00	30.85	28.08
25.49	1.004	4602				

TABLE D3-5

SPECIMEN NUMBER: 250-274
ALLOY TYPE: 2.24-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.5 K
SPECIMEN THICKNESS: 6.40 MM (.2520 IN)
MAXIMUM STRESS: 164.8 MPA (23.9 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 2157 CYCLES

K(MAX) 3 CYCLES PRIOR TO FAILURE: 38.42 MPA SQRT(M) (34.98 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
4.34	.171	1	.5213E-03	.2051E-04	18.47	16.80
4.70	.185	703	.6115E-03	.2407E-04	19.63	17.87
5.38	.212	1675	.1929E-02	.7594E-04	20.83	18.93
5.46	.234	2014	.1236E-01	.4867E-03	22.46	20.43
7.11	.280	2138	.5715E-01	.2249E-02	24.17	22.00
9.28	.365	2144	.4991E+00	.1965E-01	27.86	25.36
10.78	.424	2147				

TABLE D3-6

SPECIMEN NUMBER: 250-417
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONFIGURATION: DWELL TYPE
ENVIRONMENT: AMCOM
TEST TEMPERATURE: 288.9 K
SPECIMEN THICKNESS: 4.30 MM (.2400 IN)
MAXIMUM STRESS: 79.2 MPA (10.9 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 62937 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 49.89 MPA SQRT(M) (45.40 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	9.07	.357	0	.3865E-04	.1522E-05	12.38	11.19
	9.72	.383	21631	.9368E-04	.3688E-05	12.67	11.53
	10.22	.402	26945	.5119E-03	.2016E-04	13.09	11.91
	11.04	.435	28554	.1133E-03	.4461E-05	13.48	12.27
	11.48	.452	32412	.2990E-03	.1834E-04	13.81	12.57
	12.16	.479	35067	.2591E-03	.1020E-04	14.16	12.88
	12.54	.498	36974	.2383E-03	.9381E-05	14.49	13.19
	13.17	.518	39170	.2799E-03	.1102E-04	14.76	13.43
	13.74	.541	41221	.2753E-03	.1084E-04	15.10	13.74
	14.41	.567	43652	.3952E-03	.1556E-04	15.47	14.10
	15.10	.595	45397	.3971E-03	.1563E-04	15.84	14.42
	15.80	.622	47169	.4484E-03	.1766E-04	16.20	14.74
	16.46	.648	48827	.6101E-03	.2402E-04	16.55	15.06
	17.19	.677	49828	.2789E-03	.1098E-04	16.82	15.31
	17.54	.690	51071	.7208E-03	.2846E-04	17.09	15.55
	18.27	.719	52081	.8891E-03	.3185E-04	17.43	15.86
	18.91	.744	52869	.1120E-02	.4410E-04	18.07	16.45
	21.05	.825	54691	.8349E-03	.3303E-04	18.84	17.14
	22.19	.874	56169	.1164E-02	.4581E-04	19.69	17.47
	24.47	.963	58128	.2239E-02	.8816E-04	20.50	14.65
	26.12	1.029	58863	.2158E-02	.8497E-04	21.12	19.72
	27.36	1.077	59442	.2331E-02	.9176E-04	21.71	19.76
	29.01	1.142	60145	.3779E-02	.1472E-03	22.34	20.37
	30.47	1.200	60539	.4597E-02	.1810E-03	23.07	21.09
	32.74	1.273	60944	.5072E-02	.1997E-03	23.93	21.78
	34.74	1.368	61417	.4431E-02	.2489E-03	24.76	22.53
	36.45	1.435	61669	.1078E-01	.4245E-03	25.61	23.24
	38.63	1.521	61873	.1321E-01	.5202E-03	26.29	23.92
	40.27	1.585	61994	.1619E-01	.6374E-03	26.96	24.54
	42.06	1.656	62105	.2160E-01	.8110E-03	27.68	25.19
	43.94	1.730	62196	.2522E-01	.9947E-03	28.43	25.87
	45.86	1.805	62272	.2777E-01	.1093E-02	29.14	26.56
	47.75	1.880	62343	.4565E-01	.1797E-02	29.91	27.21
	49.44	1.946	62378	.5637E-01	.2219E-02	31.47	28.64
F	95.87	3.773	62487	.8255E-01	.3250E-02	33.05	30.18
F	97.28	3.829	62557	.5716E-01	.2251E-02	33.62	30.62
F	96.42	3.795	62627	.3813E-01	.1501E-02	34.26	31.18
F	96.32	3.791	62532	.1372E-01	.5400E-03	35.19	32.04
F	93.75	3.690	62557	.1016E-01	.4000E-03	34.35	31.28
F	94.77	3.730	62567	.2054E-01	.8129E-03	36.93	33.61
F	96.42	3.795	62575	.3175E-01	.1250E-02	37.77	34.34
F	94.33	3.713	62581	.6032E-01	.2375E-02	38.71	35.23
F	92.74	3.651	62585	.7621E-01	.3000E-02	40.01	36.41
F	93.79	3.692	62589	.7620E-01	.3000E-02	41.12	37.42
F	95.71	3.767	62591	.1461E-01	.7251E-01	42.41	38.59
F	94.99	3.739	62593	.2413E-01	.9500E-01	44.07	40.24
F	91.41	3.599	62594	.1905E-01	.7500E-01	45.18	41.12
F	93.31	3.674	62595	.2921E-01	.1150E-02	46.55	42.36
F	96.23	3.789	62596				

TABLE D3-7

SPECIMEN NUMBER= 25[illegible]
ALLOY TYPE= 2.24-T861
SPECIMEN ORIENTATION= LONGITUDINAL
CONSTRAINT= UNSTIFFENED
ENVIRONMENT= ARGON
TEST TEMPERATURE= 702.6 K
SPECIMEN THICKNESS= 6.43 MM (.253) IN
MAXIMUM STRESS= 229.5 MPA (32.7 KSI)
R-RATIO= .5
FREQUENCY= 230 CPM
CYCLES TO FAILURE= 184 CYCLES
KI(MAX) 47 CYCLES PRIOR TO FAILURE= 25.23 MPA SQRT(M) (22.92 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.41	.134	1	.5626E-02	.2215E-03	23.77	21.61
3.97	.156	1.1				

TABLE D3-8

SPECIMEN NUMBER= 25[illegible]-ST1
ALLOY TYPE= 2.24-T861
SPECIMEN ORIENTATION= TRANSVERSE
CONSTRAINT= UNSTIFFENED
ENVIRONMENT= ARGON
TEST TEMPERATURE= 299.8 K
SPECIMEN THICKNESS= 6.38 MM (.251) IN
MAXIMUM STRESS= 74.5 MPA (10.8 KSI)
R-RATIO= .5
FREQUENCY= 230 CPM
CYCLES TO FAILURE= 44592 CYCLES
KI(MAX) 115 CYCLES PRIOR TO FAILURE= 27.15 MPA SQRT(M) (24.71 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
8.53	.336	1	.1791E-03	.4296E-05	11.87	10.80
9.31	.366	7266	.1362E-03	.5363E-05	12.39	11.27
9.90	.391	11593	.1682E-03	.6621E-05	12.75	11.60
10.62	.418	15757	.2269E-03	.8932E-05	13.17	11.99
11.29	.445	18737	.1729E-03	.6806F-05	13.55	12.33
11.90	.468	22214	.238.E-03	.9372E-05	13.98	12.72
12.76	.502	26816	.2913E-03	.1147E-04	14.76	13.[illegible]
13.21	.520	27382	.3343E-03	.1316E-04	14.89	13.37
13.95	.549	29589	.2991E-03	.1177E-04	15.1[illegible]	13.74
14.72	.579	32171	.3862E-03	.1512E-04	15.46	14.07
15.29	.602	33652	.3331E-03	.1311E-04	15.72	14.30
15.71	.618	34814	.7627E-03	.3[illegible]E-04	16.[illegible]	14.59
16.51	.650	35963	.5690E-03	.2240E-04	16.38	14.91
17.10	.673	36992	.8886E-03	.3467E-04	16.7[illegible]	15.21
17.85	.703	37951	.7796E-03	.3068E-04	17.1[illegible]	15.59
18.74	.738	38992	.8267E-03	.3255E-04	17.71	16.12
20.32	.800	40903	.1583E-02	.6231E-04	18.47	16.77
21.82	.859	41852	.2081E-02	.7877E-04	19.14	17.42
23.47	.924	42874	.3128E-02	.1231E-03	20.[illegible]4	18.24
25.90	1.019	43451	.4139E-02	.1629E-03	20.84	18.97
27.21	1.071	43767	.8420E-02	.3315E-03	21.47	19.5[illegible]
28.66	1.128	43943	.1126E-01	.4431E-03	22.17	20.17
30.79	1.212	44129	.1433E-01	.5640E-03	22.95	20.89
32.52	1.280	44250	.1767E-01	.6954E-03	23.69	21.55
34.43	1.356	44358	.3026E-01	.1191E-02	24.45	22.25
36.37	1.432	44422	.4615E-01	.1817E-02	25.31	23.04
38.32	1.508	44475				

TABLE D3-9

SPECIMEN NUMBER: 253-215
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIRDRY
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.38 MM (.251" IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 12797 CYCLES

K(MAX) 157 CYCLES PRIOR TO FAILURE: 23.81 MPA SQRT(M) (21.67 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.71	.146	1				
			.9039E-04	.3912E-05	12.81	11.66
4.52	.178	8169				
			.2714E-03	.1069E-04	13.99	12.73
5.29	.208	11814				
			.3732E-03	.1469E-04	14.96	13.62
5.92	.233	12712				
			.5472E-03	.2154E-04	15.86	14.43
6.67	.262	14072				
			.7822E-03	.2769E-04	16.75	15.25
7.36	.290	15983				
			.1086E-02	.4275E-04	17.42	16.21
8.49	.334	16111				
			.1819E-02	.7145E-04	18.80	17.11
9.16	.361	16477				
			.2633E-02	.1037E-03	19.49	17.74
9.81	.386	16723				
			.3484E-02	.1372E-03	20.22	18.40
10.58	.417	16945				
			.3999E-02	.1574E-03	20.88	19.00
11.14	.439	17106				
			.8003E-02	.3151E-03	21.47	19.54
11.81	.465	17169				
			.1352E-01	.5321E-03	22.20	20.20
12.71	.503	17236				

TABLE D3-10

SPECIMEN NUMBER: 253-215
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIRDRY
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.38 MM (.251" IN)
MAXIMUM STRESS: 198.6 MPA (28.8 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 193 CYCLES

K(MAX) 49 CYCLES PRIOR TO FAILURE: 29.37 MPA SQRT(M) (21.27 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.73	.146	1				
			.4937E-02	.1944E-03	21.3[illegible]	19.[illegible]
4.4[illegible]	.173	14[illegible]				

TABLE D3-11

SPECIMEN NUMBER= 249-3L9
SELECT TYPE= 2024-T861
SPECIMEN CREATION= LONGITUDINAL
CONSTRAINT= UNSTIFFENED
ENVIRONMENT= ARGON
TEST TEMPERATURE= 269.4 K
SPECIMEN THICKNESS= 6.22 MM (.2450 IN)
MAXIMUM STRESS= 112.4 MPA (17.2 KSI)
R-RATIO= .10
FREQUENCY= 20 CPM
CYCLES TO FAILURE= 16986 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE= 42.82 MPA SQRT(M)= 38.97 KSI SQRT(IN))

CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	KSI SQRT(IN)
5.72	.147	1				
			.1733E-01	.6822E-05	6.77	6.13
6.49	.176	4347				
			.2567E-03	.9878E-05	7.35	6.69
7.29	.218	7674				
			.3783E-03	.1490E-04	7.92	7.21
8.05	.238	9843				
			.4444E-03	.1751E-04	8.35	7.60
8.66	.238	10749				
			.6574E-03	.2588E-04	8.71	7.93
9.14	.241	11627				
			.6923E-03	.2724E-04	9.09	8.27
9.74	.315	12716				
			.9639E-03	.3793E-04	9.42	8.57
9.96	.328	13134				
			.1142E-02	.4102E-04	9.74	8.86
9.94	.348	13591				
			.1336E-02	.5149E-04	10.10	9.19
9.64	.376	14131				
			.1631E-02	.6416E-04	10.47	9.52
10.18	.401	14623				
			.2107E-02	.8278E-04	10.94	9.86
10.65	.431	14836				
			.3507E-02	.1381E-03	11.28	10.26
11.17	.459	15163				
			.4304E-02	.1694E-03	11.72	10.67
12.75	.502	15295				
			.5774E-02	.2273E-03	12.11	11.02
13.89	.534	15495				
			.1843E-02	.7244E-04	12.38	11.25
13.94	.549	15651				
			.1825E-01	.7147E-03	12.77	11.62
15.38	.604	15734				
			.1391E-01	.5477E-03	13.38	12.11
16.26	.640	15739				
			.2232E-01	.8000E-03	13.73	12.49
17.13	.643	15852				
			.2129E-01	.8382E-03	14.18	12.90
18.42	.725	15913				
			.3425E-01	.1348E-02	14.62	13.31
19.72	.744	15915				
			.3757E-01	.1479E-02	14.98	13.63
21.23	.796	15954				
			.4204E-01	.1655E-02	15.28	13.90
21.73	.825	15973				
			.3196E-01	.1197E-02	15.41	14.20
21.45	.844	16000				
			.7399E-01	.2912E-02	15.96	14.53
22.31	.892	16013				
			.6298E-01	.2479E-02	16.31	14.84
23.79	.937	16027				
			.5695E-01	.2242E-02	16.67	15.17
24.47	.975	16040				
			.1695E-01	.6333E-02	17.21	15.66
26.41	.995	16054				
			.1024E-03	.4033E-02	17.72	16.13
27.72	1.031	16067				
			.2437E-03	.9593E-02	18.18	16.54
29.47	1.159	16074				
			.7183E-03	.2788E-01	18.72	17.03
30.44	1.214	16076				
			.7734E-03	.3045E-01	19.39	17.37
31.62	1.245	16077				
			.6473E-03	.2548E-01	19.55	17.79
33.66	1.321	16083				
			.8541E-03	.3528E-01	20.18	18.36
35.36	1.392	16082				
			.9842E-03	.3560E-01	20.62	18.77
36.26	1.427	16083				
			.1642E-01	.7645E-01	21.09	19.26
39.19	1.504	16084				

TABLE D3-12

SPECIMEN NUMBER: 220-213
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 288.7 K
SPECIMEN THICKNESS: 6.15 MM (.2420" IN)
MAXIMUM STRESS: 75.2 MPA (10.9 KSI)
R-RATIO: .15
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 46981 CYCLES
K(MAX) 842 CYCLES PRIOR TO FAILURE: 14.45 MPA SQRT(M) (13.15 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.58	.141	1				
			.8437E-04	.3322E-05	7.98	7.26
4.47	.172	9273				
			.1038E-03	.4086E-05	8.65	7.87
4.96	.195	15837				
			.1249E-03	.4917E-05	9.29	8.45
5.79	.228	21637				
			.1912E-03	.5952E-05	9.87	8.98
6.35	.250	25353				
			.1029E-03	.7199E-05	10.35	9.42
7.00	.276	28899				
			.1937E-03	.7626E-05	10.87	9.89
7.71	.304	32584				
			.1990E-03	.7833E-05	11.35	10.33
8.32	.327	35616				
			.2913E-03	.9882E-05	11.79	10.73
8.97	.353	38237				
			.3116E-03	.1227E-04	12.23	11.13
9.63	.379	40232				
			.3959E-03	.1398E-04	12.68	11.54
10.35	.407	42371				
			.3287E-03	.1263E-04	13.11	11.93
10.99	.433	44351				
			.3895E-03	.1534E-04	13.52	12.30
11.68	.460	46161				

TABLE D3-13

SPECIMEN NUMBER: B-113
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 294.8 K
SPECIMEN THICKNESS: 6.48 MM (.2550 IN)
MAXIMUM STRESS: 119.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 11983 CYCLES
K(MAX) 554 CYCLES PRIOR TO FAILURE: 25.22 MPA SQRT(M) (22.95 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.69	.145	1				
			.2682E-03	.1056E-04	12.58	11.45
4.24	.167	2883				
			.4639E-03	.1787E-04	13.61	12.38
5.13	.194	3819				
			.5405E-03	.2128E-04	14.62	13.30
5.67	.223	4998				
			.5328E-03	.2098E-04	15.62	14.03
6.23	.245	6042				
			.6073E-03	.3972E-04	16.28	14.82
7.04	.277	6935				
			.8742E-03	.7442E-04	17.13	15.59
7.64	.301	7629				
			.1187E-02	.4675E-04	17.87	16.26
8.32	.328	8197				
			.1292E-02	.5086E-04	18.58	16.91
8.92	.351	8663				
			.1797E-02	.6817E-04	19.86	17.62
9.79	.385	9161				
			.2084E-02	.8197E-04	20.11	18.30
10.39	.409	9451				
			.2618E-02	.1031E-03	20.73	18.87
11.03	.434	9695				
			.3415E-02	.1345E-03	21.71	19.39
11.59	.456	9859				
			.3175E-02	.1250E-03	21.99	19.96
12.34	.486	10095				
			.4992E-02	.1965E-03	22.57	20.54
12.99	.511	10225				
			.5023E-02	.1977E-03	23.16	21.18
13.66	.538	10354				
			.7118E-02	.2802E-03	23.71	21.57
14.23	.560	10439				

TABLE D3-14

SPECIMEN NUMBER: 253-2L2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.35 MM (.250 IN)
MAXIMUM STRESS: 225.4 MPA (32.7 KSI)
R-RATIO: .05
FREQUENCY: 20. CPM
CYCLES TO FAILURE: 198 CYCLES
K(MAX) 64 CYCLES PRIOR TO FAILURE: 25.72 MPA SQRT(M) (23.40 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.95	.140	1				
4.14	.161	135	.4407E-02	.1735E-03	23.64	21.43

TABLE D3-15

SPECIMEN NUMBER: 253-2T11
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.35 MM (.250 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .05
FREQUENCY: 20. CPM
CYCLES TO FAILURE: 55884 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 38.55 MPA SQRT(M) (27.10 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.65	.144	1				
4.35	.171	9267	.7534E-04	.2968E-05	7.93	7.22
5.11	.201	18792	.1073E-03	.4225E-05	8.67	7.45
5.87	.231	28331	.1157E-03	.4557E-05	9.17	8.34
6.27	.247	34623	.1643E-03	.6469E-05	9.68	8.79
6.86	.270	37856	.1826E-03	.7189E-05	10.17	9.26
7.52	.296	41664	.1734E-03	.6831E-05	10.55	9.59
8.11	.319	44143	.2357E-03	.9274E-05	11.11	10.10
8.44	.332	47654	.2513E-03	.9893E-05	11.56	10.52
9.46	.372	49193	.2491E-03	.1134E-04	12.02	10.94
10.13	.399	51321	.3187E-03	.1255E-04	12.44	11.32
11.73	.421	52862	.3644E-03	.1460E-04	12.84	11.68
11.45	.451	54856	.3739E-03	.1472E-04	13.24	12.05
12.17	.479	56159	.5126E-03	.2018E-04	13.67	12.44
12.86	.506	57326	.5423E-03	.2539E-04	14.09	12.81
13.41	.528	58241	.5975E-03	.2352E-04	14.44	13.14
14.06	.553	59248	.6326E-03	.2490E-04	14.77	13.44
14.69	.578	60161	.8124E-03	.3199E-04	15.12	13.76
15.44	.612	60943	.9211E-03	.3626E-04	15.61	14.12
16.31	.642	61743	.1015E-02	.3996E-04	15.94	14.50
16.93	.666	62234	.1267E-02	.4993E-04	16.29	14.82
17.70	.697	62744	.1498E-02	.5859E-04	16.64	15.14
18.39	.724	63165	.1733E-02	.6823E-04	17.02	15.47
19.61	.773	63808	.1962E-02	.7732E-04	17.46	15.89
20.93	.824	64429	.2496E-02	.8257E-04	18.06	16.44
22.20	.874	64814	.3312E-02	.1304E-03	18.66	16.98
23.62	.930	65135	.4849E-02	.1909E-03	19.24	17.53
24.93	.982	65353	.5252E-02	.2072E-03	19.85	18.07
26.16	1.030	65605	.8103E-02	.3190E-03	20.45	18.62
27.52	1.084	65837	.1760E-01	.5275E-03	20.96	19.08
28.79	1.134	65889	.1546E-01	.6086E-03	21.62	19.68
30.35	1.195	65969	.1946E-01	.7662E-03	22.10	20.11
31.89	1.256	66029	.2576E-01	.1014E-02	22.73	20.69
33.76	1.329	66079	.3729E-01	.1468E-02	23.42	21.31
35.63	1.403	66019	.4673E-01	.1839E-02	24.17	21.99
37.38	1.471	66034	.9704E-01	.3820E-02	24.88	22.64
38.80	1.528	66056	.6898E-01	.2715E-02	25.50	23.21
39.62	1.560	66069	.7412E-01	.2918E-02	25.94	23.61
42.09	1.658	66079	.2338E+00	.9204E-02	26.74	24.33
44.66	1.758	66087	.6423E+00	.1761E-01	27.72	25.23
47.10	1.854	66096	.8153E+00	.3210E-01	28.56	25.97

TABLE D3-16

SPECIMEN NUMBER: 250-1T9
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: MOIST AIR
TEST TEMPERATURE: 294.8 K
SPECIMEN THICKNESS: 6.10 MM (.2402 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 8.75 CYCLES
K(MAX) 19C CYCLES PRIOR TO FAILURE: 24.86 MPA SQRT(M) (21.98 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.78	.149	1				
			.3948E-03	.1397E-04	12.67	11.53
4.35	.171	1041				
			.4554E-03	.1793E-04	13.77	12.53
5.14	.232	3584				
			.6328E-03	.2491E-04	14.87	13.49
5.86	.231	4722				
			.7871E-03	.3099E-04	15.66	14.25
6.41	.252	5419				
			.8265E-03	.3254E-04	16.28	14.81
6.84	.269	5963				
			.1234E-02	.4857E-04	17.01	15.48
7.62	.300	6971				
			.1429E-02	.5613E-04	17.79	16.19
8.20	.323	6981				
			.1925E-02	.7578E-04	18.51	16.85
8.88	.350	7334				
			.2443E-02	.9617E-04	19.17	17.46
9.46	.372	7569				
			.4279E-02	.1685E-03	19.97	18.13
10.13	.399	7726				
			.4998E-02	.1968E-03	21.68	19.71
10.98	.432	7896				
			.7620E-02	.7000E-03	21.20	19.30
11.60	.456	7977				
			.1029E-01	.4053E-03	21.04	19.16
12.38	.487	8053				
			.1891E-01	.7486E-03	22.59	20.56
12.98	.511	8085				

TABLE D3-17

SPECIMEN NUMBER: 253-3T2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: MOIST AIR
TEST TEMPERATURE: 294.8 K
SPECIMEN THICKNESS: 6.15 MM (.2422 IN)
MAXIMUM STRESS: 198.6 MPA (28.8 KSI)
R-RATIO: .05
FREQUENCY: 20C CPM
CYCLES TO FAILURE: 13C CYCLES
K(MAX) 13 CYCLES PRIOR TO FAILURE: 22.4C MPA SQRT(M) (20.38 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.35	.132	1				
			.6566E-02	.2645E-03	20.37	18.52
4.05	.159	137				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D3-18

SPECIMEN NUMBER: 227-411
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 6.35 MM (.250 IN)
MAXIMUM STRESS: 48.2 MPA (12.4 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 48193 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 73.44 MPA SQRT(M) (66.66 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.81	.151	1				
				.9672E-04	.3792E-05	9.31	8.49
	4.42	.174	6144	.9671E-04	.3806E-05	9.99	9.19
	5.04	.198	12372	.1443E-03	.5671E-05	10.61	9.66
	5.63	.222	18917	.1653E-03	.6507E-05	11.31	10.29
	6.48	.255	21609	.2663E-03	.4123E-05	11.92	10.85
	6.98	.275	28328	.3033E-03	.1192E-04	12.48	11.35
	7.76	.306	28633	.3324E-03	.1309E-04	13.03	11.86
	8.31	.327	28299	.3911E-03	.1540E-04	13.57	12.32
	9.01	.355	30072	.4511E-03	.1776E-04	14.10	12.43
	9.77	.385	31764	.5017E-03	.1975E-04	14.63	13.31
	11.46	.411	33103	.4448E-03	.1699E-04	14.11	13.75
	11.09	.437	34439	.6453E-03	.2540E-04	15.5*	14.11
	11.57	.455	35181	.8537E-03	.3361E-04	15.98	14.55
	12.50	.492	36270	.7949E-03	.3130E-04	16.51	15.02
	13.14	.517	37000	.1089E-02	.4287E-04	16.88	15.76
	13.65	.538	37551	.8694E-03	.3423E-04	17.28	15.72
	14.38	.566	38387	.9811E-03	.3863E-04	17.77	16.18
	15.25	.600	39275	.1654E-02	.6514E-04	18.22	16.58
	15.85	.624	39839	.1502E-02	.5914E-04	18.60	16.92
	16.51	.650	40282	.1443E-02	.5683E-04	18.97	17.27
	17.14	.675	40714	.1108E-02	.4363E-04	19.29	17.56
	17.61	.693	41144	.1523E-02	.5996E-04	19.64	17.47
	18.36	.723	41636	.1712E-02	.6739E-04	20.04	18.24
	19.03	.749	42027	.2078E-02	.8180E-04	20.56	18.71
	20.27	.798	42623	.2066E-02	.8134E-04	21.20	19.29
	21.39	.842	43167	.3033E-02	.1194E-03	21.86	19.89
	22.77	.896	43820	.3175E-02	.1250E-03	22.56	20.53
	24.68	.968	44632	.3696E-02	.1439E-03	23.24	21.15
	25.49	1.004	44820	.4150E-02	.1634E-03	24.02	21.86
	27.18	1.070	44827	.4312E-02	.1698E-03	24.75	22.52
	28.68	1.121	45128	.5621E-02	.2213E-03	25.39	23.10
	29.85	1.175	45372	.5806E-02	.2286E-03	25.95	23.62
	31.87	1.215	45547	.6816E-02	.2683E-03	26.48	24.10
	32.10	1.264	45727	.7695E-02	.3814E-03	27.03	24.59
	33.20	1.307	45871	.7257E-02	.2857E-03	27.58	25.09
	34.47	1.357	46046	.8043E-02	.3167E-03	28.14	25.61
	35.69	1.434	46193	.9304E-02	.3696E-03	28.69	26.11
	36.87	1.452	46323	.9811E-02	.3948E-03	29.23	26.60
	38.01	1.496	46449	.1082E-01	.4261E-03	29.76	27.08
	39.23	1.544	46562	.3164E-01	.1246E-02	41.58	37.84
F	88.90	3.500	48132	.2117E+00	.8333E-02	97.39	92.22
F	92.07	3.625	48147	.1609E+00	.6333E-02	99.53	94.17
F	94.49	3.720	48162	.2286E+00	.9000E-02	61.91	56.34
F	97.92	3.855	48177	.4266E+00	.1680E-01	64.94	59.18
F	101.35	3.990	48185	.5292E+00	.2083E-01	68.13	62.08
F	104.52	4.115	48191				

TABLE D3-19

SPECIMEN NUMBER: 250-4L2
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 322.0 K
SPECIMEN THICKNESS: 6.49 MM (.2556 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
KIMAX) 1 CYCLE PRIOR TO FAILURE: CYCLES TO FAILURE: 10445 CYCLES (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.47	.273	1				
	5.60	.334	1464	.1838E-02	.7241E-04	18.41	16.75
	5.99	.484	3321	.1081E-02	.4256E-04	20.91	19.03
	6.43	.536	4139	.1144E-02	.5360E-04	22.26	20.26
	6.89	.550	4739	.1837E-02	.7231E-04	23.24	21.15
	7.46	.587	5315	.1564E-02	.6165E-04	24.13	21.96
	8.15	.645	5956	.2316E-02	.9074E-04	25.15	22.89
	8.41	.694	6476	.2375E-02	.9313E-04	25.25	23.89
	8.77	.734	6941	.2159E-02	.8453E-04	27.13	24.69
	8.94	.743	7228	.4321E-02	.1701E-03	29.30	25.48
	10.46	.823	7511	.3596E-02	.1413E-03	28.85	26.25
	1.47	.936	7877	.5127E-02	.2016E-03	29.63	26.48
	11.45	.902	7928	.4594E-02	.1809E-03	33.26	27.53
	12.7	.950	8151	.6554E-02	.2203E-03	31.10	28.31
	12.64	.997	8276	.5234E-02	.2061E-03	31.96	29.08
	13.34	1.043	8432	.7412E-02	.2917E-03	32.75	29.88
	13.42	1.087	8713	.6532E-02	.2572E-03	33.52	30.50
	14.34	1.131	8880	.8255E-02	.3251E-03	34.27	31.14
	14.47	1.171	8946	.9547E-02	.3759E-03	34.98	31.83
	15.41	1.214	9045	.1097E-01	.4319E-03	35.66	32.45
	15.84	1.248	9116	.1215E-01	.4785E-03	36.29	33.03
	16.72	1.277	9154	.1043E-01	.4107E-03	36.81	33.50
	16.	1.304	9241	.1285E-01	.5059E-03	37.27	33.92
	17.	1.345	9327	.1213E-01	.4776E-03	37.62	34.42
	17.54	1.389	9418	.1216E-01	.4789E-03	38.50	35.04
	18.07	1.449	9494	.1879E-01	.7398E-03	39.33	35.79
	18.32	1.498	9579	.1555E-01	.6122E-03	40.20	36.58
	19.07	1.541	9627	.2285E-01	.8998E-03	40.93	37.25
	21.13	1.542	9659	.2519E-01	.9918E-03	41.60	37.86
	21.64	1.575	9716	.2350E-01	.9252E-03	42.27	38.46
	21.19	1.619	9761	.2407E-01	.9474E-03	42.94	39.08
	21.70	1.715	9797	.2833E-01	.1115E-32	43.60	39.68
	22.14	1.746	9825	.3408E-01	.1339E-02	44.22	40.24
F	22.39	1.809	9845	.2643E-01	.1049E-02	45.31	40.96
F	24.35	1.917	9865	.4583E-01	.1804E-02	46.36	42.19
F	25.73	2.026	9895	.5500E-01	.2165E-02	48.38	43.75
F	27.13	2.134	10048	.5500E-01	.2165E-02	49.81	45.33
F	28.55	2.248	10095	.5823E-01	.2291E-02	51.62	46.98
F	30.15	2.366	10145	.6948E-01	.2734E-02	53.54	48.73
F	31.31	2.465	10181	.7171E-01	.2823E-02	55.37	50.39
F	32.64	2.570	10215	.7625E-01	.3003E-02	57.13	51.99
F	34.10	2.645	10249	.9700E-01	.3819E-02	59.07	53.76
F	35.54	2.822	10275	.1160E+00	.4567E-02	61.37	55.85
F	37.49	2.968	10315	.1240E+00	.4882E-02	64.07	58.31
F	41.20	3.156	10335	.1673E+00	.6588E-02	67.52	61.45
F	42.27	3.328	10360	.1644E+00	.6084E-02	71.39	64.97
F	44.49	3.583	10380	.2225E+00	.8760E-02	75.38	68.53
F	46.48	3.631	10396	.3180E+00	.1252E-01	79.88	72.78
F	48.73	3.837	10405	.3721E+00	.1465E-01	84.59	76.92
F	51.94	4.319	10419	.4450E+00	.1752E-01	89.46	81.42
F	51.95	4.093	10423				
F	53.42	4.238	10431				
F	56.30	4.433	10437				
F	58.91	4.631	10440				
F	62.19	4.895	10442				
F	65.79	5.180	10443				
F	71.13	5.593	10444				

(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)
(NET STRESS GREATER THAN 0.9 FTY)

TABLE D3-20

SPECIMEN NUMBER: 2[illegible]-1T5
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 6.35 MM (.250 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .5
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 5687 CYCLES
K(MAX) : CYCLES PRIOR TO FAILURE: 73.32 MPA SQRT(M) (66.73 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.48	.432	1				
	5.71	.455	743	.4051E-03	.1517E-04	21.27	13.35
	6.33	.499	1291	.1696E-02	.6677E-04	22.07	21.08
	6.96	.546	2329	.1203E-02	.4739E-04	23.12	21.14
	7.68	.604	3066	.2307E-02	.7911E-04	24.78	22.10
	8.36	.658	3553	.2803E-02	.1103E-03	25.47	23.18
	8.97	.706	3945	.4151E-02	.1634E-03	26.50	24.12
	9.78	.770	4253	.1985E-02	.1559E-03	27.61	25.12
	10.67	.837	4569	.5512E-02	.2169E-03	28.86	24.27
	11.20	.882	4750	.6059E-02	.2385E-03	29.90	27.21
	11.93	.940	4931	.9768E-02	.3838E-03	30.83	29.56
	12.14	.956	4964	.6603E-02	.2601E-03	31.48	29.66
	12.96	1.020	5094	.1252E-01	.4927E-03	32.20	29.30
	13.62	1.073	5207	.1184E-01	.4662E-03	33.21	31.22
	14.43	1.136	5299	.3092E-01	.1217E-02	34.21	31.12
	15.11	1.190	5321	.2202E-01	.8668E-03	35.18	32.01
	15.87	1.249	5379	.2602E-01	.1024E-02	36.11	32.46
	16.64	1.310	5418	.3157E-01	.1243E-02	37.10	33.76
	17.42	1.411	5483	.4917E-01	.1936E-02	38.40	34.95
	19.77	1.557	5533	.6994E-01	.2754E-02	40.37	36.74
	21.50	1.693	5571	.9076E-01	.3573E-02	42.66	38.77
F	22.73	1.790	5594	.9174E-01	.3613E-02	44.44	40.44
F	24.61	1.930	5614	.1775E+00	.6988E-02	46.31	42.14
F	26.12	2.057	5631	.2147E+00	.8451E-02	48.43	44.07
F	27.83	2.199	5647	.2586E+00	.1018E-01	50.59	46.04
F	29.79	2.346	5657	.3730E+00	.1469E-01	52.97	48.21
F	31.49	2.479	5667	.3383E+00	.1331E-01	55.30	50.34
F	34.41	2.711	5677	.5860E+00	.2307E-01	58.49	53.23
F	35.84	2.822	5679	.1428E+01	.5591E-01	61.61	56.07
F	38.66	2.996	5681	.2223E+01	.8749E-01	64.36	54.56
F	40.23	3.169	5682	.4353E+01	.1713E+00	67.44	61.74

TABLE D3-21

SPECIMEN NUMBER: 224-3L13
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 297.8 K
SPECIMEN THICKNESS: 6.1C MM (.240 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .1
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 2882 CYCLES
K(MAX) 96 CYCLES PRIOR TO FAILURE: 44.23 MPA SQRT(M) (40.25 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.93	.312	1				
8.62	.338	426	.1563E-02	.6153E-04	18.25	16.61
9.24	.368	890	.1607E-02	.6329E-04	19.03	17.32
9.98	.392	1213	.1876E-02	.7386E-04	19.76	17.98
10.69	.421	1419	.3582E-02	.1410E-03	20.46	18.62
11.38	.448	1621	.9433E-02	.1351E-03	21.18	19.27
12.[illegible]	.479	1819	.4209E-02	.1657E-03	21.91	19.94
12.81	.504	1945	.4716E-02	.1857E-03	22.60	20.56
13.59	.535	2038	.8489E-02	.3341E-03	23.28	21.17
14.12	.556	2121	.6260E-02	.2465E-03	23.86	21.71
14.98	.590	2221	.8611E-02	.3390E-03	24.69	22.29
15.69	.613	2261	.1495E-01	.5888E-03	25.14	22.98
16.44	.647	2343	.1598E-01	.6323E-03	25.78	23.46
17.10	.673	2396	.1172E-01	.4643E-03	26.45	24.07
17.98	.708	2441	.1942E-01	.7644E-03	27.10	24.66
18.61	.733	2481	.1618E-01	.6372E-03	27.74	25.26
19.35	.762	2523	.1851E-01	.7287E-03	28.31	25.76
2[illegible].86	.821	2571	.2986E-01	.1168E-02	29.24	26.61
22.95	.903	2639	.3067E-01	.1207E-02	30.71	27.95
24.34	.958	2676	.3776E-01	.1486E-02	32.41	29.23
26.23	1.031	2717	.4513E-01	.1777E-02	33.42	30.41
27.53	1.084	2737	.6661E-01	.2622E-02	34.69	31.57
29.14	1.147	2759	.7326E-01	.2884E-02	35.88	32.65
30.45	1.199	2776	.7746E-01	.3047E-02	37.[illegible]	33.73
32.25	1.27[illegible]	2794	.8145E-01	.3207E-02	38.3[illegible]	34.86
33.27	1.311	2811	.8513E-01	.3350E-02	39.49	35.93
34.98	1.377	2821	.1739E+00	.6773E-02	40.6[illegible]	36.97
35.76	1.408	2828	.1326E+00	.5142E-02	41.6[illegible]	37.93

TABLE D3-22

SPECIMEN NUMBER: 25L-314
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 453.0 K
SPECIMEN THICKNESS: 6.12 MM (.2411 IN)
MAXIMUM STRESS: 195.4 MPA (28.4 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1282 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 64.34 MPA SQRT(M) (58.55 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.93	.115	1				
	3.95	.155	594	.1715E-02	.6750E-04	19.34	17.61
	5.05	.199	819	.4953E-02	.1952E-03	22.13	20.14
	5.64	.222	895	.7785E-02	.3065E-03	24.13	21.96
	6.25	.246	964	.9603E-02	.3786E-03	25.44	23.16
F	6.96	.274	1017	.1344E-01	.5292E-03	25.87	24.41
F	7.92	.312	1084	.1445E-01	.5686E-03	28.44	25.91
F	9.09	.355	1119	.3157E-01	.1243E-02	30.42	27.68
F	10.15	.399	1149	.3725E-01	.1467E-02	32.37	29.46
F	11.00	.433	1174	.3404E-01	.1340E-02	34.01	31.95
F	12.61	.496	1199	.6452E-01	.2540E-02	35.96	32.73
F	13.84	.545	1214	.8213E-01	.3233E-02	38.11	34.68
F	14.62	.615	1229	.1186E+00	.4667E-02	40.26	36.64
F	17.14	.675	1241	.1272E+00	.5008E-02	42.52	38.71
F	19.30	.760	1253	.1799E+00	.7083E-02	44.93	40.89
F	21.34	.840	1261	.2032E+00	.8000E-02	47.55	43.27
F	23.24	.915	1271	.2391E+00	.9376E-02	49.91	46.42
F	24.76	.975	1277	.2563E+00	.1008E-01	51.91	47.24
F	26.54	1.045	1281	.4445E+00	.1750E-01	53.79	48.96
F	28.73	1.130	1284	.7197E+00	.2833E-01	55.99	51.45
F	30.86	1.215	1286	.1083E+01	.4250E-01	58.34	53.09
F	31.37	1.235	1287	.5083E+00	.2000E-01	59.77	54.39
F	32.38	1.275	1288	.1016E+01	.4000E-01	60.58	55.13

TABLE D3-23

SPECIMEN NUMBER: 259-417
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 459.0 K
SPECIMEN THICKNESS: 6.32 MM (.2490 IN)
MAXIMUM STRESS: 120.0 MPA (17.4 KSI)
R-RATIO: .2
FREQUENCY: 230 CPM
K(MAX) 1 CYCLES PRIOR TO FAILURE: 4965 CYCLES (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.98	.544	1				
	9.07	.714	2491	.1737E-02	.6843E-04	25.79	23.42
	10.08	.794	3233	.2461E-02	.1126E-03	28.27	25.72
	12.19	.961	3731	.7955E-02	.3132E-03	30.60	27.85
	13.15	1.035	3941	.9103E-02	.3582E-03	32.78	29.83
	14.09	1.109	4073	.1423E-01	.5631E-03	34.88	31.82
	15.11	1.193	4215	.1551E-01	.6105E-03	35.41	32.22
	16.48	1.298	4354	.1839E-01	.7237E-03	36.98	33.66
	17.83	1.404	4464	.2448E-01	.9639E-03	38.75	35.26
	19.01	1.497	4530	.3573E-01	.1407E-02	40.37	36.74
	20.17	1.589	4584	.4323E-01	.1701E-02	41.85	38.09
	21.31	1.678	4635	.4459E-01	.1756E-02	43.32	39.42
	22.75	1.791	4691	.4969E-01	.1956E-02	44.95	40.90
	24.33	1.916	4741	.6571E-01	.2587E-02	46.86	42.64
	26.17	2.060	4793	.7065E-01	.2782E-02	48.84	44.63
	29.09	2.293	4827	.1718E+00	.6764E-02	52.13	47.44
	31.85	2.444	4854	.1264E+00	.4975E-02	55.40	50.42
	32.33	2.546	4876	.1514E+00	.5961E-02	57.65	52.46
	36.33	2.860	4903	.3196E+00	.1258E-01	61.47	55.94
F	40.43	3.181	4923	.4078E+00	.1606E-01	67.89	61.71
F	42.81	3.455	4932	.3679E+00	.1447E-01	73.31	66.71
F	46.43	3.656	4951	.4251E+00	.1673E-01	79.27	72.14
F	48.74	3.838	4959	.5123E+00	.2017E-01	86.14	78.36
F	51.14	4.027	4961	(NET STRESS GREATER THAN 0.9 FTY)			
F	55.73	4.386	4963	(NET STRESS GREATER THAN 0.9 FTY)			
F	57.66	4.541	4964	(NET STRESS GREATER THAN 0.9 FTY)			

TABLE D3-24

SPECIMEN NUMBER: 259-413
ALLOY TYPE: 2 24-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 459.0 K
SPECIMEN THICKNESS: 6.30 MM (.2480 IN)
MAXIMUM STRESS: 145.4 MPA (21.4 KSI)
R-RATIO: .2
FREQUENCY: 230 CPM
K(MAX) 1 CYCLES PRIOR TO FAILURE: 57.84 MPA SQRT(M) (46.27 KSI SQRT(IN))
CYCLES TO FAILURE: 1241 CYCLES

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.62	.103	1				
	3.65	.144	576	.1796E-02	.7070E-04	18.46	16.48
	4.41	.174	775	.3816E-02	.1503E-03	20.49	19.35
	4.65	.183	909	.1829E-02	.7201E-04	22.20	20.20
F	6.24	.245	1016	.1478E-01	.5819E-03	24.34	22.15
F	7.25	.286	1116	.1016E-01	.4000E-03	27.18	24.66
F	8.22	.323	1146	.3217E-01	.1267E-02	29.03	26.42
F	9.45	.372	1178	.4106E-01	.1617E-02	31.04	28.25
F	10.30	.405	1191	.5671E-01	.2233E-02	32.84	29.89
F	11.96	.471	1216	.1109E+00	.4367E-02	34.89	31.76
F	13.07	.515	1219	.8493E-01	.3344E-02	37.03	33.70
F	14.12	.556	1225	.1757E+00	.6917E-02	38.69	35.19
F	15.41	.607	1229	.3207E+00	.1262E-01	40.29	36.67
F	16.18	.637	1232	.2582E+00	.1017E-01	41.71	37.96
F	17.03	.671	1235	.2836E+00	.1117E-01	42.83	38.95
F	18.44	.726	1237	.7048E+00	.2775E-01	44.28	40.30
F	19.93	.784	1239	.7429E+00	.2925E-01	46.12	41.97
F	20.95	.825	1240	.1029E+01	.4050E-01	47.68	43.39

TABLE D3-25

SPECIMEN NUMBER: [illegible]
ALLOY TYPE: [illegible]
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.6 K
SPECIMEN THICKNESS: 6.22 MM (.2450 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 6197 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 3.4 FTY)

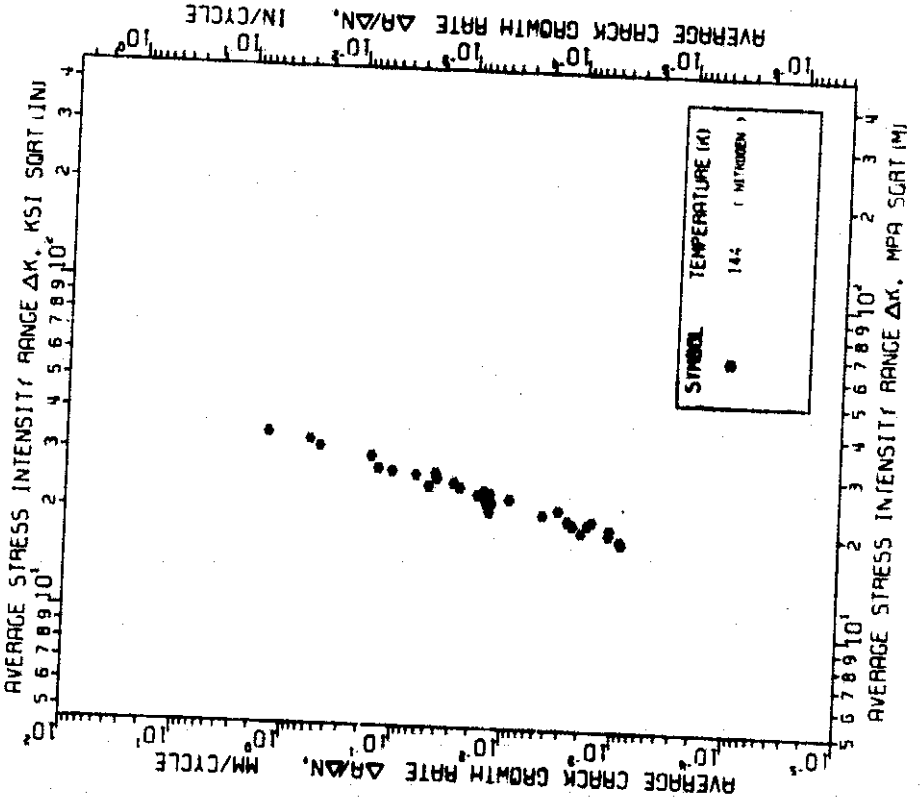
	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.66	.447	1				
	6.35	.500	792	.1665E-02	.6635E-04	21.99	20.01
	6.86	.540	1367	.1890E-02	.7887E-04	23.86	20.99
	7.42	.584	2023	.1686E-02	.6638E-04	24.89	21.86
	8.71	.686	2909	.2921E-02	.1150E-03	25.54	23.25
	9.54	.752	3310	.4157E-02	.1637E-03	27.23	24.78
	10.85	.854	3761	.5743E-02	.2276E-03	28.45	26.25
	11.84	.935	4149	.5320E-02	.2094E-03	30.54	27.80
	13.32	1.049	4631	.7550E-02	.2972E-03	32.27	29.37
	14.17	1.116	4877	.1162E-01	.4576E-03	33.82	30.78
	15.54	1.224	4918	.1137E-01	.4476E-03	35.29	32.12
	16.83	1.325	5086	.1533E-01	.6037E-03	37.01	33.68
	17.99	1.416	5201	.2034E-01	.8009E-03	38.57	35.10
	19.23	1.514	5333	.1869E-01	.7359E-03	40.68	36.47
	22.32	1.757	5524	.3235E-01	.1273E-02	42.77	38.93
	24.28	1.912	5583	.6663E-01	.2623E-02	45.91	41.78
	25.11	1.977	5646	.2610E-01	.1027E-02	47.69	43.37
	26.77	2.108	5702	.5944E-01	.2342E-02	49.22	44.79
	27.14	2.137	5731	.2544E-01	.1003E-02	50.61	46.07
	29.09	2.291	5776	.8671E-01	.3414E-02	52.00	47.32
	30.10	2.370	5803	.7493E-01	.2950E-02	53.94	49.09
	31.37	2.470	5838	.7885E-01	.3026E-02	55.46	50.47
	32.76	2.580	5862	.1371E+00	.6217E-02	57.27	52.12
	34.18	2.691	5891	.1008E+00	.3984E-02	59.23	53.90
	35.37	2.785	5927	.1465E+00	.5633E-02	61.12	55.61
	36.40	2.868	5929	.1362E+00	.5362E-02	63.06	57.37
	38.42	3.024	5964	.1604E+00	.6317E-02	66.78	53.4
	40.53	3.191	5974	.1636E+00	.6443E-02	68.34	62.24
F	42.95	3.378	6012	.1690E+00	.6661E-02	72.26	65.76
F	44.87	3.533	6027	.1572E+00	.6189E-02	75.29	68.43
F	46.98	3.699	6052	.4922E-01	.1912E-02	78.37	72.23
F	48.16	3.793	6072	.2165E+00	.8492E-02	81.96	75.44
F	51.03	4.018	6087	.3813E+00	.1501E-01	88.86	81.87
F	52.99	4.173	6102	(NET STRESS GREATER THAN 3.9 FTY)			
F	54.13	4.261	6117	(NET STRESS GREATER THAN 3.9 FTY)			
F	56.24	4.429	6127	(NET STRESS GREATER THAN 3.9 FTY)			
F	57.32	4.513	6137	(NET STRESS GREATER THAN 3.9 FTY)			
F	59.64	4.696	6147	(NET STRESS GREATER THAN 3.9 FTY)			
F	61.94	4.877	6157	(NET STRESS GREATER THAN 3.9 FTY)			
F	62.77	4.942	6167	(NET STRESS GREATER THAN 3.9 FTY)			
F	64.71	5.094	6177	(NET STRESS GREATER THAN 3.9 FTY)			
F	67.32	5.300	6182	(NET STRESS GREATER THAN 3.9 FTY)			
F	68.84	5.420	6187	(NET STRESS GREATER THAN 3.9 FTY)			
F	71.07	5.596	6192	(NET STRESS GREATER THAN 3.9 FTY)			
F	72.94	5.743	6195	(NET STRESS GREATER THAN 3.9 FTY)			
F	74.37	5.856	6196	(NET STRESS GREATER THAN 3.9 FTY)			

TABLE D3-26

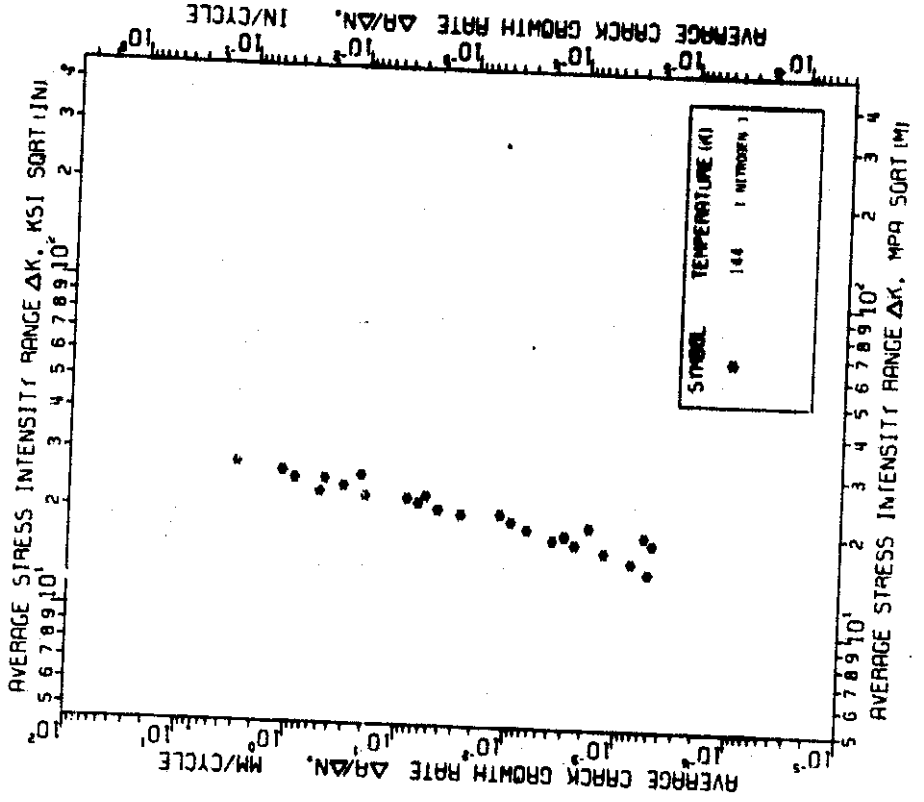
SPECIMEN NUMBER: 288-177
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 6.63 MM (.260 IN)
MAXIMUM STRESS: 112.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 4659 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.91	.456	1				
	7.17	.591	1435	.1992E-02	.7687E-04	23.13	21.05
	8.27	.631	1937	.3390E-02	.1414E-03	25.15	22.88
	9.22	.726	2541	.3469E-02	.1362E-03	26.63	24.24
	10.14	.738	2879	.5472E-02	.2154E-03	28.17	25.65
	11.44	.853	3094	.6486E-02	.2554E-03	29.28	26.65
	11.66	.918	3331	.7976E-02	.3142E-03	30.38	27.65
	12.73	.963	3448	.7695E-02	.2990E-03	31.16	28.54
	13.22	1.041	3615	.1276E-01	.5025E-03	32.44	29.52
	14.22	1.120	3759	.1301E-01	.5121E-03	33.79	30.75
	15.19	1.146	3844	.1586E-01	.6243E-03	35.01	31.86
	15.88	1.231	3948	.1969E-01	.7752E-03	36.09	32.84
	16.42	1.231	4009	.1703E-01	.6708E-03	36.96	33.63
	17.17	1.362	4064	.2387E-01	.1094E-02	37.78	34.38
	19.17	1.423	4119	.3291E-01	.1296E-02	38.43	35.34
	19.91	1.489	4150	.4182E-01	.1606E-02	39.93	36.34
	20.32	1.549	4224	.4359E-01	.1716E-02	41.32	37.60
	21.72	1.710	4294	.4715E-01	.1856E-02	43.07	39.19
	22.38	1.828	4327	.5781E-01	.2276E-02	44.71	40.69
	24.13	1.898	4354	.8463E-01	.3332E-02	46.19	42.04
	26.98	2.046	4392	.9903E-01	.3898E-02	48.08	43.76
	28.99	2.243	4441	.1229E+00	.4834E-02	51.19	46.58
	30.19	2.377	4454	.1969E+00	.7748E-02	53.92	49.07
F	34.31	3.016	4531	.2107E+00	.8294E-02	60.33	54.90
F	40.47	3.147	4551	.2165E+00	.8524E-02	64.23	62.09
F	43.22	3.403	4568	.3235E+00	.1274E-01	72.46	65.94
F	46.15	3.783	4594	.3715E+00	.1463E-01	79.76	72.59
F	49.71	3.915	4604	.3333E+00	.1311E-01	87.04	79.21
F	51.43	4.050	4614	(NET STRESS GREATER THAN 0.9 FTY)			
F	55.47	4.352	4624	(NET STRESS GREATER THAN 0.9 FTY)			
F	57.75	4.547	4634	(NET STRESS GREATER THAN 0.9 FTY)			
F	60.93	4.796	4644	(NET STRESS GREATER THAN 0.9 FTY)			
F	64.16	5.052	4649	(NET STRESS GREATER THAN 0.9 FTY)			
F	67.22	5.293	4654	(NET STRESS GREATER THAN 0.9 FTY)			
F	71.11	5.520	4658	(NET STRESS GREATER THAN 0.9 FTY)			

(a) Longitudinal



(b) Transverse

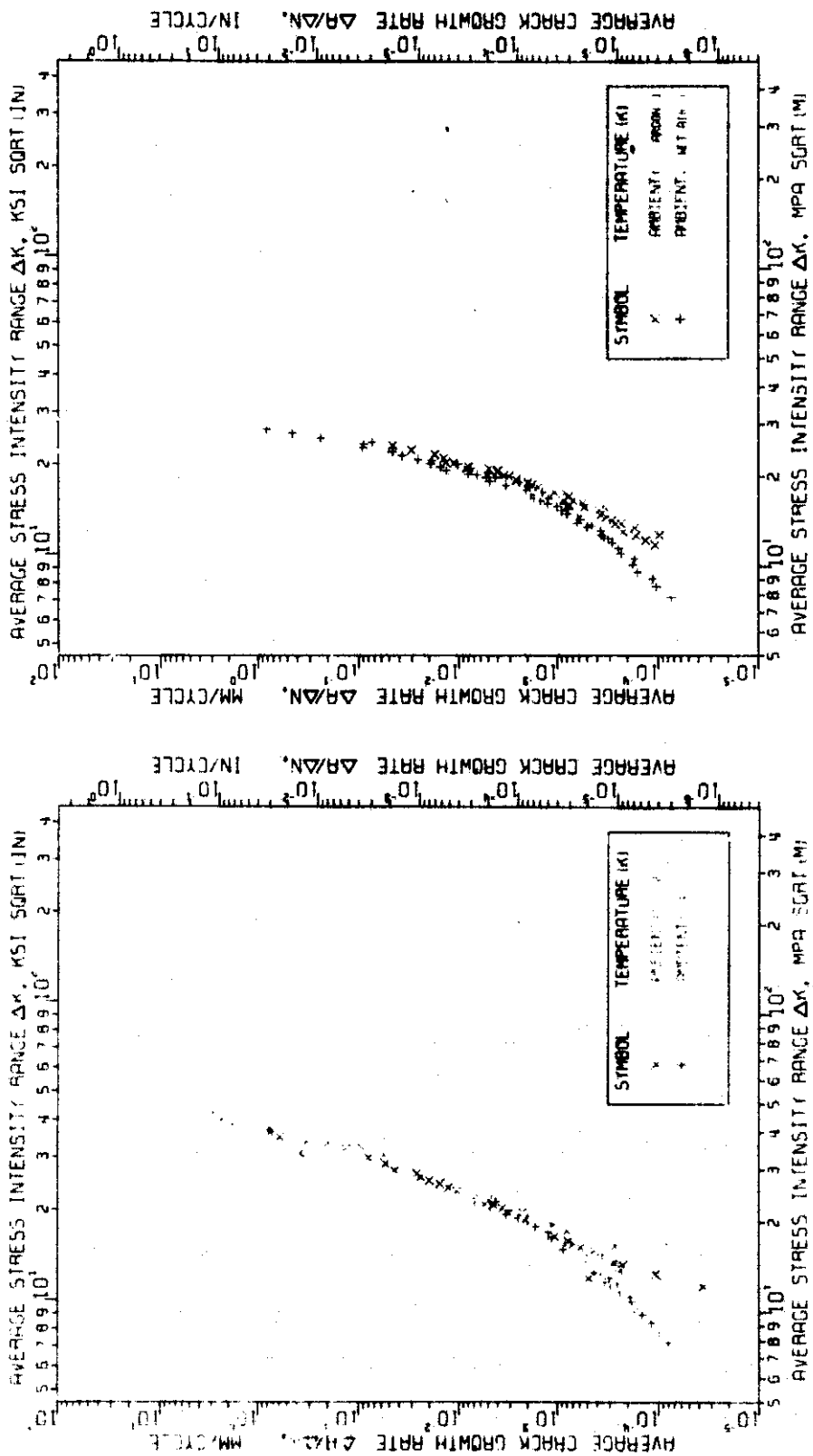


Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 6.35 mm (.250 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D3-1



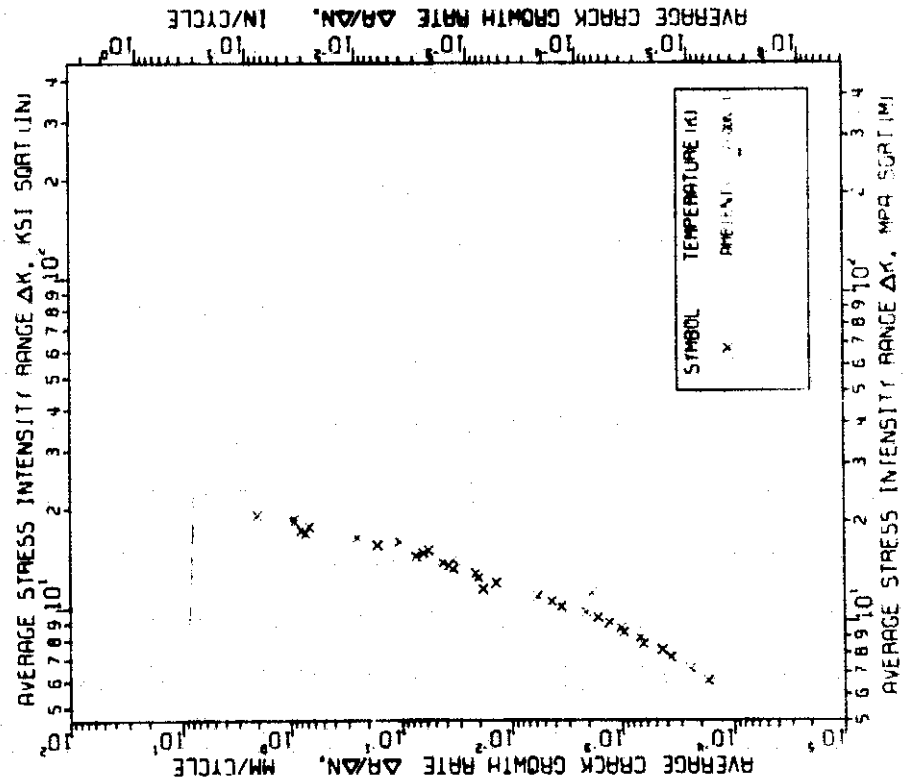
Alloy: 2024-T861 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 6.35 mm (.250 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D3-2

Longitudinal

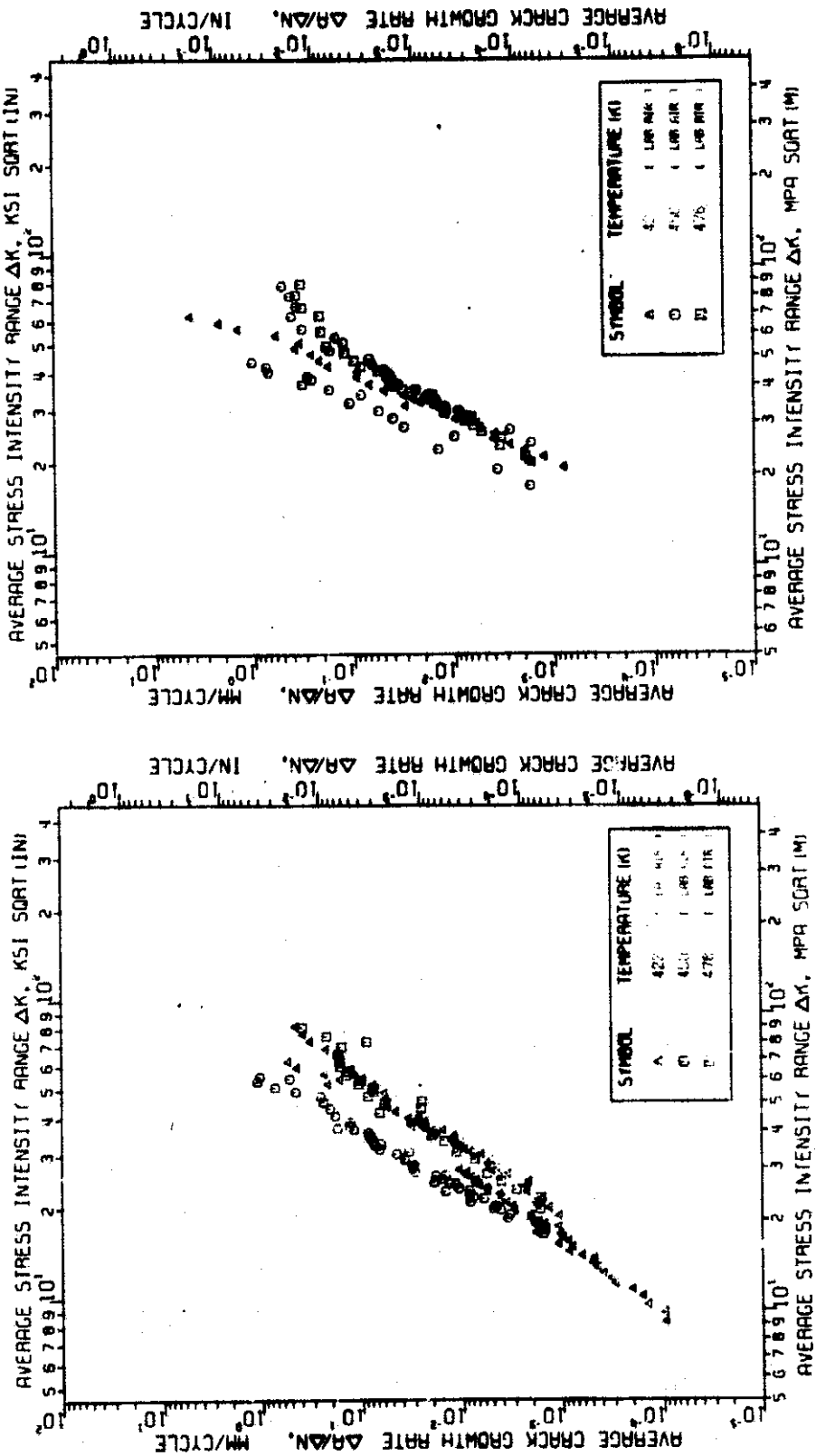


Alloy: 2024-T861 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 6.35 mm (.250 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D3-3



AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

Alloy: 2024-T861 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 6.35 mm (.250 inch) Constraint: Unstiffened

FIGURE D3-4

SECTION D4 - - FLAW GROWTH RATE DATA

FOR 6.35 mm (.250 INCH) THICK 2024-T861

AND 2124-T851 (CYCLIC FREQUENCY: 20 CPM)

TABLE D4-1. SUMMARY OF SPECIMEN TEST CONDITIONS FOR 20 CPM TESTS OF 6.35 mm (.250 INCH) THICK 2024-T861 AND 2124-T851

Test Temperature (°K)	Stress Ratio	Test Direction	Alloy	Specimen I.D.	Data Table No.	Figure No.
298 (Argon)	.05	T	2024-T861	250-4T6	D4-2	D4-1(a)
				250-3T4	D4-3	D4-1(a)
			2124-T851	2T7-253-3	D4-4	D4-1(b)
				3T3-256-2	D4-5	D4-1(b)
				1T4-259-3	D4-6	D4-1(b)
298 (Wet Air)	.05	T	2024-T861	250-1T12	D4-7	D4-1(a)
				250-1T11	D4-8	D4-1(a)
				250-1T8	D4-9	D4-1(a)
			2124-T851	3T5-253-2	D4-10	D4-1(b)
				5T2-256-2	D4-11	D4-1(b)
				2T6-259-2	D4-12	D4-1(b)
450	.05	T	2024-T861	250-1T1	D4-13	D4-2(a)
				250-2T2	D4-14	D4-2(a)
				250-2T6	D4-15	D4-2(a)
			2124-T851	2T4-253-1	D4-16	D4-2(b)
				1T6-256-3	D4-17	D4-2(b)
				5T5-259-1	D4-18	D4-2(b)

TABLE D4-2

SPECIMEN NUMBER: 251-4T6
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 308.9 K
SPECIMEN THICKNESS: 6.31 MM (.2485 IN)
MAXIMUM STRESS: 74.5 MPA (10.8 KSI)
R-RATIO: .5
FREQUENCY: 20 CPM
CYCLES TO FAILURE: GRIP FAILURE

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
10.01	.394					
10.89	.429	3212	.2721E-03	.1071E-04	12.86	11.71
11.36	.447	6291	.1932E-03	.6329E-05	13.27	12.08
12.12	.477	11872	.1377E-03	.5422E-05	13.64	12.41
13.09	.515	15452	.2671E-03	.1052E-04	14.14	12.87
13.66	.538	16850	.4298E-03	.1692E-04	14.67	13.36
14.14	.557	18261	.3295E-03	.1297E-04	14.86	13.53
14.66	.577	20088	.2815E-03	.1108E-04	15.13	13.77
15.11	.595	21274	.3789E-03	.1492E-04	15.39	14.01
15.82	.623	22780	.4988E-03	.1964E-04	15.73	14.29
16.43	.646	24769	.5461E-03	.2151E-04	16.09	14.59
17.25	.679	25144	.6188E-03	.2436E-04	16.39	14.92
18.02	.709	26504	.5622E-03	.2213E-04	16.87	15.29
19.04	.750	27988	.6881E-03	.2709E-04	17.29	15.68
20.35	.801	29318	.9943E-03	.3915E-04	17.79	16.19
20.81	.819	29852	.8389E-03	.3303E-04	18.21	16.56

TABLE D4-3

SPECIMEN NUMBER: 252-3T6
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 333.5 K
SPECIMEN THICKNESS: 6.27 MM (.2469 IN)
MAXIMUM STRESS: 198.6 MPA (28.8 KSI)
R-RATIO: .5
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 484 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 21.67 MPA SQRT(M) (19.72 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.24	.127					
3.53	.139	665	.4437E-03	.1747E-04	19.46	17.71
3.79	.149	684	.1344E-01	.5289E-03	28.24	18.62

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D4-4

SPECIMEN NUMBER: 2T7-253-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 300.4 K
SPECIMEN THICKNESS: 6.46 MM (.2545 IN)
MAXIMUM STRESS: 141.3 MPA (20.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1678 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 54.20 MPA SQRT(M) (49.34 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	10.39	.409	1	.2253E-02	.8867E-04	24.58	22.36
	11.21	.441	364	.2415E-02	.9507E-04	25.43	23.14
	11.96	.468	644	.5478E-02	.2156E-03	26.37	24.00
	12.93	.509	837	.4178E-02	.1645E-03	27.25	24.80
	13.54	.533	992	.6316E-02	.2376E-03	27.85	25.35
	14.10	.555	1075	.6464E-02	.2545E-03	28.41	25.86
	14.63	.576	1153	.9004E-02	.3546E-03	29.28	26.64
	15.86	.625	1293	.1298E-01	.5119E-03	30.33	27.60
	16.76	.660	1362	.1691E-01	.6655E-03	31.32	28.50
	17.96	.707	1433	.2937E-01	.1180E-02	32.15	29.25
	18.56	.731	1453	.5047E-01	.2318E-02	33.60	30.58
F	21.21	.835	1498	.2222E-01	.8750E-03	35.14	31.98
F	22.10	.870	1538	.7197E-01	.2833E-02	36.43	33.15
F	24.26	.955	1564	.2963E-01	.1167E-02	37.68	34.29
F	25.15	.990	1594	.5715E-01	.2251E-02	38.51	35.04
F	26.29	1.035	1618	.7620E-01	.3001E-02	39.42	35.88
F	27.43	1.080	1633	.1345E+00	.5294E-02	41.66	37.91
F	32.00	1.260	1667	.4233E+00	.1667E-01	43.89	39.94
F	33.27	1.310	1671	.5080E+00	.2000E-01	44.75	40.73
F	34.29	1.350	1672	.8255E+00	.3250E-01	45.75	41.63
F	35.94	1.415	1674	.1778E+01	.7000E-01	47.02	42.79
F	37.72	1.485	1675	.2667E+01	.1050E+00	48.66	44.29
F	40.39	1.590	1676	.2540E+01	.1000E+00	50.54	46.03
F	42.93	1.690	1677				

TABLE D4-5

SPECIMEN NUMBER: 3T3-256-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 311.6 K
SPECIMEN THICKNESS: 6.58 MM (.2590 IN)
MAXIMUM STRESS: 214.7 MPA (31.1 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 417 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 53.72 MPA SQRT(M) (48.88 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.15	.282	1	.9244E-02	.3641E-03	31.31	28.49
7.81	.307	72	.1434E-01	.6317E-03	33.63	30.60
9.43	.371	171	.1764E-01	.6947E-03	36.86	33.55
11.24	.443	274	.1729E-01	.6806E-03	38.93	35.43
11.78	.464	317	.2783E-01	.1095E-02	40.25	36.63
12.81	.504	344	.3750E-01	.1476E-02	42.01	38.23
13.93	.548	374	.2551E-01	.1004E-02	43.68	39.75
14.99	.590	392	.1184E+00	.4657E-02	45.25	41.19
15.10	.594	401	.1719E+00	.6767E-02	46.43	42.26
16.61	.654	414	.2997E+01	.1179E+00	48.96	44.55
19.61	.764	435				

TABLE D4-6

SPECIMEN NUMBER	1T4-299-3
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	ARGON
TEST TEMPERATURE	295. 0 K
SPECIMEN THICKNESS	6.76 MM (.2498 IN)
MAXIMUM STRESS	372.4 MPA (54.1 KSI)
R-RATIO	.05
FREQUENCY	20 CPM
CYCLES TO FAILURE	16A CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE	58.8; MPA SQRT(M) (53.51 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES 1	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.62	.147					
2.78	.109	67	.8447E-02	.3326E-03	31.39	28.56
3.21	.127	117	.8717E-02	.3439E-03	34.37	31.28
3.77	.149	137	.2803E-01	.1103E-02	37.12	33.78
4.91	.193	155	.6329E-01	.2492E-02	41.39	37.67
5.75	.226	160	.1669E+00	.6570E-02	45.87	41.74
7.09	.311	166	.4283E+00	.1686E-01	51.95	47.23

TABLE D4-7

SPECIMEN NUMBER	2S6-3T10
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	299.8 K
SPECIMEN THICKNESS	6.27 MM (.2470 IN)
MAXIMUM STRESS	74.5 MPA (10.8 KSI)
R-RATIO	.05
FREQUENCY	20 CPM
CYCLES TO FAILURE	GRIP FAILURE

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES 1	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.79	.305					
8.76	.345	3789	.2672E-03	.1052E-04	11.41	10.39
9.45	.372	6737	.2384E-03	.9386E-05	11.99	13.91
9.88	.389	8583	.2250E-03	.8856E-05	12.36	11.25
10.78	.425	10788	.4114E-03	.1621E-04	12.78	11.63
11.35	.447	12294	.3786E-03	.1491E-04	13.24	12.05
12.22	.481	13785	.5631E-03	.2284E-04	13.67	12.44
12.96	.510	15014	.6046E-03	.2380E-04	14.13	12.86
13.69	.539	16199	.6167E-03	.2428E-04	14.55	13.24
14.22	.560	17138	.5764E-03	.2269E-04	14.89	13.55
15.11	.594	18195	.8123E-03	.3197E-04	15.27	13.90
15.42	.607	19214	.8014E-03	.3155E-04	15.72	14.31
16.64	.655	19979	.9778E-03	.3850E-04	16.12	14.67
17.24	.679	20442	.1237E-02	.4870E-04	16.44	14.98
17.87	.703	20822	.1672E-02	.6584E-04	16.76	15.25

TABLE D4-8

SPECIMEN NUMBER	253-1T11
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	311.1 K
SPECIMEN THICKNESS	6.12 MM (.241) IN)
MAXIMUM STRESS	114.6 MPA (17.2 KSI)
R-RATIO	.05
FREQUENCY	20 CPM
CYCLES TO FAILURE	8368 CYCLES
K(MAX) 246 CYCLES PRIOR TO FAILURE	24.61 MPA SQRT(M) (22.41 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.17	.164	1				
			.3315E-03	.1303E-04	13.65	12.42
5.15	.203	2959				
			.6448E-03	.2539E-04	14.81	13.47
5.79	.228	4127				
			.6453E-03	.2541E-04	15.36	13.98
5.98	.236	4434				
			.5595E-03	.2203E-04	15.57	14.17
6.11	.241	4661				
			.9058E-03	.3566E-04	16.17	14.68
6.86	.270	5477				
			.1101E-02	.4336E-04	17.17	15.59
7.75	.305	6292				
			.1236E-02	.4866E-04	18.02	16.4.
8.38	.330	6807				
			.1773E-02	.6982E-04	18.77	17.26
9.08	.357	7198				
			.2180E-02	.8582E-04	19.48	17.73
9.69	.382	7487				
			.3236E-02	.1274E-03	20.31	14.48
10.67	.420	7751				
			.5626E-02	.2215E-03	21.11	19.21
11.27	.444	7888				
			.5994E-02	.2356E-03	21.40	19.43
12.06	.475	8.2.				
			.8337E-02	.3281E-03	22.43	20.41
12.58	.495	8092				
			.1849E-01	.7282E-03	23.03	21.96
13.33	.525	8121				

TABLE D4-9

SPECIMEN NUMBER	253-1T8
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	311.9 K
SPECIMEN THICKNESS	6.35 MM (.2501 IN)
MAXIMUM STRESS	198.6 MPA (28.8 KSI)
R-RATIO	.05
FREQUENCY	20 CPM
CYCLES TO FAILURE	164 CYCLES
K(MAX) 165 CYCLES PRIOR TO FAILURE	34.2. MPA SQRT(M) (31.12 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
4.70	.1?)	1				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D4-10

SPECIMEN NUMBER: 3TS-253-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.3 K
SPECIMEN THICKNESS: 6.35 MM (.2500 IN)
MAXIMUM STRESS: 143.0 MPA (20.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1619 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 54.91 MPA SQRT(M) (49.97 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.95	.392	1				
			.2163E-02	.8515E-04	23.91	21.77
10.53	.415	267				
			.5893E-02	.2845E-03	24.82	22.59
11.58	.453	457				
			.4771E-02	.1878E-03	25.68	23.37
12.06	.475	574				
			.5391E-02	.2122E-03	26.66	24.17
13.13	.516	764				
			.7436E-02	.3085E-03	27.69	25.20
14.20	.559	989				
			.7222E-02	.2843E-03	28.61	26.04
14.92	.587	1088				
			.1119E-01	.4406E-03	29.33	26.69
15.64	.616	1072				
			.1202E-01	.4733E-03	30.02	27.32
16.37	.643	1133				
			.6328E-02	.2491E-03	30.53	27.78
16.70	.657	1189				
			.2074E-01	.8167E-03	31.08	28.29
17.51	.689	1227				
			.1044E-01	.4110E-03	31.75	28.89
18.13	.714	1286				
			.2554E-01	.1005E-02	32.36	29.44
18.84	.742	1314				
			.1265E-01	.4981E-03	32.98	30.01
19.51	.768	1367				
			.1736E-01	.6827E-03	33.70	30.67
20.46	.806	1422				
			.7213E-01	.1269E-02	34.64	31.52
21.65	.852	1459				
			.3745E-01	.1473E-02	35.66	32.45
22.85	.900	1491				
			.5425E-01	.2136E-02	36.79	33.48
24.37	.959	1519				
			.4578E-01	.1802E-02	37.85	34.43
25.38	.999	1541				
			.5691E-01	.2240E-02	38.72	35.24
26.97	1.062	1562				
			.1264E+00	.4975E-02	39.80	36.04
27.58	1.086	1573				
			.9769E-01	.3846E-02	40.50	36.85
28.85	1.136	1583				
			.1213E+00	.4775E-02	41.54	37.82
30.31	1.193	1595				
			.2837E+00	.1105E-01	42.77	38.92
31.90	1.263	1601				
			.5762E+00	.2268E-01	44.06	40.10
33.72	1.328	1604				
			.2603E+00	.1025E-01	45.01	40.96
34.53	1.359	1617				
			.4723E+00	.1858E-01	45.83	41.70
35.92	1.414	1613				
			.2445E+00	.9010E-01	46.92	42.70
37.45	1.474	1612				
			.7239E+00	.2838E-01	48.28	43.94
39.61	1.559	1615				
			.2102E+01	.8279E-01	50.62	46.07
43.81	1.725	1617				

TABLE D4-11

SPECIMEN NUMBER: 3TS-254-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 297.3 K
SPECIMEN THICKNESS: 6.38 MM (.2513 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1803 CYCLES

K(MAX) 216 CYCLES PRIOR TO FAILURE: 37.37 MPA SQRT(M) (33.67 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.53	.139	1				
			.1529E-02	.6018E-04	22.91	20.85
4.31	.170	512				
			.2744E-02	.1080E-03	25.64	23.33
5.51	.217	947				
			.3765E-02	.1482E-03	28.33	25.78
6.47	.255	1203				
			.4392E-02	.1729E-03	30.16	27.45
7.10	.280	1347				
			.8974E-02	.3533E-03	31.89	29.02
8.05	.317	1453				
			.8448E-02	.3325E-03	34.03	33.97
9.19	.362	1589				

TABLE D4-12

SPECIMEN NUMBER: 2TA-259-2
ALLOY TYPE: 2124-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.35 MM (.251 IN)
MAXIMUM STRESS: 326.3 MPA (47.3 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 452 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 55.91 MPA SQRT(M) (50.92 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.49	.098	1	.1810E-02	.7126E-04	28.44	25.88
2.87	.113	204	.8178E-02	.3220E-03	31.58	28.74
3.74	.147	315	.1398E-01	.5505E-03	35.25	32.08
4.49	.177	371	.2743E-01	.1080E-02	38.87	35.37
5.51	.217	407	.6198E-01	.2440E-02	42.51	38.68
6.44	.254	422	.4816E-01	.1897E-02	45.36	41.28
7.16	.282	437	.5116E-01	.2014E-02	47.14	42.90
7.52	.296	444	.2375E+00	.9350E-02	48.47	44.11
8.08	.318	446	.2392E+00	.9268E-02	51.00	46.41
9.17	.361	451				

TABLE D4-13

SPECIMEN NUMBER: 2SD-1T1
ALLOY TYPE: 2024-T861
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.9 K
SPECIMEN THICKNESS: 6.35 MM (.251 IN)
MAXIMUM STRESS: 195.9 MPA (28.4 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 854 CYCLES
K(MAX) 163 CYCLES PRIOR TO FAILURE: 28.20 MPA SQRT(M) (25.66 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.92	.115	1	.2619E-02	.1030E-03	18.82	17.13
3.69		255	.5833E-02	.1992E-03	20.68	14.82
4.27	.168	391	.4741E-02	.1867E-03	22.54	23.51
5.06	.199	557	.1011E-01	.3979E-03	24.31	22.12
5.79	.228	629	.1104E-01	.4347E-03	25.96	23.63
6.48	.259	751				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D4-14

SPECIMEN NUMBER: 22C-272
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.38 MM (.2513 IN)
MAXIMUM STRESS: 372.4 MPA (53.9 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 16 CYCLES
K(MAX) 3 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 1.5 KSI)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.28	.247	1				
17.47	.688	13	.9324E-01	.3671E-01	56.14	51.11

TABLE D4-15

SPECIMEN NUMBER: 22A-276
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.40 MM (.2520 IN)
MAXIMUM STRESS: 118.6 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1674 CYCLES
K(MAX) 112 CYCLES PRIOR TO FAILURE: 39.68 MPA SQRT(M) (36.11 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
9.86	.388	237	.3961E-02	.1559E-03	19.53	17.78
9.99	.393	407	.3728E-02	.1468E-03	20.33	18.50
10.62	.418	518	.6339E-02	.2496E-03	20.79	19.10
11.33	.446	670	.4445E-02	.1750E-03	21.68	19.70
12.00	.473	764	.7501E-02	.2955E-03	22.31	20.30
12.75	.502	858	.7767E-02	.3059E-03	22.96	20.89
13.44	.529	962	.1037E-01	.4082E-03	23.74	21.60
14.52	.572	1021	.1515E-01	.5966E-03	24.58	22.37
15.42	.607	1114	.1336E-01	.5260E-03	25.47	23.18
16.66	.656	1165	.1559E-01	.6137E-03	26.29	23.92
17.45	.687	1211	.1723E-01	.6783E-03	26.91	24.49
18.24	.718	1238	.2084E-01	.8204E-03	27.44	24.97
19.01	.748	1314	.2314E-01	.9112E-03	28.32	25.77
20.57	.810	1347	.3313E-01	.1303E-02	29.38	26.73
21.66	.853	1390	.3159E-01	.1242E-02	30.36	27.63
23.33	.918	1434	.4568E-01	.1798E-02	31.61	28.67
24.90	.980	1465	.5428E-01	.2137E-02	32.64	29.70
26.58	1.046	1491	.5697E-01	.2243E-02	33.74	30.71
28.18	1.109	1523	.6218E-01	.2448E-02	34.83	31.72
29.86	1.175	1534	.7275E-01	.2866E-02	35.71	32.52
31.67	1.246	1551	.8248E-01	.3247E-02	36.58	33.36
33.44	1.317	1564	.9121E-01	.3591E-02	37.37	34.05

TABLE D4-16

SPECIMEN NUMBER:	2T4-253-1
ALLOY TYPE:	2124-T851
SPECIMEN ORIENTATION:	TRANSVERSE
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	LAB AIR
TEST TEMPERATURE:	45°C K
SPECIMEN THICKNESS:	6.41 MM (.253" IN)
MAXIMUM STRESS:	103.4 MPA (15,0 KSI)
R-RATIO:	.05
FREQUENCY:	20 CPM
CYCLES TO FAILURE:	11966 CYCLES

K(MAX) 677 CYCLES PRIOR TO FAILURE: 53.86 MPA SQRT(M) (49.01 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
10.32	.339	1				
10.85	.427	900	.9719E-03	.3436E-04	18.40	17.11
11.44	.451	1459	.1153E-02	.4539E-04	19.43	17.68
12.20	.481	2184	.1053E-02	.4145E-04	20.32	18.22
12.81	.504	2831	.1358E-02	.5347E-04	20.60	18.75
13.47	.530	3519	.1169E-02	.5399E-04	21.13	19.23
14.26	.561	4271	.1416E-02	.5571E-04	21.72	19.76
14.76	.581	4834	.1403E-02	.5523E-04	22.27	20.23
15.36	.605	5399	.1825E-02	.6397E-04	22.68	20.62
15.99	.626	5936	.1369E-02	.5390E-04	23.09	21.02
16.74	.659	6574	.2224E-02	.8757E-04	23.61	21.49
17.14	.693	6981	.1936E-02	.7622E-04	24.14	21.97
18.20	.717	7737	.1373E-02	.1329E-03	24.67	22.45
19.21	.756	8132	.2561E-02	.1009E-03	25.14	23.06
20.02	.812	8655	.2703E-02	.1064E-03	26.18	23.83
22.33	.891	7238	.3167E-02	.1247E-03	27.25	24.80
23.47	.940	7819	.3832E-02	.1432E-03	28.32	25.77
25.37	.999	7961	.4374E-02	.1727E-03	29.28	26.65
27.39	1.078	8399	.4587E-02	.1806E-03	30.19	27.65
28.98	1.137	8665	.5667E-02	.2231E-03	31.47	28.64
30.06	1.194	8876	.5506E-02	.2199E-03	32.28	29.38
30.95	1.219	9032	.7677E-02	.3022E-03	32.70	29.94
32.24	1.269	9187	.6617E-02	.2605E-03	33.58	30.63
33.48	1.318	9373	.6659E-02	.2621E-03	34.39	31.21
35.21	1.379	9556	.7949E-02	.3130E-03	35.11	31.85
36.71	1.445	9732	.1021E-01	.4021E-03	36.05	32.60
38.52	1.516	9961	.7903E-02	.3111E-03	37.16	33.72
40.39	1.578	10069	.1726E-01	.6828E-03	38.01	34.61
41.64	1.639	10207	.1277E-01	.5029E-03	38.89	35.39
42.49	1.680	10291	.1297E-01	.5108E-03	39.63	36.07
43.42	1.724	10346	.1281E-01	.5043E-03	40.39	36.68
45.22	1.791	10476	.1473E-01	.5794E-03	41.03	37.34
46.95	1.848	10574	.1421E-01	.5595E-03	41.41	38.05
47.31	1.862	10664	.1541E-01	.6062E-03	42.59	38.76
49.48	1.948	10733	.1561E-01	.7722E-03	43.48	39.50
50.68	1.995	10827	.1625E-01	.6399E-03	44.19	40.22
52.14	2.053	10977	.2090E-01	.8229E-03	44.97	40.92
53.36	2.097	10945	.1644E-01	.6471E-03	45.72	41.61
54.47	2.145	10988	.2421E-01	.1113E-02	46.40	42.23
55.98	2.194	11045	.1762E-01	.6939E-03	47.06	42.82
56.68	2.232	11113	.2285E-01	.8134E-03	47.71	43.42
58.11	2.288	11159	.2549E-01	.1004E-02	48.58	44.14
59.44	2.340	11212	.2514E-01	.9968E-03	49.77	44.98
60.60	2.386	11253	.2429E-01	.1117E-02	50.79	45.69
61.76	2.431	11293	.2905E-01	.1144E-02	50.91	46.24

TABLE D4-17

SPECIMEN NUMBER: 176-256-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.38 MM (.251 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 2073 CYCLES

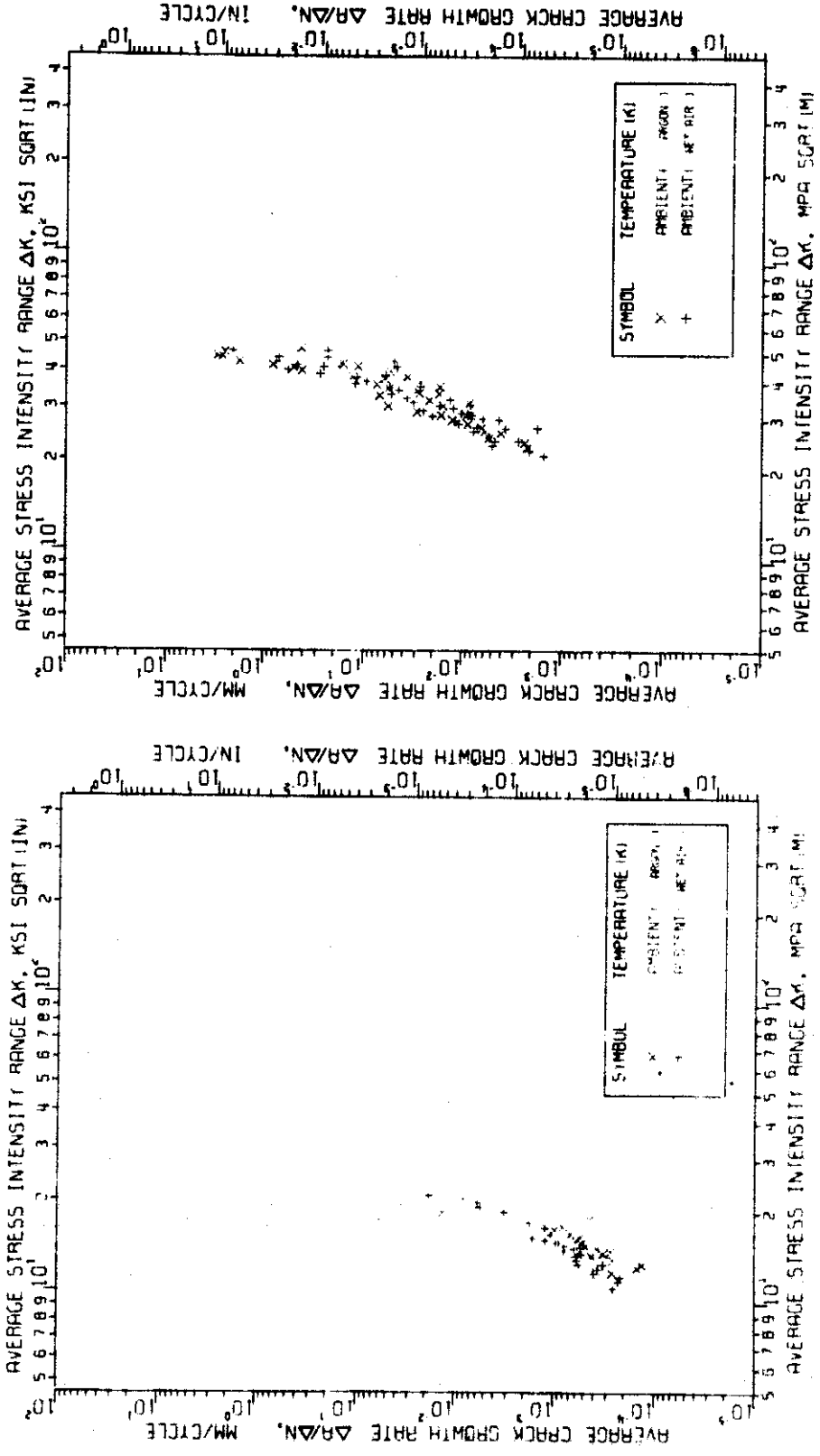
K(MAX) : CYCLES PRIOR TO FAILURE: 89.16 MPA SQRT(M) (81.14 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.58	.101	1				
	3.16	.124	529	.1106E-02	.4356E-04	19.59	17.83
	3.81	.150	935	.1589E-02	.6256E-04	21.59	19.65
	4.42	.174	1228	.2089E-02	.8225E-04	23.46	21.35
	4.96	.195	1437	.3030E-02	.1193E-03	25.06	22.81
	5.86	.230	1663	.4276E-02	.1684E-03	27.17	24.72
	6.77	.267	1810	.4864E-02	.1915E-03	29.32	26.68
	7.42	.292	1888	.8353E-02	.3288E-03	30.85	28.08
	8.01	.316	1977	.6664E-02	.2624E-03	32.18	29.29
	8.94	.352	2093	.7937E-02	.3125E-03	33.74	30.70
	9.69	.382	2176	.9089E-02	.3578E-03	35.38	32.20
	10.63	.418	2253	.1268E-01	.4993E-03	36.97	33.64
	11.34	.446	2308	.1222E-01	.4812E-03	38.46	35.00
	11.99	.472	2343	.2748E-01	.1082E-02	39.65	36.08
	12.65	.498	2395	.1205E-01	.4745E-03	40.77	37.10
	13.40	.528	2437	.1972E-01	.7765E-03	41.94	38.17
	14.00	.551	2463	.2562E-01	.1009E-02	43.04	39.17
F	17.27	.680	2567	.3142E-01	.1237E-02	46.05	41.91
F	19.18	.755	2625	.3284E-01	.1293E-02	49.83	45.35
F	20.83	.823	2667	.3931E-01	.1548E-02	52.31	47.60
F	21.97	.865	2697	.3810E-01	.1500E-02	54.19	49.32
F	23.37	.920	2724	.5174E-01	.2037E-02	55.87	50.84
F	24.76	.975	2737	.1075E+00	.4231E-02	57.67	52.48
F	26.84	1.056	2771	.5976E-01	.2353E-02	59.84	54.45
F	28.32	1.115	2784	.1172E+00	.4615E-02	62.03	56.45
F	29.69	1.169	2799	.8467E-01	.3333E-02	63.73	58.00
F	31.88	1.255	2814	.1524E+00	.6000E-02	66.86	60.84
F	33.15	1.305	2824	.1271E+00	.5005E-02	67.96	61.85
F	35.31	1.390	2834	.2159E+00	.8500E-02	69.96	63.67
F	38.86	1.530	2854	.1779E+00	.7003E-02	73.28	66.67
F	41.61	1.638	2869	.1372E+00	.1303E-01	76.24	69.38
F	43.46	1.695	2864	.5080E+00	.2000E-01	78.63	71.55
F	45.34	1.785	2869	.4572E+00	.1800E-01	81.37	74.05
F	47.12	1.855	2872	.1422E+00	.2333E-01	83.64	76.16

TABLE D4-18

SPECIMEN NUMBER: STS-259-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 5.94 MM (.2340 IN)
MAXIMUM STRESS: 307.6 MPA (44.6 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 899 CYCLES
KTMAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)	
	2.56	.101	1	.2639E-02	.1037E-03	27.54	25.06	(NET STRESS GREATER THAN 0.9 FTY)
	3.09	.122	282	.4824E-02	.1899E-03	30.30	27.65	(NET STRESS GREATER THAN 0.9 FTY)
	3.79	.149	346	.6978E-02	.2747E-03	33.19	30.21	(NET STRESS GREATER THAN 0.9 FTY)
	4.42	.174	437	.7388E-02	.2877E-03	35.94	32.70	(NET STRESS GREATER THAN 0.9 FTY)
	5.28	.208	543	.1567E-01	.6171E-03	38.42	34.96	(NET STRESS GREATER THAN 0.9 FTY)
	5.79	.228	581	.1952E-01	.6111E-03	40.39	36.76	(NET STRESS GREATER THAN 0.9 FTY)
	6.35	.250	617	.1226E-01	.4825E-03	42.50	38.68	(NET STRESS GREATER THAN 0.9 FTY)
	7.09	.279	677	.2328E-01	.9133E-03	44.72	40.70	(NET STRESS GREATER THAN 0.9 FTY)
	7.78	.306	707	.2283E-01	.8988E-03	47.16	42.92	(NET STRESS GREATER THAN 0.9 FTY)
	8.74	.344	749					(NET STRESS GREATER THAN 0.9 FTY)
	9.57	.377	766					(NET STRESS GREATER THAN 0.9 FTY)
	10.74	.407	788					(NET STRESS GREATER THAN 0.9 FTY)
	10.69	.421	801					(NET STRESS GREATER THAN 0.9 FTY)
	10.96	.431	809					(NET STRESS GREATER THAN 0.9 FTY)
	12.28	.483	819					(NET STRESS GREATER THAN 0.9 FTY)
F	18.88	.740	849					(NET STRESS GREATER THAN 0.9 FTY)
F	20.32	.800	859					(NET STRESS GREATER THAN 0.9 FTY)
F	22.48	.885	869					(NET STRESS GREATER THAN 0.9 FTY)
F	25.48	1.008	879					(NET STRESS GREATER THAN 0.9 FTY)
F	27.43	1.080	887					(NET STRESS GREATER THAN 0.9 FTY)
F	31.50	1.240	893					(NET STRESS GREATER THAN 0.9 FTY)
F	35.18	1.385	896					(NET STRESS GREATER THAN 0.9 FTY)
F	38.35	1.510	897					(NET STRESS GREATER THAN 0.9 FTY)
F	41.02	1.615	898					(NET STRESS GREATER THAN 0.9 FTY)



Thickness: 6.35 mm (.250 inch)

Constraint: Unstiffened

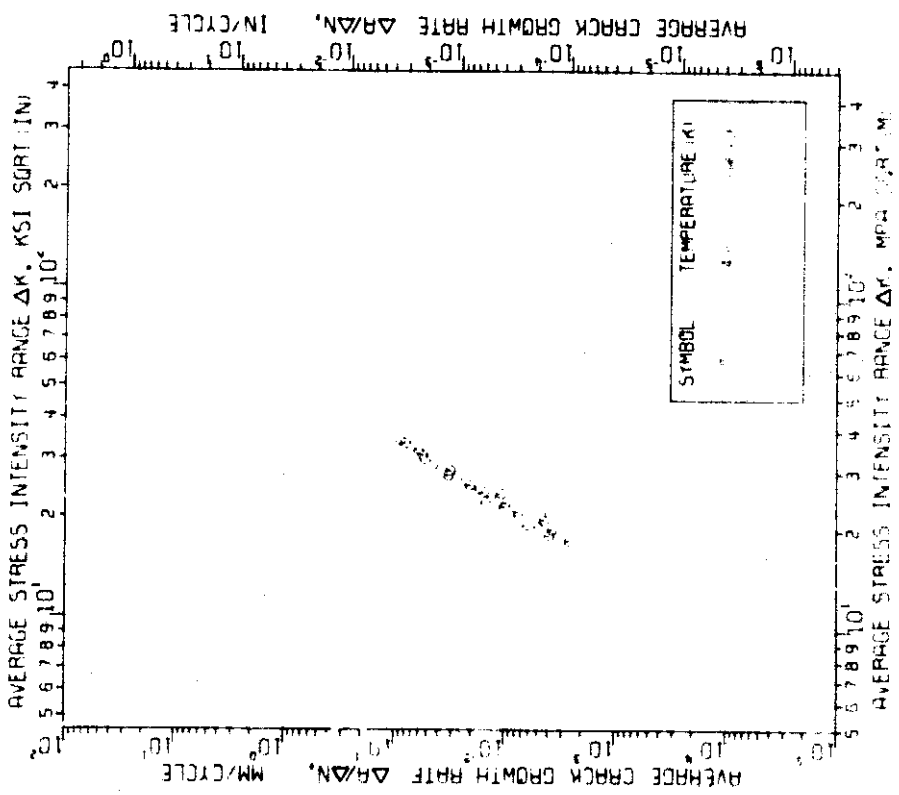
Stress Ratio: .05

Frequency: 20 cpm

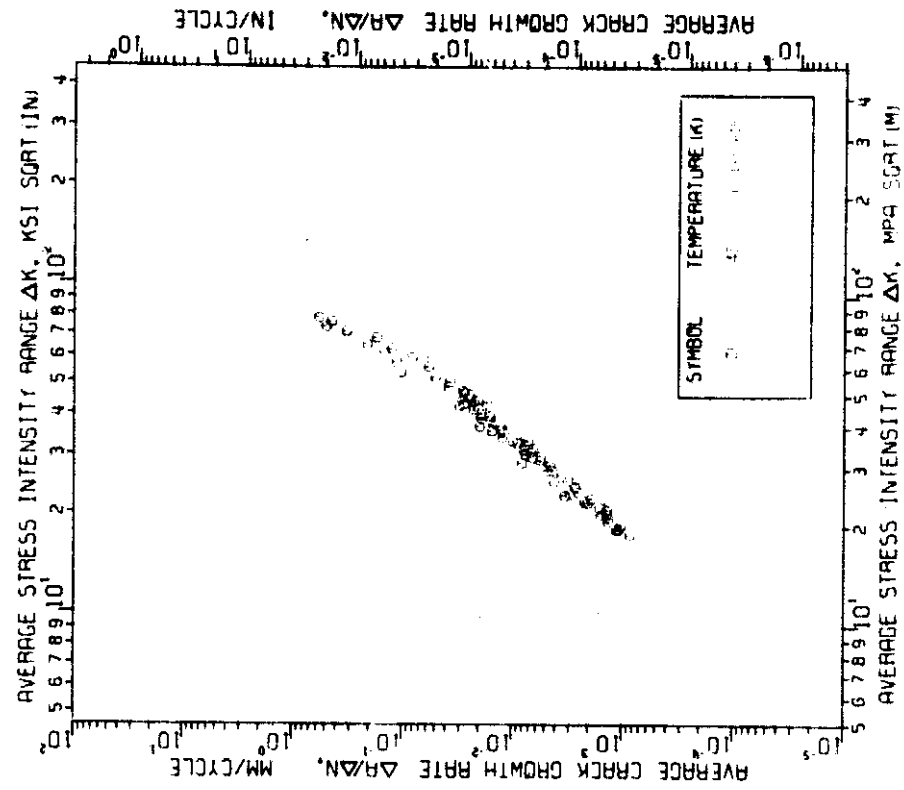
AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D4-1

(a) Transverse, 2024-T861



(b) Transverse, 2124-T851



Thickness: 6.35 mm (.250 inch)

Constraint: Unstiffened

Stress Ratio: .05

Frequency: 200 cpm

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D4-7

SECTION D5 - - FLAW GROWTH RATE DATA

FOR 6.35 mm (.250 INCH) THICK 2124-T851

TABLE D5-1. SUMMARY OF SPECIMEN TEST CONDITIONS FOR 200 CPM TESTS OF 6.35 mm (.250 INCH) THICK 2124-T851

Test Temperature (°K)	Stress Ratio	Test Direction	Specimen I.D.	Data Table No.	Figure No.
144 (N_2)	.05	L	2L2-256-1	D5-2	D5-1(a)
			3L2-259-2	D5-3	D5-1(a)
		T	2T3-256-1	D5-4	D5-1(b)
			2T1-259-1	D5-5	D5-1(b)
	.50	L	3L1-253-1	D5-6	D5-2(a)
			2L1-256-3	D5-7	D5-2(a)
			3L2-259-3	D5-8	D5-2(a)
		T	2T1-259-3	D5-9	D5-2(b)
			1T6-256-2	D5-10	D5-2(b)
			1T1-253-3	D5-11	D5-2(b)
298 (Argon)	.05	L	3L1-253-3	D5-12	D5-3(a)
			1L2-256-1	D5-13	D5-3(a)
			3L7-259-1	D5-14	D5-3(a)
		T	2T4-253-2	D5-15	D5-3(b)
			1T8-256-1	D5-16	D5-3(b)
			2T4-259-3	D5-17	D5-3(b)
	.50	L	1L1-253-3	D5-18	D5-4(a)
			2L3-256-3	D5-19	D5-4(a)
			1L3-259-1	D5-20	D5-4(a)
		T	3T5-253-4	D5-21	D5-4(b)
			3T3-256-3	D5-22	D5-4(b)
			3T8-259-1	D5-23	D5-4(b)
298 (Wet Air)	.05	L	2L2-253-4	D5-24	D5-3(a)
			3L3-256-1	D5-25	D5-3(a)
			1L3-259-2	D5-26	D5-3(a)
		T	3T5-253-3	D5-27	D5-3(b)
			5T5-259-2	D5-28	D5-3(b)
	.50	L	3L1-253-2	D5-29	D5-4(a)
			1L2-256-2	D5-30	D5-4(a)
			5L5-259-2	D5-31	D5-4(a)
		T	2T7-253-1	D5-32	D5-4(b)
			5T2-256-1	D5-33	D5-4(b)
			1T8-256-3	D5-34	D5-4(b)
			1T4-259-1	D5-35	D5-4(b)

TABLE D5-1. (CONTINUED)

Test Temperature (°K)	Stress Ratio	Test Direction	Specimen I.D.	Data Table No.	Figure No.
422	.05	L	1L1-253-1	D5-36	D5-5(a)
		T	3T5-253-1	D5-37	D5-5(b)
450	.05	L	2L2-253-2	D5-38	D5-5(a)
			3L3-256-2	D5-39	D5-5(a)
			4L3-259-2	D5-40	D5-5(a)
		T	2T4-253-3	D5-41	D5-5(b)
			3T3-256-1	D5-42	D5-5(b)
			2T6-259-1	D5-43	D5-5(b)
	.50	L	2L3-256-2	D5-44	D5-6(a)
			4L3-259-3	D5-45	D5-6(a)
		T	2T3-256-3	D5-46	D5-6(b)
			2T1-259-2	D5-47	D5-6(b)
478	.05	L	1L1-253-4	D5-48	D5-5(a)
		T	2T4-253-4	D5-49	D5-5(b)

TABLE D5-2

SPECIMEN NUMBER: 2L2-256-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNIFORM
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 6.38 MM (.251 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 3493 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 113.06 MPA SQRT(M) (102.89 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	4.04	.159	1	.7604E-03	.2994E-04	23.79	21.65
	4.41	.174	482	.8167E-03	.3216E-04	24.93	22.69
	4.87	.192	1044	.1372E-02	.5401E-04	27.11	24.67
	6.10	.240	1945	.6382E-02	.2513E-03	29.48	26.83
	6.86	.270	2064	.4999E-02	.1968E-03	31.36	28.54
	7.80	.307	2252	.2641E-02	.1040E-03	33.11	30.14
	8.54	.336	2533	.3591E-02	.1414E-03	34.37	31.28
	9.06	.357	2675	.7427E-02	.2924E-03	35.91	32.68
	10.13	.399	2823	.7518E-02	.2960E-03	37.52	34.14
	10.79	.425	2907	.1006E-01	.3961E-03	38.68	35.20
	11.43	.450	2971	.1114E-01	.4388E-03	39.72	36.14
	11.98	.472	3021	.2333E-01	.9186E-03	40.88	37.20
	12.79	.504	3059	.1514E-01	.5961E-03	42.60	38.68
	13.94	.549	3131	.1123E-01	.4423E-03	43.77	39.84
	14.38	.566	3171	.1138E-01	.4480E-03	44.34	40.35
	14.87	.577	3195	.2209E-01	.8696E-03	44.95	40.91
	15.18	.597	3218	.1864E-01	.7336E-03	45.98	41.85
	16.02	.631	3261	.2664E-01	.1049E-02	47.45	43.18
	17.13	.675	3309	.2216E-01	.8725E-03	48.59	44.22
	17.56	.692	3325	.9504E-01	.3775E-02	50.14	45.63
F	19.30	.760	3347	.4762E-01	.1875E-02	53.94	49.09
F	23.11	.910	3423	.3255E-01	.1282E-02	57.51	52.34
F	24.76	.975	3441	.1016E+00	.4000E-02	59.52	54.16
F	26.29	1.035	3456	.1524E+00	.6000E-02	61.41	55.89
F	27.81	1.095	3468	.2393E+00	.9444E-02	63.68	57.93
F	29.97	1.181	3477	.6350E+00	.2500E-01	66.46	61.40
F	32.51	1.280	3481	.6350E+00	.2500E-01	69.46	63.23
F	35.05	1.380	3485	.1206E+01	.4750E-01	72.31	65.81
F	37.46	1.475	3487	.1651E+01	.6500E-01	74.65	67.93
F	39.12	1.540	3489	.3175E+01	.1250E+00	77.47	70.44
F	42.29	1.665	3489	.2921E+01	.1150E+00	80.37	73.09
F	45.21	1.780	3490	.2921E+01	.1150E+00	84.20	76.62
F	48.13	1.895	3491	.1791E+02	.7050E+00	86.31	87.66
F	56.04	2.206	3493				

TABLE D5-3

SPECIMEN NUMBER:	3L2-259-2
ALLOY TYPE:	2124-T851
SPECIMEN ORIENTATION:	LONGITUDINAL
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	NITROGEN
TEST TEMPERATURE:	144.8 K
SPECIMEN THICKNESS:	6.32 MM (.249 IN)
MAXIMUM STRESS:	320.6 MPA (46.5 KSI)
R-RATIO:	.05
FREQUENCY:	230 CPM
CYCLES TO FAILURE:	2352 CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 92.48 MPA SQRT(M) (84.16 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.56	.101	1				
			.9212E-03	.3627E-04	28.65	26.08
3.08	.121	569	.1720E-02	.6771E-04	32.08	29.20
3.98	.157	1094	.2906E-02	.1144E-03	35.74	32.53
4.78	.188	1368	.2132E-02	.8393E-04	38.14	34.71
5.20	.205	1564	.5245E-02	.2065E-03	40.39	36.72
5.98	.235	1710	.5554E-02	.2187E-03	43.23	39.34
6.84	.269	1868	.8993E-02	.3540E-03	45.14	41.09
7.73	.304	1967	.9025E-02	.3553E-03	48.57	44.20
8.41	.331	2042	.1292E-01	.5086E-03	50.35	45.82
8.92	.351	2082	.1258E-01	.4951E-03	52.02	47.34
9.56	.377	2133	.2489E-01	.9486E-03	54.12	49.26
10.43	.411	2169	.1607E-01	.6328E-03	55.99	50.95
10.95	.431	2201	.2532E-01	.9969E-03	57.72	52.53
11.76	.463	2233	.2515E-01	.1148E-02	59.49	54.14
12.34	.486	2253	.4397E-01	.1731E-02	62.89	57.24
14.54	.572	2303	.4972E-01	.1880E-02	66.08	60.06
14.99	.590	2313	.1135E+00	.4470E-02	67.08	61.78
16.13	.635	2323	.9292E-01	.3658E-02	69.67	63.41
16.69	.657	2329	.1643E+00	.6468E-02	72.22	65.73
18.80	.740	2340	.2874E+00	.1132E-01	75.90	69.07
20.22	.796	2346	.1068E+01	.4175E-01	82.85	75.48
25.52	1.005	2351				

TABLE D5-4

SPECIMEN NUMBER:	2T3-256-1
ALLOY TYPE:	2124-T851
SPECIMEN ORIENTATION:	TRANSVERSE
CONSTRAINT:	UNSTIFFENED
ENVIRONMENT:	NITROGEN
TEST TEMPERATURE:	144.8 K
SPECIMEN THICKNESS:	6.50 MM (.256 IN)
MAXIMUM STRESS:	217.2 MPA (31.5 KSI)
R-RATIO:	.05
FREQUENCY:	208 CPM
CYCLES TO FAILURE:	1423 CYCLES

K(MAX) 12 CYCLES PRIOR TO FAILURE: 48.62 MPA SQRT(M) (44.25 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.85	.152	1				
			.1679E-02	.6609E-04	23.64	21.51
4.49	.177	381	.2352E-02	.9259E-04	25.55	23.25
5.25	.207	704	.4619E-02	.1818E-03	27.74	25.25
6.23	.245	916	.2977E-02	.1172E-03	29.35	26.71
6.81	.268	1044	.6768E-02	.2665E-03	30.38	27.65
7.15	.281	1123	.1165E-01	.4586E-03	31.77	28.91
7.89	.311	1187	.1238E-01	.4872E-03	33.69	30.66
9.01	.355	1277	.2611E-01	.1028E-02	35.86	32.58
10.05	.396	1317	.2111E-01	.8313E-03	37.24	33.89
10.56	.416	1341	.3815E-01	.1502E-02	39.39	35.85
12.47	.491	1391	.1135E+00	.4468E-02	42.04	38.27
13.71	.540	1402	.2244E+00	.8833E-02	44.65	40.64
15.73	.619	1411				

TABLE D5-5

SPECIMEN NUMBER: 2T1-259-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 6.10 MM (.240 IN)
MAXIMUM STRESS: 368.2 MPA (53.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 166 CYCLES
KIMAX) 1 CYCLES PRIOR TO FAILURE) 54.16 MPA SQRT(M)(49.29 KSI SQRT(IN)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	2.38	.091	1				
	2.58	.102	61	.4697E-02	.1833E-03	29.55	26.89
	3.69	.144	136	.1424E-01	.5607E-03	33.38	30.38
	4.78	.188	154	.6279E-01	.2472E-02	38.84	35.34
	6.29	.248	162	.1891E+00	.7446E-02	44.53	40.52
F	6.63	.261	164	.1689E+00	.6650E-02	48.12	43.79
F	7.38	.290	165	.7493E+00	.2950E-01	50.11	45.60

TABLE D5-6

SPECIMEN NUMBER: 3L1-2ST-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 6.60 MM (.2600 IN)
MAXIMUM STRESS: 168.7 MPA (23.5 KSI)
R-RATIO: .20
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 25465 CYCLES
KIMAX) 319 CYCLES PRIOR TO FAILURE) 63.84 MPA SQRT(M)(58.10 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
7.01	.276	1	.1919E-01	.7555E-03	12.21	11.11
7.66	.302	3429	.2459E-03	.9679E-05	12.96	11.79
9.93	.391	9163	.3164E-03	.1247E-04	13.80	12.56
9.46	.372	11429	.3491E-03	.1375E-04	14.41	13.11
10.90	.429	13264	.3656E-03	.1439E-04	14.96	13.62
11.13	.438	14991	.7474E-03	.2942E-04	15.31	13.93
11.91	.469	15895	.5317E-03	.2093E-04	15.70	14.29
12.91	.485	16844	.5344E-03	.2104E-04	16.06	14.56
12.71	.500	17567	.1349E-02	.4133E-04	16.32	14.85
13.11	.525	18172	.1083E-02	.4267E-04	16.79	15.28
14.19	.558	18965	.1655E-02	.6516E-04	17.26	15.71
14.86	.585	19774	.1173E-02	.4604E-04	17.70	16.11
15.65	.616	20557	.2033E-02	.8007E-04	18.20	16.57
16.56	.652	20498	.1643E-02	.6469E-04	18.69	17.01
17.34	.683	20966	.2117E-02	.8333E-04	19.07	17.36
17.91	.705	21236	.2421E-02	.9532E-04	19.41	17.66
18.56	.731	21517	.2624E-02	.1151E-03	19.85	18.06
19.51	.768	21827	.3531E-02	.1390E-03	20.55	18.71
21.29	.838	22258	.3499E-02	.1374E-03	21.19	19.46
22.67	.893	22674	.5495E-02	.2321E-03	22.05	20.02
23.83	.938	22941	.4234E-02	.1655E-03	22.49	20.47
24.45	.962	23083	.5897E-02	.2322E-03	23.04	21.00
26.00	1.024	23313	.6726E-02	.2373E-03	23.77	21.67
27.23	1.072	23517				
28.61	1.127	23726	.8404E-02	.2803E-03	24.31	22.14
30.13	1.186	23927	.7503E-02	.2973E-03	25.01	22.76
31.28	1.231	24150	.8432E-02	.3399E-03	25.63	23.33
32.61	1.284	24326	.9899E-02	.3582E-03	26.30	23.95
34.42	1.355	24478	.6672E-02	.2627E-03	26.39	24.90
35.56	1.400	24630	.1615E-01	.3996E-03	27.59	25.11
37.19	1.464	24656	.2173E-01	.8580E-03	28.21	25.67
38.41	1.512	24741	.1594E-01	.6293E-03	28.46	25.29
40.21	1.583	24913	.1351E-01	.4146E-03	29.52	26.87
41.69	1.641	25025	.1307E-01	.5147E-03	30.25	27.53
43.17	1.707	25099	.2314E-01	.9113E-03	30.99	28.16
44.72	1.751	25147	.2765E-01	.1089E-02	31.62	28.78

TABLE D5-7

SPECIMEN NUMBER: 3L1-296-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 6.40 MM (.2498 IN)
MAXIPUP STRESS: 217.1 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 8713 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 95.48 MPA SQRT(IN) (86.82 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	6.98	.274	1				
	7.68	.299	1062	.6969E-03	.2809E-04	18.44	16.96
	8.43	.332	1687	.1327E-02	.5216E-04	17.29	15.78
	9.04	.356	2229	.1122E-02	.4419E-04	18.02	16.39
	9.71	.382	2633	.1294E-02	.5118E-04	18.67	16.99
	10.34	.407	2846	.2951E-02	.1162E-03	19.31	17.57
	10.99	.417	2996	.1718E-02	.6733E-04	19.74	17.96
F	11.47	.451	3413	.2181E-02	.8273E-04	20.27	18.48
F	12.46	.491	3713	.3382E-02	.1388E-03	21.12	19.22
F	13.72	.540	4013	.4191E-02	.1650E-03	22.11	20.12
F	14.99	.590	4263	.5888E-02	.2888E-03	23.18	21.09
F	15.87	.625	4463	.4445E-02	.1750E-03	24.05	21.89
F	17.45	.695	4663	.8898E-02	.3508E-03	25.18	22.84
F	18.88	.748	4813	.7628E-02	.3888E-03	26.21	23.88
F	19.96	.785	4913	.1143E-01	.4588E-03	27.05	24.62
F	21.08	.838	4993	.1429E-01	.5625E-03	27.89	25.37
F	22.35	.888	5053	.2117E-01	.8333E-03	28.73	26.14
F	23.11	.918	5103	.1524E-01	.6088E-03	29.43	26.78
F	24.38	.968	5143	.2222E-01	.8751E-03	29.99	27.29
F	25.27	.995	5183	.3175E-01	.1250E-02	30.72	27.95
F	26.54	1.045	5213	.4233E-01	.1667E-02	31.65	28.72
F	27.38	1.078	5233	.3810E-01	.1500E-02	32.22	29.32
F	29.46	1.145	5253	.8890E-01	.3500E-02	33.83	30.66
F	30.35	1.195	5268	.8467E-01	.3333E-02	34.88	30.96
F	32.28	1.268	5278	.1051E+00	.4588E-02	34.92	31.78
F	33.53	1.320	5288	.1524E+00	.6088E-02	35.98	32.67
F	35.51	1.415	5297	.2540E+00	.1000E-01	37.87	33.73
F	36.73	1.446	5301	.2222E+00	.8750E-02	38.83	34.61
F	37.85	1.498	5304	.3810E+00	.1500E-01	38.65	35.17
F	39.37	1.550	5307	.5080E+00	.2000E-01	39.45	35.98
F	40.89	1.610	5309	.7620E+00	.3000E-01	40.37	36.73
F	44.07	1.735	5310	.3175E+01	.1250E+00	41.77	38.01
F	45.97	1.810	5311	.1905E+01	.7500E-01	43.29	39.48
F	52.32	2.060	5312	.6350E+01	.2500E+00	45.77	41.65

TABLE D5-8

SPECIMEN NUMBER: 3L2-259-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 6.32 MM (.2490 IN)
MAXIPUP STRESS: 328.6 MPA (48.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4475 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 89.67 MPA SQRT(IN) (81.61 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.72	.107	1				
4.11	.162	2620	.5754E-03	.2265E-04	16.61	15.12
5.53	.218	3289	.1631E-02	.6421E-04	19.74	17.96
6.62	.261	3678	.2473E-02	.1131E-03	22.17	20.18
7.73	.304	3921	.4487E-02	.1735E-03	24.18	21.94
9.06	.357	4135	.6185E-02	.2439E-03	26.08	23.74
10.21	.402	4297	.1139E-01	.4478E-03	27.96	25.44
12.57	.495	4339	.2328E-01	.9132E-03	30.43	27.69
13.58	.534	4396	.1760E-01	.6930E-03	32.64	29.71
14.93	.588	4431	.3872E-01	.1524E-02	34.11	31.05
16.47	.648	4451	.7677E-01	.3023E-02	35.85	32.62
18.08	.712	4467	.1018E+00	.3978E-02	37.66	34.27
24.09	.949	4473	.1302E+01	.3944E-01	41.78	38.02

TABLE D5-9

SPECIMEN NUMBER: 2T1-266-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.12 MM (.2409) IN
MAXIMUM STRESS: 304.1 MPA (44.1 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2424 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 64.85 MPA SQRT(M) (59.29 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.65	.104	1				
	3.05	.120	1529	.2636E-03	.1038E-04	14.38	13.19
	3.37	.133	2221	.4668E-03	.1838E-04	15.27	13.96
	3.99	.157	2867	.9739E-03	.3833E-04	16.34	14.89
	4.61	.181	3031	.3564E-02	.1405E-03	17.65	16.19
	5.14	.202	3151	.4449E-02	.1750E-03	18.87	17.13
	5.59	.220	3231	.5556E-02	.2187E-03	19.76	17.98
	6.26	.247	3346	.6855E-02	.2734E-03	20.76	18.70
	6.83	.269	3365	.2832E-01	.1115E-02	21.69	19.47
	7.79	.307	3386	.4544E-01	.1790E-02	23.07	21.00
	8.06	.317	3392	.4551E-01	.1792E-02	24.03	21.87
	8.45	.333	3403	.3679E-01	.1449E-02	24.97	22.34
	8.87	.348	3413	.3819E-01	.1504E-02	25.11	22.85
	9.41	.371	3419	.9673E-01	.3809E-02	25.87	23.48
	11.45	.451	3425	.3393E+00	.1336E-01	27.61	25.12
F	12.43	.493	3426	.1086E+01	.4277E-01	29.67	26.96
F	13.97	.550	3427	.1435E+01	.5651E-01	31.17	28.37

TABLE D5-10

SPECIMEN NUMBER: 1T6-256-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 6.40 MM (.2520 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1467 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 54.05 MPA SQRT(M) (49.19 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	7.02	.276	1				
	8.38	.327	455	.2928E-02	.1110E-03	16.84	15.34
	9.05	.356	775	.2334E-02	.9184E-04	17.94	16.33
	9.96	.392	982	.4424E-02	.1742E-03	18.79	17.10
	11.47	.452	1075	.5462E-02	.2151E-03	19.69	17.74
F	12.95	.510	1387	.7984E-02	.3143E-03	20.89	19.11
F	14.35	.565	1437	.2794E-01	.1100E-02	22.68	21.05
F	15.49	.610	1447	.1143E+00	.4499E-02	23.63	21.91
F	16.38	.645	1452	.1779E+00	.7003E-02	24.45	22.25
F	17.78	.700	1455	.4697E+00	.1849E-01	25.34	23.06
F	19.38	.763	1456	.1524E+01	.6000E-01	25.44	24.36

TABLE D5-11

SPECIMEN NUMBER: 171-253-7
ALLOY TYPE: 2124-T45
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 0.34 MM (.0475 IN)
MAXIMUM STRESS: 152.4 MPA (22.1 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 20475 CYCLES
K(MAX) 3 CYCLES PRIOR TO FAILURE: 63.1A MPA SQRT(M) (57.49 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	6.99	.274	1				
	7.52	.296	3995	.1437E-03	.5659E-05	11.58	10.47
	7.96	.314	7391	.1328E-03	.5227E-05	11.91	10.94
	8.52	.335	9402	.2690E-03	.1059E-04	12.26	11.18
	9.19	.362	11639	.3009E-03	.1185E-04	12.71	11.59
	9.89	.388	13535	.3208E-03	.1263E-04	13.19	12.00
	10.82	.426	15521	.5135E-03	.2022E-04	13.75	12.51
	11.62	.458	18458	.8593E-03	.3383E-04	14.35	13.05
	12.13	.478	17105	.7871E-03	.3099E-04	14.77	13.44
	12.83	.505	17669	.1245E-02	.4902E-04	15.15	13.79
	13.71	.540	18315	.1358E-02	.5346E-04	15.63	14.23
	14.61	.572	18846	.1543E-02	.6077E-04	16.13	14.69
	15.45	.608	19157	.2943E-02	.1158E-03	16.63	15.14
	17.17	.676	19512	.4858E-02	.1913E-03	17.37	15.81
	18.81	.741	19853	.4818E-02	.1896E-03	18.28	16.63
	20.12	.792	20012	.8243E-02	.3245E-03	19.04	17.33
	21.89	.862	20179	.1084E-01	.4267E-03	19.81	18.03
	23.36	.920	20253	.1891E-01	.7442E-03	20.61	18.75
	25.40	1.000	20387	.1571E-01	.5989E-03	21.44	19.51
	26.94	1.061	20466	.1945E-01	.7656E-03	22.27	20.27
	28.67	1.129	20518	.3334E-01	.1312E-02	23.01	20.94
	29.77	1.172	20542	.4556E-01	.1794E-02	23.65	21.52
F	31.37	1.235	20610	.2367E-01	.9279E-03	24.24	22.06
F	32.00	1.260	20620	.6353E-01	.2503E-02	24.71	22.51
F	32.89	1.295	20628	.1778E+00	.7010E-02	25.06	22.81
F	33.27	1.310	20633	.7622E-01	.3003E-02	25.34	23.06
F	34.16	1.345	20635	.1778E+00	.7003E-02	25.61	23.31
F	34.18	1.345	20640	.2032E+00	.8000E-02	26.02	23.68
F	36.07	1.420	20649	.1778E+00	.7000E-02	26.43	24.05
F	36.83	1.450	20653	.1524E+00	.6000E-02	26.78	24.37
F	38.13	1.501	20659	.2540E+00	.1000E-01	27.21	24.76
F	39.12	1.540	20661	.1491E+00	.5869E-02	27.69	25.20
F	40.26	1.585	20664	.3810E+00	.1500E-01	28.15	25.61
F	40.77	1.605	20666	.2540E+00	.1000E-01	28.49	25.93
F	41.53	1.635	20667	.7621E+00	.3001E-01	29.26	26.17
F	42.42	1.670	2,669	.8890E+00	.3500E-01	29.11	26.49
F	43.76	1.715	20669	.1143E+01	.4500E-01	29.57	25.88
F	44.70	1.760	20671	.1143E+01	.4500E-01	30.01	27.31
F	46.10	1.815	20671	.1397E+01	.5500E-01	30.57	27.82
F	47.89	1.885	23472	.1778E+01	.7000E-01	31.21	28.41

TABLE D5-12

SPECIMEN NUMBER: 3L1-253-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 394.3 K
SPECIMEN THICKNESS: 6.48 MM (.2552 IN)
MAXIMUM STRESS: 144.1 MPA (20.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 28710 CYCLES
K(MAX) 916 CYCLES PRIOR TO FAILURE: 40.78 MPA SQRT(M) (37.11 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
3.63	.143	1	.1358E-03	.5314E-05	15.89	13.73
4.39	.161	3445	.2674E-03	.1053E-04	16.86	14.62
4.66	.183	9644	.3974E-03	.1487E-04	17.85	15.52
5.21	.205	7086	.3867E-03	.1523E-04	17.99	16.38
5.77	.227	8544	.4142E-03	.1631E-04	18.95	17.25
6.40	.252	10074	.6307E-03	.2515E-04	19.93	18.14
7.16	.278	11694	.7333E-03	.2769E-04	21.02	19.13
7.98	.311	12293	.7846E-03	.2774E-04	22.10	20.12
8.63	.340	13333	.1009E-02	.3956E-04	23.25	21.16
9.69	.388	14344	.1335E-02	.5248E-04	24.54	22.34
10.69	.421	15129	.1292E-02	.5088E-04	25.80	23.48
11.79	.463	15945	.1522E-02	.5994E-04	26.97	24.55
12.76	.502	16604	.2309E-02	.9089E-04	27.91	25.40
13.45	.529	16906	.2343E-02	.9225E-04	29.67	26.85
14.38	.554	17177	.3413E-02	.1344E-03	28.42	26.77
14.97	.589	17436	.2158E-02	.8496E-04	30.17	27.45
15.54	.612	17732	.3109E-02	.1224E-03	30.79	28.02
16.23	.638	17914	.3314E-02	.1305E-03	31.45	28.62
16.88	.665	18119	.5234E-02	.2062E-03	32.19	29.29
17.72	.698	18295	.3279E-02	.1291E-03	32.90	29.93
18.34	.722	18469	.4184E-02	.1647E-03	33.47	30.42
19.18	.743	18595	.5862E-02	.2309E-03	33.38	30.91
19.49	.767	18732	.4628E-02	.1783E-03	34.61	31.49
22.29	.739	18877				
21.22	.938	19029	.6281E-02	.2473E-03	35.38	32.28
22.47	.885	19172	.8562E-02	.3371E-03	36.35	33.18
23.14	.911	19252	.8342E-02	.3300E-03	37.19	33.45
23.49	.941	19335	.8982E-02	.3536E-03	37.80	34.48
24.53	.970	19394	.1257E-01	.4949E-03	38.43	34.97

TABLE D5-13

SPECIMEN NUMBER: 3L2-25W-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 302.6 K
SPECIMEN THICKNESS: 6.43 MM (.253 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 3277 CYCLES
KIMAX) 3 CYCLES PRIOR TO FAILURE: 94.07 MPA SQRT(M) (85.61 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	5.96	.196	1	.9967E-03	.3916E-04	25.07	22.82
	6.47	.216	1482	.2751E-02	.1083C-03	28.24	25.70
	6.67	.256	1861	.2339E-02	.9210E-04	26.18	27.46
	7.11	.280	2131	.4791E-02	.1886E-03	31.76	28.91
	7.93	.312	2334	.4434E-02	.1805E-03	33.64	33.61
	8.92	.351	2529	.6297E-02	.2479E-03	39.21	32.34
	9.63	.379	2615	.7124E-02	.2806E-03	36.32	33.35
	10.13	.398	2685	.1164E-01	.4584E-03	38.09	34.67
	11.46	.451	2812	.1377E-01	.5407E-03	45.56	35.31
	12.91	.509	2909	.2224E-01	.8775E-03	42.15	38.36
	13.78	.547	2979	.2141E-01	.8431E-03	43.37	39.47
	14.66	.569	2979	.5467E-01	.7151E-02	46.68	42.31
F	17.40	.685	3031	.4444E-01	.1750E-02	48.82	43.67
F	19.19	.755	3.77	.5091E-01	.2005E-02	52.22	47.52
F	20.70	.815	3103	.5033E-01	.1787E-02	54.76	49.47
F	22.35	.880	3133	.6773E-01	.2667E-02	56.77	51.17
F	24.38	.960	3163	.5716E-01	.2251E-02	58.83	53.51
F	26.53	1.044	3189	.8893E-01	.3501E-02	61.69	55.17
F	27.35	1.076	3203	.1014E+00	.4110E-02	62.69	57.02
F	28.83	1.135	3219	.1051E+00	.4140E-02	64.87	58.74
F	31.44	1.238	3229	.1779E+00	.7008E-02	66.61	61.32
F	32.26	1.270	3239	.2359E+00	.9291E-02	68.97	62.77
F	34.47	1.357	3244	.1814E+00	.7222E-02	71.14	64.74
F	35.07	1.420	3257	.5183E+00	.2038E-01	73.26	66.67
F	38.11	1.500	3261	.6949E+00	.2753E-01	75.27	66.46
F	39.52	1.556	3261	.8259E+00	.3251E-01	76.84	71.46
F	41.19	1.622	3265	.3134E+01	.4123E-01	78.66	71.95
F	43.18	1.700	3267	.2476E+01	.9750E-01	83.17	75.56
F	45.17	1.778	3269	.3048E+01	.1200E+00	87.61	79.73
F	51.19	2.015	327:				

TABLE D5-14

SPECIMEN NUMBER: 3L7-259-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 294.0 K
SPECIMEN THICKNESS: 6.33 MM (.2492 IN)
MAXIMUM STRESS: 383.2 MPA (55.6 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 46,263 CYCLES
K(MAX) 5 CYCLES PRIOR TO FAILURE: 80.78 MPA SQRT(M) (73.52 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.92	.115	39	.1366E-01	.4118E-03	33.66	33.63
3.43	.135	129	.5673E-02	.2213E-03	36.36	33.09
3.99	.157	241	.4957E-02	.1952E-03	39.32	35.79
4.46	.175	273	.1545E-01	.6083E-03	41.97	38.19
4.68	.183	295	.8544E-02	.3364E-03	43.56	39.64
5.12	.202	321	.1903E-01	.7497E-03	45.12	41.06
5.49	.216	337	.2144E-01	.8441E-03	47.02	42.79
5.97	.235	353	.3016E-01	.1188E-02	48.87	44.47
6.31	.249	363	.3467E-01	.1365E-02	50.82	46.06
7.37	.290	389	.4044E-01	.1592E-02	53.43	48.63
8.08	.318	404	.4767E-01	.1877E-02	56.80	51.69
8.78	.346	414	.6947E-01	.2735E-02	59.35	54.01
9.40	.370	424	.6281E-01	.2465E-02	61.65	56.11
10.37	.408	431	.1384E+00	.5450E-02	64.33	58.54
10.74	.423	435	.9178E-01	.3613E-02	66.49	60.51
11.45	.451	440	.1415E+00	.5570E-02	68.19	62.05
12.39	.488	445	.1882E+00	.7410E-02	70.71	64.35
13.24	.521	450	.1714E+00	.6750E-02	73.38	66.78
13.99	.551	455	.1499E+00	.5900E-02	75.69	68.88

TABLE D5-15

SPECIMEN NUMBER: 2T4-253-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 297.0 K
SPECIMEN THICKNESS: 6.43 MM (.2531 IN)
MAXIMUM STRESS: 140.0 MPA (20.3 KSI)
R-RATIO: .05
FREQUENCY: 208 CPM
CYCLES TO FAILURE: 14865 CYCLES
K(MAX) 40 CYCLES PRIOR TO FAILURE: 41.51 MPA SQRT(M) (37.74 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.58	.141	3212	.1036E-03	.4080E-05	14.42	13.13
3.91	.154	6153	.1818E-03	.7157E-05	15.24	13.87
4.44	.175	7676	.7671E-03	.2784E-04	16.65	15.15
5.52	.217	8923	.7547E-03	.2971E-04	18.26	16.62
6.46	.254	9867	.7924E-03	.3120E-04	19.51	17.76
7.21	.284	10426	.1454E-02	.5725E-04	20.60	18.75
8.02	.316	11262	.1148E-02	.4522E-04	21.78	19.82
8.90	.354	11924	.1758E-02	.6888E-04	23.10	21.03
10.14	.399	12833	.2674E-02	.1053E-03	25.21	22.94
12.57	.495	13122	.4803E-02	.1576E-03	27.16	24.71
13.73	.540	13387	.6151E-02	.2422E-03	28.34	25.79
14.87	.585	13461	.5517E-02	.2172E-03	29.13	26.78
15.72	.619	13596	.8086E-02	.3152E-03	30.27	27.55
16.88	.664	13664	.1286E-01	.4751E-03	31.17	28.37
17.62	.694	13771	.8282E-02	.3229E-03	31.98	29.08
18.58	.728	13817	.2463E-01	.9696E-03	32.87	29.91
19.63	.773	13864	.3768E-01	.1483E-02	33.83	30.79
20.69	.813	13889	.2326E-01	.9156E-03	34.72	31.58
21.69	.854	13951	.2882E-01	.1135E-02	35.93	32.70
23.48	.924	14885	.6388E-01	.2483E-02	38.87	34.65
26.88	1.058					

TABLE D5-18

SPECIMEN NUMBER: 1L1-253-3
SPECIMEN ORIENTATION: L-T
CONSTRAINT: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
TEST TEMPERATURE: AMBIENT
SPECIMEN THICKNESS: 6.39 MM (.251 IN)
MAXIMUM STRESS: 144.1 MPA (20.9 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 21185 CYCLES

K(MAX) 39 CYCLES PRIOR TO FAILURE: 82.97 MPA SQRT(M) (75.99 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
10.35	.396	1	.3304E-03	.1301E-04	13.44	12.23
11.96	.471	5793	.6382E-03	.2363E-04	14.22	12.94
12.84	.498	6425	.5159E-03	.1992E-04	14.65	13.33
13.43	.529	8474	.8237E-03	.3243E-04	15.09	13.73
14.28	.559	9416	.1334E-02	.4971E-04	15.48	14.09
14.84	.554	10035	.9649E-03	.3797E-04	15.81	14.39
15.43	.608	10648	.8787E-03	.3428E-04	16.11	14.66
15.98	.628	11244	.1048E-02	.4127E-04	16.43	14.95
16.67	.656	11931	.1084E-02	.4286E-04	16.78	15.27
17.38	.681	12623	.9338E-03	.3676E-04	17.13	15.59
18.07	.711	13339	.1532E-02	.6030E-04	17.54	15.96
18.94	.746	13912	.1191E-02	.4688E-04	18.05	16.43
20.17	.794	14918	.1508E-02	.5935E-04	18.68	17.00
21.41	.851	15895	.2041E-02	.8035E-04	19.36	17.61
23.07	.908	16610	.3072E-02	.1210E-03	19.94	18.15
24.19	.952	16975	.3101E-02	.1221E-03	20.45	18.61
25.38	.999	17360	.3717E-02	.1188E-03	20.97	19.05
26.55	1.045	17744	.3275E-02	.1289E-03	21.58	19.64
28.16	1.110	18249	.3969E-02	.1258E-03	22.16	20.16
29.28	1.152	18597	.4080E-02	.1921E-03	22.78	20.66
30.78	1.212	18958	.5834E-02	.2220E-03	23.29	21.13
31.76	1.250	19041	.5199E-02	.2047E-03	23.67	21.54
32.98	1.298	19316	.1013E-01	.3988E-03	24.14	21.97
34.39	1.342	19426				
			.7560E-02	.3134E-03	24.47	22.45
35.58	1.401	19613	.7044E-02	.2773E-03	25.19	22.92
36.84	1.442	19763	.9636E-02	.3794E-03	25.62	23.31
37.73	1.486	19877	.1183E-01	.5050E-03	26.12	23.77
39.19	1.541	19987	.1248E-01	.5089E-03	26.70	24.30
40.64	1.600	20119	.1574E-01	.6040E-03	27.30	24.84
42.17	1.660	20203	.1274E-01	.5032E-03	27.94	25.34
43.77	1.723	20297	.1637E-01	.6448E-03	28.59	25.75
44.47	1.751	20344	.1855E-01	.7304E-03	28.82	26.23
46.03	1.812	20449	.2784E-01	.1096E-02	29.42	26.77
47.45	1.868	20499	.1984E-01	.7815E-03	29.94	27.25
49.48	1.917	20541	.2389E-01	.9420E-03	30.43	27.69
49.98	1.956	20611	.2523E-01	.9933E-03	30.97	28.19
51.39	2.023	20671	.3504E-01	.1381E-02	31.54	28.74
52.96	2.091	20713	.3224E-01	.1270E-02	32.24	29.34
54.67	2.152	20749	.2427E-01	.9554E-03	32.94	29.97
56.25	2.214	20814	.6347E-01	.2381E-02	33.79	30.72
58.41	2.307	20873	.3644E-01	.1439E-02	34.60	31.49
60.29	2.373	20919	.4557E-01	.1794E-02	35.38	32.20
62.25	2.451	20962	.6191E-01	.2437E-02	36.30	33.12
64.97	2.558	21036	.6949E-01	.2736E-02	37.61	34.06
66.92	2.634	21034	.1555E+00	.6123E-02	38.40	34.95
69.25	2.726	21049	.2309E+00	.7911E-02	39.36	35.92
71.26	2.798	21054	.1988E+00	.7491E-02	40.16	36.56
72.59	2.857	21064	.4896E+00	.1927E-01	41.30	37.31
74.54	2.934	21070				

TABLE D5-19

SPECIMEN NUMBER: [illegible]
ALLOY TYPE: [illegible]
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIR/GH
TEST TEMPERATURE: 366.5 K
SPECIMEN THICKNESS: 6.48 MM (.255 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 6174 CYCLES
K(MAX) 17 CYCLES PRIOR TO FAILURE: 79.20 MPA SQRT(M) (72.37 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.84	.269	1				
			.4591E-03	.1808E-04	16.7.	15.2C
7.19	.722	2921				
			.1545E-02	.6240E-04	18.09	16.47
9.42	.171	3704				
			.1973E-02	.7766E-04	19.36	17.62
10.71	.422	4359				
			.2763E-02	.1086E-03	20.33	18.51
11.44	.450	4625				
			.1445E-02	.5746E-04	20.79	18.92
11.70	.461	4834				
			.1075E-01	.4247E-03	21.63	19.68
12.32	.426	4954				
			.6345E-02	.2494E-03	23.06	20.99
15.07	.593	5233				
			.9457E-02	.2149E-01	24.32	22.14
16.43	.647	5479				
			.9717E-02	.3833E-03	25.29	23.01
17.54	.690	5593				
			.1294E-01	.5094E-03	26.04	23.70
18.42	.725	5661				
			.1113E-01	.4382E-03	26.67	24.27
19.21	.756	5732				
			.1055E-01	.4153E-03	27.29	24.84
20.13	.793	5821				
			.1333E-01	.5245E-03	28.25	25.71
21.89	.862	5952				
			.1839E-01	.7244E-03	29.60	26.99
24.28	.953	6080				
			.2480E-01	.9469E-03	30.83	28.06
24.37	.999	6129				
			.3124E-01	.1230E-02	32.44	29.52
29.09	1.145	6249				
			.2928E-01	.1153E-02	33.80	31.76
29.45	1.167	6267				
			.5677E-01	.2235E-02	34.34	31.25
30.78	1.212	6287				
			.1149E+00	.4522E-02	37.17	33.83
38.82	1.528	6357				

TABLE D5-20

SPECIMEN NUMBER: [illegible]
ALLOY TYPE: [illegible]
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIR/GH
TEST TEMPERATURE: 297.5 K
SPECIMEN THICKNESS: 6.36 MM (.2502 IN)
MAXIMUM STRESS: 383.2 MPA (55.6 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 710 CYCLES
K(MAX) 2 CYCLES PRIOR TO FAILURE: 78.43 MPA SQRT(M) (71.37 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.35	.092	1				
				.2297E-02	.9043E-04	17.27	15.72
	2.83	.111	217				
				.3636E-02	.1432E-03	19.13	17.41
	3.52	.138	403				
				.4994E-02	.1793E-03	21.11	19.21
	4.21	.166	452				
				.1691E-01	.6653E-03	22.82	21.77
	4.82	.190	504				
				.3034E-01	.1102E-02	24.31	22.12
	5.42	.213	604				
				.2429E-01	.9565E-03	25.87	23.54
	6.17	.243	639				
				.3033E-01	.1193E-02	27.38	24.92
	6.81	.268	660				
				.2742E-01	.1033E-03	28.54	25.97
	7.24	.247	681				
				.1067E+00	.4200E-02	29.56	26.89
	7.81	.308	685				
				.1121E+00	.4410E-02	31.41	27.85
	8.37	.330	697				
				.1464E+00	.5760E-02	31.81	28.95
	9.11	.359	695				
				.1304E+00	.5140E-02	33.06	30.09
	9.76	.384	708				
				.9119E-01	.3593E-02	34.13	31.07
	11.22	.442	735				
F	12.83	.505	787	.1305E+01	.5137E-01	36.58	33.29
F	13.21	.520	734	.3815E+00	.1502E-01	38.42	34.62

TABLE D5-21

SPECIMEN NUMBER: ITS-253-4
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: T-L
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: AIR/RM
TEST TEMPERATURE: 380.4 K
SPECIMEN THICKNESS: 6.38 MM (.251" IN)
MAXIMUM STRESS: 140.0 MPA (20.3 KSI)
R-RATIO: .02
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 12118 CYCLES
K(MAX) 14 CYCLES PRIOR TO FAILURE: 64.33 MPA SQRT(M) (58.54 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
10.28	.405	1				
11.28	.444	2379	.4211E-03	.1659E-04	12.92	11.76
12.28	.480	3993	.5675E-03	.2234E-04	13.49	12.28
12.74	.501	4859	.4677E-03	.3189E-04	13.91	12.66
13.23	.521	5203	.9922E-03	.3513E-04	14.20	12.92
13.53	.533	5763	.5484E-03	.2187E-04	14.42	13.12
14.09	.478	6948	.9762E-03	.3843E-04	14.82	13.48
15.47	.489	7496	.1429E-02	.5611E-04	15.33	13.95
16.20	.638	8055	.1315E-02	.5179E-04	15.72	14.31
17.03	.669	8930	.1676E-02	.6600E-04	16.11	14.66
17.96	.691	8878	.1647E-02	.6485E-04	16.44	14.96
18.31	.721	9164	.2849E-02	.1003E-03	16.76	15.26
18.81	.741	9390	.2211E-02	.8709E-04	17.06	15.53
19.62	.772	9696	.2618E-02	.1031E-03	17.37	15.81
21.25	.837	10144	.3673E-02	.1446E-03	17.94	16.33
22.77	.896	10469	.4650E-02	.1834E-03	18.66	16.98
24.12	.950	10672	.6675E-02	.2629E-03	19.29	17.56
25.68	1.008	10897	.7991E-02	.3146E-03	19.90	18.11
26.94	1.061	11001	.9385E-02	.3693E-03	20.53	18.66
28.97	1.140	11243	.8378E-02	.3299E-03	21.20	19.30
30.30	1.193	11359	.1140E-01	.4522E-03	21.89	19.92
31.94	1.258	11505	.1125E-01	.4429E-03	22.49	20.47
33.71	1.327	11682	.1826E-01	.7191E-03	23.18	21.09
35.28	1.388	11806	.1848E-01	.7274E-03	23.83	21.69
36.41	1.433	11751	.1797E-01	.8919E-03	24.36	22.17
38.06	1.538	11884	.8439E-01	.1826E-02	25.06	22
40.78	1.682	11871	.2763E-01	.1088E-02	25.98	23.
42.61	1.678	11929	.3289E-01	.1295E-02	26.62	24.23
43.77	1.723	11957	.4127E-01	.1625E-02	27.21	24.76
46.75	1.841	12003	.6519E-01	.2566E-02	28.01	25.49
49.50	1.949	12041	.7192E-01	.2832E-02	28.12	26.58
50.74	1.998	12061	.6223E-01	.2450E-02	29.90	27.21
52.56	2.050	12076	.8788E-01	.3460E-02	30.40	27.66
54.04	2.127	12089	.1322E+00	.5992E-02	31.05	28.26
55.16	2.172	12098	.1269E+00	.4917E-02	31.66	28.82
55.14	2.109	12104	.1137E+00	.4475E-02	32.03	29.14

TABLE D5-22

SPECIMEN NUMBER	3T3-256-7
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	ARGON
TEST TEMPERATURE	303.2 K
SPECIMEN THICKNESS	6.43 MM (.253 IN)
MAXIMUM STRESS	217.2 MPA (31.5 KSI)
R-RATIO	.05
FREQUENCY	200 CPM
CYCLES TO FAILURE	2627 CYCLES

K(MAX) 3 CYCLES PRIOR TO FAILURE 64.29 MPA SQRT(M) (58.51 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.96	.274	1				
			.1128E-02	.4440E-04	17.17	15.62
8.48	.350	1731				
			.3437E-02	.1351E-03	18.73	17.04
9.94	.391	2833				
			.9891E-02	.3891E-03	20.42	18.58
12.41	.488	2284				
			.6353E-02	.2501E-03	22.03	20.05
13.85	.533	2464				
			.4449E-01	.1750E-02	23.59	21.47
16.13	.635	2522				
			.3554E-01	.1431E-02	25.54	23.25
18.51	.729	2589				
			.7853E-01	.3092E-02	27.13	24.69
23.39	.883	2611				
			.3135E+00	.1234E-01	28.70	26.12
22.92	.902	2621				
			.1292E+01	.5088E-01	30.87	28.09
26.78	1.054	2624				

TABLE D5-23

SPECIMEN NUMBER	3T4-253-1
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	ARGON
TEST TEMPERATURE	294.0 K
SPECIMEN THICKNESS	6.46 MM (.255 IN)
MAXIMUM STRESS	177.1 MPA (25.7 KSI)
R-RATIO	.05
FREQUENCY	200 CPM
CYCLES TO FAILURE	2662 CYCLES

K(MAX) 15 CYCLES PRIOR TO FAILURE 45.81 MPA SQRT(M) (41.69 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.27	.089	1				
			.37..E-02	.1462E-03	16.56	15.07
2.75	.108	131				
			.7681E-02	.3024E-03	18.01	16.45
3.23	.127	193				
			.1555E-01	.6122E-03	19.6.	17.86
3.83	.151	231				
			.4298E-01	.1614E-02	21.89	19.13
4.25	.167	241				
			.4495E-01	.1744E-02	22.24	21.24
4.79	.188	251				

TABLE D5-24

SPECIMEN NUMBER: 2L2-253-4
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 294.7 K
SPECIMEN THICKNESS: 6.43 MM (.2533 IN)
MAXIMUM STRESS: 144.1 MPA (20.9 KSI)
R-RATIO: .06
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 12635 CYCLES
K(MAX) 1093 CYCLES PRIOR TO FAILURE: 39.69 MPA SQRT(M) (36.12 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
3.67	.144	1				
			.3631E-03	.1430E-04	15.33	13.95
4.31	.173	1761				
			.5627E-03	.2216E-04	16.70	15.19
5.15	.213	3237				
			.6674E-03	.2627E-04	17.92	16.30
5.74	.226	4140				
			.8641E-03	.3402E-04	18.93	17.23
6.41	.252	4919				
			.7417E-03	.2920E-04	19.88	18.09
6.98	.275	5689				
			.8677E-03	.3416E-04	20.73	18.87
7.58	.298	6373				
			.1190E-02	.4687E-04	21.64	19.70
8.28	.326	6944				
			.1066E-02	.4196E-04	22.51	20.48
8.96	.349	7535				
			.1335E-02	.5255E-04	23.36	21.26
9.69	.377	8053				
			.1956E-02	.7701E-04	24.29	22.05
10.24	.403	8348				
			.1914E-02	.7537E-04	25.15	22.89
11.10	.437	8815				
			.1777E-02	.6974E-04	26.22	23.84
11.74	.462	9134				
			.2279E-02	.1094E-03	26.90	24.39
12.46	.491	9455				
			.3116E-02	.1227E-03	27.69	25.20
13.33	.525	9735				
			.2325E-02	.9157E-04	28.47	25.91
13.91	.548	9944				
			.2548E-02	.1003E-03	29.09	26.44
14.44	.569	10184				
			.3458E-02	.1356E-03	29.64	26.98
15.14	.596	10367				
			.4309E-02	.1696E-03	30.27	27.55
15.68	.617	10535				
			.4569E-02	.1799E-03	30.98	28.17
16.42	.646	10664				
			.3175E-02	.1250E-03	31.58	28.74
16.95	.667	10836				
			.4675E-02	.1841E-03	32.26	29.36
17.62	.731	11021				
			.4692E-02	.1847E-03	32.96	29.99
18.38	.724	11142				
			.6104E-02	.2405E-03	33.84	30.80
19.23	.777	11362				
			.6634E-02	.2612E-03	35.29	31.93
21.12	.831	11572				
			.7634E-02	.3006E-03	36.23	32.97
22.30	.878	11727				
			.9633E-02	.3791E-03	37.23	33.88
23.41	.922	11842				

TABLE D5-25

SPECIMEN NUMBER: 3L3-256-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 297.6 K
SPECIMEN THICKNESS: 6.30 MM (.2480 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .06
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2494 CYCLES
K(MAX) 855 CYCLES PRIOR TO FAILURE: 34.53 MPA SQRT(M) (31.42 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
3.64	.144	1				
			.1422E-02	.5598E-04	23.23	21.14
4.44	.175	561				
			.2275E-02	.8956E-04	25.37	23.08
5.20	.235	892				
			.1709E-02	.6730E-04	26.80	24.39
5.56	.219	1103				
			.3702E-02	.1458E-03	28.04	25.51
6.21	.245	1280				
			.3986E-02	.1569E-03	29.93	27.24
7.19	.283	1526				
			.7305E-02	.2876E-03	31.99	29.02
8.02	.316	1639				

TABLE D5-26

SPECIMEN NUMBER: 1L3-259-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.32 MM (.2488 IN)
MAXIMUM STRESS: 338.4 MPA (49.0 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1185 CYCLES

K(MAX) 6 CYCLES PRIOR TO FAILURE: 81.28 MPA SQRT(M) (73.89 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.92	.099	1	.1377E-02	.5421E-04	29.82	27.14
3.02	.119	369	.3164E-02	.1245E-03	32.92	29.95
3.73	.147	591	.5255E-02	.2069E-03	36.32	33.05
4.49	.177	736	.8542E-02	.3363E-03	38.96	35.37
5.45	.215	849	.1318E-01	.4889E-03	42.93	39.07
6.01	.237	984	.1837E-01	.7233E-03	44.97	40.92
6.60	.258	934	.2727E-01	.1074E-02	46.85	42.64
7.38	.279	953	.2362E-01	.9300E-03	48.97	44.52
7.79	.307	983	.2559E-01	.1004E-02	51.18	46.51
8.43	.332	1008	.4084E-01	.1608E-02	53.05	48.27
9.04	.356	1023	.2466E-01	.9708E-03	55.29	50.32
9.93	.391	1059	.4188E-01	.1648E-02	57.31	52.15
10.43	.411	1071	.4639E-01	.1826E-02	59.12	53.80
11.22	.442	1088	.3869E-01	.1523E-02	60.98	55.50
11.80	.464	1103	.4295E-01	.1691E-02	62.39	56.77
12.27	.483	1114	.3889E-01	.1531E-02	64.21	58.44
13.28	.523	1138	.4657E-01	.1833E-02	66.85	60.11
13.72	.540	1144	.9842E-01	.3860E-02	67.82	61.72
14.63	.576	1154	.1092E+00	.4300E-02	69.57	63.31
14.17	.597	1159	.9803E-01	.3544E-02	71.10	64.78
15.98	.629	1168	.1031E+00	.7208E-02	73.39	66.79
17.88	.672	1174	.2245E+00	.8848E-02	75.98	69.07
18.28	.717	1179				

TABLE D5-27

SPECIMEN NUMBER: 1T5-253-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 6.53 MM (.257 IN)
MAXIMUM STRESS: 143.0 MPA (20.7 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 6647 CYCLES

K(MAX) 618 CYCLES PRIOR TO FAILURE: 24.05 MPA SQRT(M) (21.44 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.84	.151	1	.6321E-03	.2488E-04	15.37	13.99
4.66	.183	1297	.7201E-03	.2834E-04	16.77	15.22
5.40	.213	2336	.9256E-03	.3644E-04	17.99	16.37
6.22	.245	3221	.1378E-02	.5414E-04	19.14	17.42
6.94	.273	3743	.1347E-02	.5304E-04	20.17	18.32
7.60	.299	4234	.2.84E-02	.8234E-04	21.24	19.33
8.47	.333	4699	.1947E-02	.7665E-04	22.19	20.19
9.07	.357	4954	.3149E-02	.1236E-03	22.87	21.77
9.58	.377	5119	.2584E-02	.1017E-03	23.49	21.38
10.18	.401	5349	.3621E-02	.1425E-03	24.27	22.05
10.83	.426	5529	.4369E-02	.1632E-03	24.97	22.72
11.45	.451	5681	.5334E-02	.2111E-03	25.74	23.42
12.21	.481	5824	.6862E-02	.2694E-03	26.51	24.12
12.85	.506	5917	.7855E-02	.3092E-03	27.23	24.78
13.57	.534	6009				

TABLE D5-28

SPECIMEN NUMBER: STR-293-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONFIGURATION: UNNOTCHED
ENVIRONMENT: DRY AIR
TEST TEMPERATURE: 250°F
SPECIMEN THICKNESS: 6.32 MM (.249 IN)
MAXIMUM STRESS: 372.4 MPA (54.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 180 CYCLES
K(MAX) 4 CYCLES PRIOR TO FAILURE: 41.48 MPA SQRT(M) (37.75 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.53	.102	1				
			.8462E-02	.3331E-03	32.98	29.65
3.86	.128	87				
			.9887E-01	.3861E-02	37.13	33.79
3.94	.155	96				

TABLE D5-29

SPECIMEN NUMBER: SL1-293-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONFIGURATION: UNNOTCHED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 250°F
SPECIMEN THICKNESS: 6.35 MM (.250 IN)
MAXIMUM STRESS: 144.1 MPA (20.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 26287 CYCLES
K(MAX) 6 CYCLES PRIOR TO FAILURE: 79.28 MPA SQRT(M) (72.15 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
8.00	.315	1				
			.2381E-03	.8195E-05	11.81	10.75
9.03	.355	4925				
			.4137E-03	.1629E-04	12.45	11.33
9.89	.389	7083				
			.4356E-03	.1715E-04	12.96	11.79
10.58	.417	8589				
			.3488E-03	.1373E-04	13.34	12.14
11.18	.437	10032				
			.6535E-03	.2573E-04	13.71	12.47
11.77	.464	11110				
			.5996E-03	.2361E-04	14.21	12.93
12.78	.503	12796				
			.8287E-03	.3263E-04	14.91	13.57
14.21	.560	14520				
			.7907E-03	.3113E-04	15.66	14.25
15.58	.610	16147				
			.1533E-02	.6065E-04	16.35	14.88
16.98	.661	17434				
			.1587E-02	.6247E-04	17.05	15.52
18.25	.710	18318				
			.1111E-02	.4374E-04	17.71	16.12
19.46	.766	19413				
			.1725E-02	.6790E-04	18.29	16.64
20.62	.812	20086				
			.1935E-02	.7617E-04	18.89	17.19
22.21	.867	20810				
			.1539E-02	.6059E-04	19.51	17.75
23.30	.918	21641				
			.2984E-02	.1175E-03	20.30	18.27
24.57	.967	22064				
			.2756E-02	.1085E-03	20.62	18.76
25.71	1.013	22447				
			.3356E-02	.1321E-03	21.19	19.19
26.72	1.052	22781				
			.3771E-02	.1485E-03	21.64	19.70
28.12	1.115	23205				
			.5642E-02	.2221E-03	22.32	20.31
29.90	1.177	23485				
			.3798E-02	.1495E-03	22.90	20.84
31.39	1.224	23808				
			.5813E-02	.2289E-03	23.36	21.26
32.14	1.265	23966				
			.5439E-02	.2140E-03	23.98	21.73
33.93	1.323	24254				
			.9536E-02	.3754E-03	24.91	22.31
35.26	1.388	24429				
			.6677E-02	.2629E-03	25.18	22.83
36.49	1.414	24494				
			.8462E-02	.3331E-03	25.62	23.31
37.91	1.443	24575				
			.8041E-02	.3166E-03	26.17	23.82
39.21	1.543	24910				
			.8527E-02	.3357E-03	26.69	24.29
40.51	1.595	25093				
			.7511E-02	.3115E-03	27.15	24.71
41.55	1.636	25224				
			.1123E-01	.4421E-03	27.49	25.14
42.30	1.669	25344				
			.1446E-01	.5728E-03	28.29	25.74
44.14	1.747	25440				
			.1377E-01	.4230E-03	28.92	26.32
46.10	1.815	25594				
			.1493E-01	.5867E-03	29.35	26.71
47.10	1.855	25654				
			.2062E-01	.8120E-03	30.34	27.34
49.16	1.931	25754				
			.1864E-01	.7337E-03	30.66	27.90
51.03	1.992	25837				
			.2261E-01	.8867E-03	31.30	28.49
53.11	2.036	25848				
			.2101E-01	.8273E-03	31.75	28.89
53.15	2.110	25965				
			.3185E-01	.1254E-02	32.49	29.56
55.29	2.177	26072				
			.3512E-01	.1540E-02	33.41	30.41
57.87	2.278	26092				
			.5154E-01	.2029E-02	34.14	31.75
60.73	2.391	26128				
			.4687E-01	.3538E-02	35.54	32.34
63.58	2.530	26172				
			.1167E-01	.4575E-02	36.47	33.66
65.82	2.591	26195				
			.4433E+00	.1745E-01	38.50	35.04
70.78	2.784	26231				

TABLE D5-30

SPECIMEN NUMBER	1L2-256-2
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	LONGITUDINAL
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	300. K
SPECIMEN THICKNESS	6.53 MM (.260 IN)
MAXIMUM STRESS	217.2 MPA (31.5 KSI)
R-RATIO	.10
FREQUENCY	200 CPM
CYCLES TO FAILURE	13174 CYCLES
K(MAX) 4166 CYCLES PRIOR TO FAILURE	33.89 MPA SQRT(M) (30.84 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.29	.130	1				
			.1818E-03	.7159E-05	11.31	10.30
3.61	.142	1761				
			.3659E-03	.1440E-04	12.60	10.92
4.19	.165	3233				
			.4356E-03	.1715E-04	12.85	11.69
4.79	.187	4612				
			.5915E-03	.2329E-04	13.73	12.50
5.42	.213	6021				
			.8760E-03	.3449E-04	14.57	13.26
6.03	.237	6914				
			.5464E-03	.2151E-04	15.30	13.92
6.58	.259	7525				
			.6490E-03	.2555E-04	15.87	14.44
6.99	.275	8159				
			.8676E-03	.3416E-04	16.93	15.85
7.73	.304	9088				

TABLE D5-31

SPECIMEN NUMBER	5L5-259-2
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	LONGITUDINAL
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	297.0 K
SPECIMEN THICKNESS	6.30 MM (.248 IN)
MAXIMUM STRESS	304.9 MPA (44.2 KSI)
R-RATIO	.10
FREQUENCY	200 CPM
CYCLES TO FAILURE	2911 CYCLES
K(MAX) 19 CYCLES PRIOR TO FAILURE	23.76 MPA SQRT(M) (67.13 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.28	.140	1				
			.6883E-03	.2711E-04	18.01	16.39
3.29	.130	1477				
			.1923E-02	.1544E-03	20.10	18.29
3.65	.144	1567				
			.3044E-02	.1220E-03	20.78	18.91
3.77	.148	1627				
			.2596E-02	.1022E-03	21.75	19.79
4.35	.171	1832				
			.3063E-02	.1206E-03	23.49	21.38
5.12	.202	2282				
			.1518E-02	.1344E-03	25.29	23.01
5.68	.224	2242				
			.4146E-02	.1648E-03	26.32	23.95
6.21	.244	2267				
			.6861E-02	.2733E-03	27.66	25.16
6.91	.272	2469				
			.7966E-02	.3136E-03	29.39	26.75
7.90	.311	2593				
			.2239E-02	.7092E-03	32.27	29.37
8.92	.351	2856				
			.1844E-01	.7274E-03	34.71	31.58
1..66	.420	2898				
			.4764E-01	.1955E-02	36.11	32.87
11.61	.457	2917				

TABLE D5-32

SPECIMEN NUMBER: 217-263-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.3 K
SPECIMEN THICKNESS: 6.30 MM (.2513 IN)
MAXIMUM STRESS: 141.3 MPA (20.3 KSI)
R-RATIO: .50
FREQUENCY: 21.4 CPM
CYCLES TO FAILURE: 18646 CYCLES
K(MAX) 10 CYCLES PRIOR TO FAILURE: 50.85 MPA SQRT(M) (46.28 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
7.54	.298	1				
			.3352E-03	.1320E-04	10.90	10.30
8.09	.318	1569				
			.4946E-03	.2341E-04	11.42	10.39
8.80	.346	2752				
			.5977E-03	.2353E-04	11.84	10.78
9.38	.368	3672				
			.7261E-03	.2859E-04	12.27	11.13
10.03	.394	4878				
			.9522E-03	.3749E-04	12.73	11.58
10.91	.438	5933				
			.1043E-02	.4893E-04	13.24	12.36
11.69	.460	6283				
			.1358E-02	.5345E-04	13.75	12.51
12.68	.499	7007				
			.1327E-02	.5223E-04	14.25	12.97
13.48	.531	7613				
			.2085E-02	.8208E-04	14.69	13.17
14.28	.562	7998				
			.1955E-02	.7697E-04	15.11	13.75
15.05	.593	8391				
			.3281E-02	.1292E-03	15.64	14.23
16.31	.642	8775				
			.2628E-02	.1335E-03	16.18	14.72
17.18	.676	9107				
			.6722E-02	.2646E-03	16.71	15.20
18.45	.726	9296				
			.3795E-02	.1494E-03	17.24	15.69
19.42	.765	9551				
			.6281E-02	.2473E-03	17.95	16.34
21.49	.846	9881				
			.1080E-01	.3938E-03	18.87	17.17
23.49	.925	10081				
			.9255E-02	.3644E-03	19.62	17.76
24.43	.962	10182				
			.9760E-02	.3843E-03	19.94	18.15
25.48	1.003	10290				
			.1066E-01	.4198E-03	20.40	18.56
26.56	1.046	10391				
			.3154E-01	.1242E-02	21.15	19.25
29.08	1.145	10471				
			.9688E-01	.2239E-02	22.27	20.27
32.04	1.261	10521				
			.3117E-01	.1227E-02	23.19	21.11
33.69	1.326	10576				
			.5784E-01	.2246E-02	23.92	21.77
35.75	1.407	10612				
			.1768E+00	.6953E-02	24.88	22.64
38.57	1.519	10628				

TABLE D5-33

SPECIMEN NUMBER: 512-256-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 301.5 K
SPECIMEN THICKNESS: 6.27 MM (.2471 IN)
MAXIMUM STRESS: 217.1 MPA (31.5 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1575 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 69.14 MPA SQRT(M) (62.92 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.84	.269	1				
				.1893E-02	.7440E-04	16.28	14.79
	7.39	.291	292				
				.1510E-02	.5977E-04	16.78	15.27
	7.77	.306	564				
				.2285E-02	.8999E-04	17.22	15.67
	8.23	.323	732				
				.9936E-02	.3900E-03	17.74	16.15
	8.74	.344	787				
				.5629E-02	.2216E-03	18.99	17.28
F	10.64	.419	1125				
				.6724E-02	.2647E-03	20.45	18.61
F	11.79	.464	1295				
				.1295E-01	.5101E-03	21.55	19.61
F	13.08	.515	1395				
				.1442E-01	.5833E-03	22.49	20.47
F	13.97	.550	1455				
				.4657E-01	.1833E-02	23.44	21.34
F	15.37	.605	1485				
				.1813E-01	.1503E-02	24.46	22.26
F	16.51	.650	1515				
				.4464E-01	.1758E-02	25.26	22.98
F	17.40	.685	1535				
				.1185E+00	.4667E-02	26.27	23.90
F	19.18	.755	1551				
				.1397E+00	.5513E-02	27.47	24.96
F	21.97	.810	1561				
				.3467E+00	.1357E-01	28.78	25.19
F	22.99	.905	1567				
				.2561E+00	.1011E-01	29.96	27.26
F	24.01	.945	1571				
				.1206E+01	.4750E-01	31.10	28.31
F	26.42	1.040	1573				
				.4191E+01	.1650E-01	33.25	30.26
F	31.81	1.235	1574				

TABLE D5-34

SPECIMEN NUMBER: 1T8-256-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 297.6 K
SPECIMEN THICKNESS: 6.50 MM (.256) IN
MAXIMUM STRESS: 218.5 MPA (31.4 KSI)
R-RATIO: .5
FREQUENCY: 270 CPM
CYCLES TO FAILURE: 2426 CYCLES
K(MAX) 507 CYCLES PRIOR TO FAILURE: 31.88 MPA SQRT(M) (29.01 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.44	.136	1				
			.6803E-03	.2679E-04	11.68	10.63
3.84	.151	727				
			.1439E-02	.5665E-04	12.67	11.53
4.75	.187	1291				
			.2743E-02	.1079E-03	13.65	12.42
5.32	.210	1531				
			.2890E-02	.1138E-03	14.53	13.23
6.09	.240	1766				
			.5417E-02	.2133E-03	15.46	14.11
6.89	.271	1913				

TABLE D5-35

SPECIMEN NUMBER: 1T4-259-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 297.0 K
SPECIMEN THICKNESS: 6.17 MM (.243) IN
MAXIMUM STRESS: 179.5 MPA (26.0 KSI)
R-RATIO: .5
FREQUENCY: 230 CPM
CYCLES TO FAILURE: 281 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 56.52 MPA SQRT(M) (51.43 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.26	.089	1				
			.4788E-02	.1885E-03	16.60	15.11
2.80	.110	114				
			.1644E-01	.6474E-03	17.95	16.34
3.11	.123	133				
			.7662E-02	.3017E-03	18.76	17.17
3.34	.132	161				
			.9133E-02	.3595E-03	19.56	17.90
3.68	.145	201				
			.8194E-02	.3226E-03	20.37	19.54
3.93	.155	231				
			.3416E-01	.1345E-02	21.16	19.25
4.27	.168	241				
			.1318E+00	.5190E-02	22.41	20.40
4.93	.194	246				
			.7799E-01	.3070E-02	23.66	21.53
5.32	.210	251				
			.3475E-01	.1368E-02	24.54	22.33
5.71	.225	262				
			.8893E-01	.3500E-02	26.66	24.26
7.31	.288	280				

TABLE D5-36

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN CONFIGURATION:
CONDITION:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:
KIMAX) 100 CYCLES PRIOR TO FAILURE:

LONGITUDINAL
LAB AIR
6.50 MM (.256 IN)
144.7 MPA (21.0 KSI)
ZERO TO TENSION
7063 CYCLES
(NET STRESS GREATER THAN 0.5 PSI)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
5.83	.459	1				
			.1329E-02	.5234E-04	27.42	24.95
6.78	.527	1797				
			.3166E-02	.1247E-03	29.11	26.49
7.40	.583	1742				
			.2159E-02	.8463E-04	30.61	27.86
8.15	.642	2437				
			.2418E-02	.9520E-04	32.12	29.23
8.92	.703	3078				
			.3783E-02	.1489E-03	34.73	31.61
10.92	.860	4134				
			.4601E-02	.1811E-03	37.31	33.99
11.81	.930	4522				
			.4896E-02	.1927E-03	38.76	35.27
12.61	.993	4844				
			.4702E-02	.1851E-03	39.95	36.36
13.23	1.042	5113				
			.8504E-02	.3348E-03	43.41	39.50
14.96	1.328	5967				
			.1372E-01	.5402E-03	47.37	42.83
17.93	1.413	6118				
			.1019E-01	.4088E-03	48.32	43.98
18.58	1.456	6239				
			.1116E-01	.4395E-03	49.36	44.92
19.25	1.516	6370				
			.1676E-01	.6597E-03	50.69	46.13
20.25	1.594	6489				
			.1414E-01	.5565E-03	52.55	47.83
21.78	1.709	6695				
			.1960E-01	.7717E-03	54.62	49.71
22.98	1.809	6825				
			.1626E-01	.6376E-03	56.57	51.48
24.26	1.918	6903				
			.2602E-01	.1024E-02	58.44	53.18
25.43	2.032	7073				
			.2564E-01	.1010E-02	60.76	55.29
27.26	2.147	7216				
			.4770E-01	.1878E-02	63.81	58.07
29.31	2.338	7302				
			.4609E-01	.1813E-02	66.15	60.20
33.19	2.377	7340				
			.5224E-01	.2057E-02	68.85	61.93
34.62	2.490	7395				
			.4719E-01	.1858E-02	70.61	64.26
33.25	2.618	7464				
			.7597E-01	.2991E-02	75.91	69.09
37.66	2.965	7583				
			.8862E-01	.3489E-02	81.64	74.30
39.38	3.094	7617				
			.9778E-01	.3849E-02	86.22	78.46
42.13	3.318	7675				

TABLE D5-37

SPECIMEN NUMBER: [illegible]
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFNED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 5.49 MM (.2533 IN)
MAXIMUM STRESS: 144.8 MPA (21.0 KSI)
R-RATIO: .05
FREQUENCY: 20C CPM
CYCLES TO FAILURE: 7807 CYCLES
K(MAX) & CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN .0 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	5.76	.454	1	.1909E-02	.7516E-04	27.58	25.10
	6.92	.545	1223	.1635E-02	.6436E-04	29.67	26.82
	7.62	.542	1951	.2916E-02	.1148E-03	31.02	29.23
	8.44	.664	2679	.2743E-02	.1080E-03	32.54	29.65
	9.12	.718	3371	.1674E-02	.1527E-03	33.99	31.94
	9.93	.782	3488	.3345E-02	.1317E-03	35.37	32.19
	10.63	.837	3905	.4374E-02	.1722E-03	36.81	33.49
	11.54	.909	4122	.6996E-02	.2754E-03	38.43	34.97
	12.50	.985	4598	.7247E-02	.2869E-03	39.97	36.38
	13.38	1.053	4838	.1079E-01	.4248E-03	41.54	37.82
	14.43	1.136	5032	.1006E-01	.3961E-03	43.14	39.26
	14.35	1.208	5219	.6998E-02	.2519E-03	44.63	40.61
	16.33	1.284	5514	.1598E-01	.7867E-03	46.67	42.47
	17.06	1.414	5690	.1478E-01	.5822E-03	48.73	44.34
	18.08	1.495	5819	.1431E-01	.5864E-03	50.27	45.75
	19.09	1.574	5959	.1844E-01	.7259E-03	51.71	47.06
	20.07	1.644	6094	.1826E-01	.7187E-03	53.06	48.29
	21.77	1.714	6157	.2447E-01	.9616E-03	54.98	50.03
	23.43	1.843	6286	.2971E-01	.1169E-02	57.25	52.11
	24.76	1.949	6377	.4295E-01	.1691E-02	60.54	55.12
F	27.72	2.183	6515	.4944E-01	.1947E-02	64.17	58.48
F	29.69	2.371	6591	.7743E-01	.2891E-02	67.70	61.61
F	31.84	2.507	6652	.5503E-01	.2166E-02	70.72	64.36
F	33.21	2.615	6707	.9154E-01	.3581E-02	73.68	67.07
F	35.04	2.759	6762	.8866E-01	.3494E-02	76.51	69.63
F	36.59	2.881	6777	.1.32E+00	.4663E-02	79.16	72.14
F	37.84	2.987	6837	.1387E+00	.6291E-02	82.54	75.11
F	40.06	3.154	6862	.1513E+00	.5965E-02	86.37	78.56
F	41.57	3.273	6882				
F	43.16	3.398	6894				
F	45.20	3.559	6912				
F	46.76	3.682	6917				
F	48.84	3.846	6932				
F	50.93	4.011	6947				
F	52.48	4.133	6957				
F	54.58	4.297	6967				
F	55.95	4.406	6974				
F	57.98	4.567	6986				
F	60.67	4.779	6993				
F	62.43	4.916	6994				
F	65.63	5.168	6996				
F	67.32	5.301	6994				
F	71.25	5.611	7007				
F	72.38	5.699	7021				

(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)
(NET STRESS GREATER THAN 3.9 FTY)

TABLE D5-38

CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA(K) MPA SQRT(M)	KSI SQRT(IN)
7.29	.287	1	.8692E-03	.2241E-04	16.38	14.91
8.64	.340	2451	.7537E-03	.2967E-04	17.78	16.18
10.07	.396	4340	.8591E-03	.3382E-04	19.02	17.30
11.29	.445	5765	.1099E-02	.4312E-04	20.38	18.55
13.28	.523	7914	.1294E-02	.5094E-04	21.71	19.75
14.91	.571	8921	.1769E-02	.6929E-04	22.57	20.54
15.41	.607	9829	.1688E-02	.6644E-04	23.28	21.12
16.16	.636	9476	.1734E-02	.6825E-04	23.78	21.64
16.94	.667	9928	.1739E-02	.6831E-04	24.37	22.18
17.79	.700	10414	.2677E-02	.1054E-03	25.84	22.79
18.81	.740	10795	.1995E-02	.7855E-04	25.98	23.64
20.48	.806	11628	.2787E-02	.1866E-03	27.03	24.60
21.92	.863	12161	.3082E-02	.1213E-03	28.80	25.49
23.58	.921	12837	.3925E-02	.1945E-03	29.12	26.58
25.37	.999	13143	.3315E-02	.1305E-03	30.22	27.58
26.87	1.058	13595	.4158E-02	.1634E-03	31.18	28.38
28.58	1.122	13987	.4882E-02	.1891E-03	32.17	29.27
30.18	1.185	14321	.5661E-02	.2229E-03	33.17	30.18
31.84	1.254	14629	.6159E-02	.2425E-03	34.05	30.99
33.38	1.302	14829	.6156E-02	.2424E-03	34.89	31.75
34.73	1.367	15097	.8363E-02	.3371E-03	35.86	32.64
36.42	1.434	15295	.7596E-02	.2998E-03	36.81	33.50
38.08	1.496	15503	.9413E-02	.3706E-03	37.73	34.34
39.69	1.561	15678				
			.9518E-02	.3985E-03	38.79	35.30
41.68	1.641	15883	.1421E-01	.5594E-03	39.76	36.18
43.35	1.695	15979	.1257E-01	.4949E-03	40.74	37.08
45.16	1.778	16147	.1291E-01	.5083E-03	41.79	38.03
46.71	1.839	16267	.1449E-01	.5706E-03	42.77	38.93
48.61	1.914	16398	.1666E-01	.6560E-03	43.72	39.79
50.30	1.980	16482	.1782E-01	.7014E-03	44.68	40.66
51.91	2.044	16589	.1898E-01	.7474E-03	45.65	41.54
53.35	2.101	16665	.1919E-01	.7557E-03	46.62	42.42
55.22	2.174	16762	.2024E-01	.7969E-03	47.55	43.28
56.53	2.226	16827	.2728E-01	.1074E-02	48.42	44.06
58.11	2.288	16885				

TABLE D5-39

SPECIMEN NUMBER: 3L3-256-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450 F
SPECIMEN THICKNESS: 0.49 MM (.250 IN)
MAX PUMP STRESS: 217.5 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20
CYCLES TO FAILURE: 3870 CYCLES

K(MAX) 12 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.47	.097	1				
				.9893E-03	.3583E-04	19.19	17.46
	3.02	.119	603	.1659E-02	.6531E-04	21.28	19.37
	3.73	.147	1034	.1629E-02	.6413E-04	23.37	21.27
	4.41	.174	1449	.2194E-02	.8638E-04	25.18	22.92
	5.34	.199	1731	.3819E-02	.1189E-03	27.13	24.69
	5.92	.233	2027	.4851E-02	.1910E-03	27.85	26.43
	6.64	.262	2177	.3598E-02	.1571E-03	30.60	27.85
	7.29	.287	2339	.4646E-02	.1829E-03	32.84	29.18
	8.08	.315	2491	.6303E-02	.2363E-03	33.58	30.56
	8.77	.345	2619	.5484E-02	.2159E-03	34.93	31.78
	9.39	.368	2728	.5233E-02	.2060E-03	36.19	32.94
	10.19	.397	2867	.7581E-02	.2784E-03	37.47	34.19
	10.44	.427	2973	.8499E-02	.3346E-03	38.47	35.34
	11.50	.453	3051	.1284E-01	.5038E-03	39.99	36.39
	12.17	.479	3103	.1344E-01	.9291E-03	41.18	37.47
	12.91	.508	3158	.1233E-01	.4854E-03	42.99	38.75
	13.88	.547	3237	.1405E-01	.5538E-03	43.93	39.97
	14.58	.574	3287	.1432E-01	.5638E-03	45.70	40.95
	15.26	.601	3334	.2259E-01	.8881E-03	46.12	41.97
	16.35	.632	3379	.2642E-01	.1040E-02	47.31	43.05
	16.94	.663	3403	.2674E-01	.1053E-02	48.56	44.19
	17.75	.699	3434	.2350E-01	.9283E-03	49.72	45.25
	18.48	.727	3464	.3233E-01	.1261E-02	50.74	46.17
	19.20	.756	3487				
				.3144E-01	.1236E-02	51.97	47.29
	20.23	.797	3520	.3824E-01	.1497E-02	53.20	48.41
	21.10	.827	3543	.3826E-01	.1506E-02	54.12	49.25
	21.61	.851	3556	.5607E-01	.2239E-02	55.20	50.24
	22.63	.891	3574	.4433E-01	.1745E-02	56.51	51.43
	23.61	.929	3590	.5478E-01	.2157E-02	57.67	52.48
	24.43	.962	3611	.5737F-01	.2259E-02	59.21	53.88
F	26.33	1.035	3639	.5888E-01	.2888E-02	61.16	55.66
F	27.56	1.085	3669	.5927E-01	.2333E-02	62.64	57.00
F	28.45	1.120	3684	.8467E-01	.3333E-02	63.95	58.19
F	29.72	1.170	3699	.8467E-01	.3333E-02	65.47	59.58
F	30.99	1.220	3714	.1103E+00	.4667E-02	67.24	61.22
F	32.77	1.290	3729	.1103E+00	.4667E-02	69.36	63.12
F	34.54	1.360	3744	.1143E+00	.4500E-02	71.76	64.66
F	35.69	1.405	3754	.1397E+00	.5500E-02	72.52	66.00
F	37.18	1.464	3764	.1651E+00	.6500E-02	74.27	67.59
F	38.77	1.525	3774	.2032E+00	.8000E-02	76.37	69.50
F	40.77	1.605	3784	.2286E+00	.9000E-02	78.18	71.15
F	41.91	1.650	3789	.2540E+00	.1000E-01	79.95	72.40
F	43.18	1.700	3794	.2540E+00	.1000E-01	81.30	73.71
F	44.45	1.750	3799	.2794E+00	.1100E-01	82.52	75.09
F	45.45	1.805	3804	.4064E+00	.1600E-01	84.47	76.87
F	47.54	1.885	3809	.4318E+00	.1700E-01	86.87	79.05
F	50.04	1.970	3814				
F	51.94	2.045	3817				

(NET STRESS GREATER THAN 0.9 FTY)

TABLE D5-40

SPECIMEN NUMBER: 4L3-259-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: [illegible]
SPECIMEN THICKNESS: 6.32 MM (.2490 IN)
MAXIMUM STRESS: 307.2 MPA (44.6 KSI)
R-RATIO: [illegible]
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1326 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.51	.099	1	.2666E-02	.1050E-03	28.03	25.51
	3.34	.132	313	.4137E-02	.1629E-03	31.71	28.86
	4.14	.163	587	.6261E-02	.2465E-03	34.96	31.82
	4.95	.195	636	.7374E-02	.2903E-03	37.88	34.48
	5.67	.223	734	.8275E-02	.3258E-03	40.53	36.88
	6.53	.257	830	.1269E-01	.4996E-03	43.64	39.71
	7.81	.308	923	.1949E-01	.7671E-03	46.29	42.13
	8.28	.326	956	(NET STRESS GREATER THAN 0.9 FTY)			
	9.82	.387	1049	(NET STRESS GREATER THAN 0.9 FTY)			
	10.65	.419	1092	(NET STRESS GREATER THAN 0.9 FTY)			
	11.56	.455	1133	(NET STRESS GREATER THAN 0.9 FTY)			
	12.34	.486	1160	(NET STRESS GREATER THAN 0.9 FTY)			
	12.97	.511	1199	(NET STRESS GREATER THAN 0.9 FTY)			
F	13.33	.525	1212	(NET STRESS GREATER THAN 0.9 FTY)			
F	14.35	.565	1242	(NET STRESS GREATER THAN 0.9 FTY)			
F	15.62	.615	1262	(NET STRESS GREATER THAN 0.9 FTY)			
F	16.89	.665	1277	(NET STRESS GREATER THAN 0.9 FTY)			
F	17.91	.705	1287	(NET STRESS GREATER THAN 0.9 FTY)			
F	18.67	.735	1294	(NET STRESS GREATER THAN 0.9 FTY)			
F	20.45	.805	1302	(NET STRESS GREATER THAN 0.9 FTY)			
F	21.46	.845	1307	(NET STRESS GREATER THAN 0.9 FTY)			
F	22.73	.895	1312	(NET STRESS GREATER THAN 0.9 FTY)			
F	24.38	.960	1316	(NET STRESS GREATER THAN 0.9 FTY)			
F	26.03	1.025	1319	(NET STRESS GREATER THAN 0.9 FTY)			
F	27.18	1.070	1321	(NET STRESS GREATER THAN 0.9 FTY)			
F	29.21	1.150	1323	(NET STRESS GREATER THAN 0.9 FTY)			
F	30.48	1.200	1324	(NET STRESS GREATER THAN 0.9 FTY)			
F	31.88	1.255	1325	(NET STRESS GREATER THAN 0.9 FTY)			
F	33.78	1.330	1326				

TABLE D5-41

SPECIMEN NUMBER: 2T6-293-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: T-S
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 588.0 K
SPECIMEN THICKNESS: 6.44 MM (.2534 IN)
MAXIMUM STRESS: 109.0 MPA (15.8 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 13593 CYCLES

KMAX: 516 CYCLES PRIOR TO FAILURE: 42.21 MPA SQRT(M) (38.42 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.99	.275	1				
			.4832E-03	.1932E-04	15.68	14.27
7.59	.299	1239				
			.5242E-03	.2064E-04	16.23	14.86
8.20	.323	2414				
			.8498E-03	.3346E-04	17.05	15.52
9.20	.356	3354				
			.1104E-02	.4348E-04	17.87	16.27
9.89	.389	4199				
			.1238E-02	.4874E-04	18.79	17.10
10.97	.432	5232				
			.1350E-02	.5315E-04	19.41	17.78
11.45	.455	5661				
			.1733E-02	.6822E-04	20.18	18.36
12.46	.491	5987				
			.2145E-02	.8445E-04	20.87	19.00
13.28	.523	6331				
			.2563E-02	.1009E-03	21.67	19.63
14.17	.558	6713				
			.2454E-02	.9661E-04	22.19	20.19
14.79	.581	6966				
			.2526E-02	.9943E-04	22.84	20.79
15.86	.625	7388				
			.3709E-02	.1460E-03	23.55	21.43
16.60	.654	7587				
			.4575E-02	.1801E-03	24.44	22.24
17.30	.721	7959				
			.4966E-02	.1955E-03	25.31	23.05
19.08	.751	8115				
			.4175E-02	.1644E-03	26.14	23.79
21.63	.812	8407				
			.4145E-02	.1222E-03	27.29	24.84
22.49	.885	8714				
			.8681E-02	.1418E-03	28.51	25.94
24.34	.958	8927				
			.5644E-02	.2221E-03	29.47	26.78
25.38	.999	9111				
			.1771E-01	.6973E-03	31.34	27.65
27.36	1.077	9229				
			.1074E-01	.4233E-03	31.46	29.72
29.22	1.151	9434				
			.1399E-01	.5513E-03	32.68	29.76
31.09	1.222	9535				
			.2188E-01	.8620E-03	33.86	32.82
33.21	1.308	9634				
			.1403E-01	.5511E-03	35.17	31.94
35.25	1.388	9761				
			.2076E-01	.7994E-03	36.18	32.91
36.89	1.452	9862				
			.2106E-01	.8292E-03	37.24	33.93
39.13	1.540	9949				
			.3422E-01	.9984E-03	38.49	35. 2
41.07	1.617	10025				
			.3598E-01	.1416E-02	39.57	34.01
42.94	1.691	10077				

TABLE D5-42

SPECIMEN NUMBER: T73-256-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.40 MM (.252 IN)
MAXIMUM STRESS: 137.9 MPA (31.5 KSI)
R-RATIO: .15
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2569 CYCLES
K(MAX) 68 CYCLES PRIOR TO FAILURE: 57.12 MPA SQRT(M) (51.99 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.37	.093	1				
	3.11	.122	697	.1359E-02	.4616E-04	19.14	17.42
	3.90	.154	1221	.1505E-02	.5926E-04	21.66	19.70
	4.70	.185	1513	.2727E-02	.1176E-03	23.99	21.83
	5.29	.208	1669	.1043E-02	.1511E-03	25.86	23.53
	5.99	.236	1785	.5939E-02	.2378E-03	27.49	25.01
	6.85	.270	1912	.6763E-02	.2661E-03	29.32	26.69
	7.52	.296	2005	.7265E-02	.2869E-03	31.04	28.24
	8.31	.327	2084	.9855E-02	.3885E-03	32.58	29.65
	8.90	.350	2134	.1199E-01	.4720E-03	33.98	31.72
	9.48	.373	2183	.1174E-01	.4622E-03	35.13	31.97
	10.23	.403	2233	.1514E-01	.5960E-03	36.39	33.12
	11.01	.433	2267	.2275E-01	.8956E-03	37.81	34.40
	11.56	.455	2298	.1774E-01	.6984E-03	38.97	35.47
	12.15	.478	2319	.2624E-01	.1112E-02	39.96	36.37
	12.85	.506	2339	.4374E-01	.1722E-02	41.06	37.36
	13.56	.534	2352	.4176E-01	.1644E-02	42.22	38.42
F	14.35	.565	2373	.3774E-01	.1486E-02	43.43	39.52
F	15.24	.600	2413	.2963E-01	.1167E-02	44.76	41.72
F	16.84	.655	2433	.4657E-01	.1833E-02	46.49	42.31
F	18.03	.710	2454	.6652E-01	.2619E-02	48.55	44.18
F	19.30	.760	2478	.5292E-01	.2083E-02	50.45	45.91
F	20.57	.810	2493	.8467E-01	.3333E-02	52.21	47.51
F	21.46	.845	2501	.1111E+00	.4375E-02	53.67	48.84

TABLE D5-43

SPECIMEN NUMBER: T74-258-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.32 MM (.249 IN)
MAXIMUM STRESS: 137.9 MPA (20.0 KSI)
R-RATIO: .15
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 518 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 3.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.00	.118	1				
	3.62	.143	93	.1273E-01	.5012E-03	29.82	27.14
	4.29	.169	197	.6518E-02	.2756E-03	32.50	29.66
	4.99	.196	307	.6449E-02	.2539E-03	35.27	32.16
	5.46	.215	363	.1187E-01	.4674E-03	37.40	34.04
	6.46	.254	371	.3711E-01	.1461E-02	40.04	36.44
	7.03	.277	386	.3512E-01	.1391E-02	42.60	38.77
F	12.56	.495	424	.1317E+00	.5186E-02	51.43	46.78
F	13.72	.540	459	(NET STRESS GREATER THAN 3.9 FTY)			
F	16.51	.650	474	(NET STRESS GREATER THAN 3.9 FTY)			
F	18.41	.725	491	(NET STRESS GREATER THAN 3.9 FTY)			
F	21.57	.910	501	(NET STRESS GREATER THAN 3.9 FTY)			
F	24.61	.969	513	(NET STRESS GREATER THAN 3.9 FTY)			
F	26.92	1.060	515	(NET STRESS GREATER THAN 3.9 FTY)			
F	29.34	1.155	516	(NET STRESS GREATER THAN 3.9 FTY)			
F	31.52	1.240	517	(NET STRESS GREATER THAN 3.9 FTY)			

TABLE D5-44

SPECIMEN NUMBER= 2L2-2SA-2
ALLOY TYPE= 2124-T851
SPECIMEN ORIENTATION= LONGITUDINAL
CONSTRAINT= UNRIVETTED
ENVIRONMENT= LAB AIR
TEST TEMPERATURE= 450 K
SPECIMEN THICKNESS= 6.40 MM (.2520 IN)
MAXIMUM STRESS= 217.1 MPA (31.5 KSI)
R-RATIO= .10
FREQUENCY= 20 CPM
CYCLES TO FAILURE= 13346 CYCLES
K(MAX) 28 CYCLES PRIOR TO FAILURE= (NET STRESS GREATER THAN 1.0 KSI)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.72	.107	1				
	3.37	.133	1972	.3267E-03	.1286E-04	12.62	9.66
	4.11	.157	3921	.3414E-03	.1344E-04	11.68	10.63
	4.66	.184	5143	.4477E-03	.1763E-04	12.77	11.63
	5.46	.215	6151	.8151E-03	.3209E-04	13.69	12.46
	6.01	.237	6819	.8465E-03	.3332E-04	14.59	13.28
	6.58	.259	7397	.9071E-03	.3571E-04	15.27	13.90
	7.12	.281	7917	.1186E-02	.4669E-04	15.97	14.49
	7.62	.300	8274	.1415E-02	.5571E-04	16.54	15.05
	8.22	.324	8652	.1569E-02	.6178E-04	17.27	15.66
	8.84	.348	9042	.2116E-02	.8329E-04	18.21	16.39
	9.37	.369	9334	.2167E-02	.8493E-04	18.75	17.06
	10.30	.406	9837	.1854E-02	.7692E-04	19.32	17.58
	11.00	.433	9864	.2703E-02	.1.64E-03	19.91	18.12
	11.62	.457	10188	.2779E-02	.1094E-03	20.69	18.68
	12.35	.486	10394	.2764E-02	.1088E-03	21.14	19.24
	13.14	.517	10521	.4108E-02	.1617E-03	21.77	19.81
	14.40	.567	10771	.5464E-02	.2151E-03	22.66	20.61
	15.13	.596	10927	.5332E-02	.2099E-03	23.52	21.40
	15.89	.626	11062	.4167E-02	.1641E-03	24.24	21.98
	16.33	.643	11179	.4435E-02	.1825E-03	24.51	22.31
	17.03	.671	11407	.4558E-02	.2594E-03	25.37	23.16
	18.79	.740	11537	.3478E-02	.1731E-03	26.27	23.91
	19.80	.779	11669	.4234E-02	.2454E-03	27.59	24.97
	21.55	.849	11746	.3944E-02	.1914E-03	27.84	25.15
	21.43	.944	11842	.4234E-02	.1837E-03	28.22	25.69
	22.11	.471	11911	.4516E-02	.1744E-03	28.76	24.19
	23.65	.432	11994	.2479E-02	.2944E-03	29.18	25.56
	23.17	.912	12032	.1434E-01	.5618E-03	29.65	26.89
	24.13	.950	12081	.1534E-01	.5921E-03	30.06	27.15
	24.79	.976	12146	.1074E-01	.4234E-03	30.59	27.84
F	25.51	1.005	12276	.1167E-01	.4515E-03	31.71	28.53
F	26.19	1.031	12394	.1732E-01	.6814E-03	32.42	29.51
F	26.46	1.161	12466	.1587E-01	.6245E-03	32.44	30.43
F	27.86	1.215	12564	.1746E-01	.6879E-03	34.29	31.20
F	32.38	1.275	12626	.1035E-01	.7508E-03	35.19	32.43
F	34.64	1.363	12716	.3499E-01	.1367E-02	36.77	33.18
F	35.81	1.411	12764	.2117E-01	.8333E-03	37.38	34.02
F	37.46	1.475	12826	.2752E-01	.1083E-02	38.26	34.92
F	39.24	1.546	12896	.2967E-01	.1167E-02	39.30	35.76
F	41.27	1.626	12976	.1811E-01	.1503E-02	40.29	36.67
F	43.83	1.725	13076	.3246E-01	.1278E-02	41.62	37.98
F	45.47	1.791	13096	.2223E-01	.8750E-03	43.03	39.16
F	48.45	1.935	13146	.4192E-01	.1611E-02	44.66	41.66
F	51.94	2.045	13216	.9311E-01	.3667E-02	46.62	42.42
F	53.72	2.115	13246				
F	56.51	2.225	13275				
F	57.66	2.271	13294				
F	58.67	2.311	13314				
F	59.44	2.340	13311				
F	60.83	2.395	13321				

(NET STRESS GREATER THAN 1.0 KSI)
(NET STRESS GREATER THAN 1.0 KSI)
(NET STRESS GREATER THAN 1.0 KSI)
(NET STRESS GREATER THAN 1.0 KSI)
(NET STRESS GREATER THAN 1.0 KSI)
(NET STRESS GREATER THAN 1.0 KSI)

TABLE D5-45

SPECIMEN NUMBER: AL3-250-3
ALLOY TYPE: 2124-T851
SPECIMEN CONFIGURATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 410.9 K
SPECIMEN THICKNESS: 6.32 MM (.249 IN)
MAXIMUM STRESS: 307.5 MPA (44.6 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 2624 CYCLES
KMAX: 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	3.32	.119	1				
	3.65	.144	447	.1283E-02	.5051E-04	15.74	14.33
	4.40	.173	913	.1768E-02	.6964E-04	17.29	15.74
	5.11	.231	1138	.3161E-02	.1244E-03	18.88	17.11
	5.67	.223	1295	.3834E-02	.1510E-03	20.82	18.22
	6.39	.256	1450	.4102E-02	.1615E-03	21.15	19.25
	7.98	.279	1624	.4211E-02	.1658E-03	22.36	20.35
	7.91	.312	1724	.8589E-12	.3350E-03	23.65	21.52
	8.82	.347	1802	.1128E-01	.4442E-03	24.99	22.74
	10.12	.399	1891	(NET STRESS GREATER THAN 0.9 FTY)			
	10.59	.415	1941	(NET STRESS GREATER THAN 0.9 FTY)			
	11.48	.449	1979	(NET STRESS GREATER THAN 0.9 FTY)			
	12.23	.481	2017	(NET STRESS GREATER THAN 0.9 FTY)			
	13.11	.516	2059	(NET STRESS GREATER THAN 0.9 FTY)			
	13.71	.540	2079	(NET STRESS GREATER THAN 0.9 FTY)			
	14.22	.560	2098	(NET STRESS GREATER THAN 0.9 FTY)			
F	15.97	.629	2134	(NET STRESS GREATER THAN 0.9 FTY)			
F	17.02	.670	2173	(NET STRESS GREATER THAN 0.9 FTY)			
F	18.16	.715	2224	(NET STRESS GREATER THAN 0.9 FTY)			
F	19.05	.750	2254	(NET STRESS GREATER THAN 0.9 FTY)			
F	20.07	.790	2284	(NET STRESS GREATER THAN 0.9 FTY)			
F	21.34	.840	2314	(NET STRESS GREATER THAN 0.9 FTY)			
F	22.96	.900	2334	(NET STRESS GREATER THAN 0.9 FTY)			
F	24.38	.945	2354				
F	25.15	.990	2368	(NET STRESS GREATER THAN 0.9 FTY)			
F	27.67	1.050	2384	(NET STRESS GREATER THAN 0.9 FTY)			
F	27.86	1.085	2394	(NET STRESS GREATER THAN 0.9 FTY)			
F	28.61	1.139	2404	(NET STRESS GREATER THAN 0.9 FTY)			
F	29.84	1.175	2409	(NET STRESS GREATER THAN 0.9 FTY)			
F	31.24	1.230	2414	(NET STRESS GREATER THAN 0.9 FTY)			
F	32.64	1.285	2420	(NET STRESS GREATER THAN 0.9 FTY)			
F	33.91	1.335	2421	(NET STRESS GREATER THAN 0.9 FTY)			
F	34.92	1.375	2422	(NET STRESS GREATER THAN 0.9 FTY)			
F	37.38	1.460	2423	(NET STRESS GREATER THAN 0.9 FTY)			

TABLE D5-46

SPECIMEN NUMBER: 2T1-256-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 65±5 F
SPECIMEN THICKNESS: 6.40 MM (.2520 IN)
MAXIMUM STRESS: 217.3 MPA (31.6 KSI)
R-RATIO: .10
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 9151 CYCLES
K(MAX) 16 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 1.0 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.57	.101	1				
	3.74	.147	2555	.4564E-03	.1795E-04	10.02	9.05
	5.07	.200	4259	.7818E-03	.3078E-04	12.74	11.63
	5.77	.227	4871	.1151E-02	.4526E-04	14.10	12.91
	6.23	.245	5168	.1535E-02	.6044E-04	14.93	13.59
	6.96	.273	5682	.1771E-02	.6969E-04	15.64	14.23
	7.51	.297	6041	.2305E-02	.9073E-04	16.40	14.92
	9.11	.359	6695	.2493E-02	.9238E-04	17.61	16.71
	9.67	.381	6866	.3269E-02	.1285E-03	18.70	17.02
	10.43	.411	7042	.3534E-02	.1391E-03	19.36	17.61
	11.07	.436	7253	.3818E-02	.1503E-03	20.03	18.23
	11.69	.460	7417	.3787E-02	.1491E-03	20.61	18.76
	12.29	.484	7569	.4111E-02	.1619E-03	21.19	19.28
	13.11	.516	7783	.5991E-02	.2752E-03	21.81	19.85
	13.82	.544	7809	.5533E-02	.2178E-03	22.46	20.43
	14.57	.574	7876	.1084E-01	.4268E-03	23.07	21.00
	15.57	.613	7999	.8252E-02	.3248E-03	23.78	21.64
	16.71	.658	8139	.7146E-02	.2812E-03	24.64	22.42
F	17.02	.670	8203	.4862E-02	.1914E-03	25.23	22.93
F	17.65	.695	8271	.9334E-02	.3676E-03	25.56	23.26
F	18.54	.730	8371	.8898E-02	.3500E-03	26.14	23.79
F	19.13	.753	8471	.1651E-01	.6500E-03	27.08	24.64
F	20.19	.795	8471	.1733E-01	.6824E-03	28.35	25.40
F	22.10	.870	8541	.1814F-01	.7143E-03	29.45	26.80
F	23.37	.920	8651	.1647E-01	.6251E-03	30.15	27.39
F	24.00	.945	8691	.2222E-01	.8750E-03	30.82	27.98
F	24.89	.980	8731	.4762E-01	.1875E-02	31.54	28.73
F	26.82	1.055	8771	.5080E-01	.2000E-02	32.92	29.97
F	28.87	1.136	8811	.3387E-01	.1333E-02	33.79	30.75
F	29.84	1.175	8841	.2540E-01	.1000E-02	34.59	31.48
F	31.37	1.235	8931	.6773E-01	.2667E-02	35.70	32.49
F	33.43	1.316	8931	.3525E-01	.1750E-02	36.91	33.59
F	35.31	1.390	8951	.7112E-01	.2800E-02	38.03	34.61
F	37.64	1.482	8976	.3175E-01	.1250E-02	38.76	35.27
F	37.72	1.485	8996	.5080E-01	.2000E-02	39.31	35.80
F	38.99	1.535	9021	.7622E-01	.3000E-02	40.17	36.56
F	40.51	1.595	9041	.4265E-01	.1750E-02	41.13	37.43
F	42.16	1.660	9061	.1131E+00	.4333E-02	42.61	38.78
F	45.47	1.790	9091	.1524E+00	.6000E-02	44.29	40.31
F	47.75	1.880	9115	.1524E+00	.6000E-02	45.47	41.35
F	49.28	1.940	9115	.1411E+00	.5556E-02	46.24	42.12
F	50.65	1.994	9125		(NET STRESS GREATER THAN 1.0 FTY)		
F	51.82	2.040	9133		(NET STRESS GREATER THAN 1.0 FTY)		
F	52.72	2.115	9137				

TABLE D5-47

SPECIMEN NUMBER: 2T1-259-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 6.43 MM (.2530 IN)
MAXIMUM STRESS: 307.6 MPA (44.6 KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 2013 CYCLES

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.64	.104	1				
	3.17	.125	567	.1124E-02	.4426E-04	14.56	13.25
	3.88	.153	815	.2063E-02	.1127E-03	16.19	14.73
	4.77	.188	1026	.4183E-02	.1647E-03	17.93	16.32
	5.35	.211	1135	.7395E-02	.2911E-03	19.39	17.65
	6.45	.254	1246	.7888E-02	.3071E-03	20.95	19.17
	7.29	.287	1350	.8108E-02	.3192E-03	22.62	20.58
	8.18	.319	1465	.6991E-02	.2752E-03	23.94	21.79
	8.86	.349	1517	.1468E-01	.5750E-03	25.14	22.88
	9.67	.381	1585	(NET STRESS GREATER THAN 0.0 FTY)			
	10.38	.409	1683	(NET STRESS GREATER THAN 0.0 FTY)			
	11.12	.438	1743	(NET STRESS GREATER THAN 0.0 FTY)			
	11.89	.468	1791	(NET STRESS GREATER THAN 0.0 FTY)			
	12.69	.500	1834	(NET STRESS GREATER THAN 0.0 FTY)			
	13.79	.543	1877	(NET STRESS GREATER THAN 0.0 FTY)			
	14.41	.567	1910	(NET STRESS GREATER THAN 0.0 FTY)			
F	17.02	.670	1930	(NET STRESS GREATER THAN 0.0 FTY)			
F	18.06	.711	1963	(NET STRESS GREATER THAN 0.0 FTY)			
F	20.78	.818	1988	(NET STRESS GREATER THAN 0.0 FTY)			
F	21.97	.865	1998	(NET STRESS GREATER THAN 0.0 FTY)			
F	23.11	.910	2010	(NET STRESS GREATER THAN 0.0 FTY)			
F	25.48	1.000	2012	(NET STRESS GREATER THAN 0.0 FTY)			

TABLE D5-48

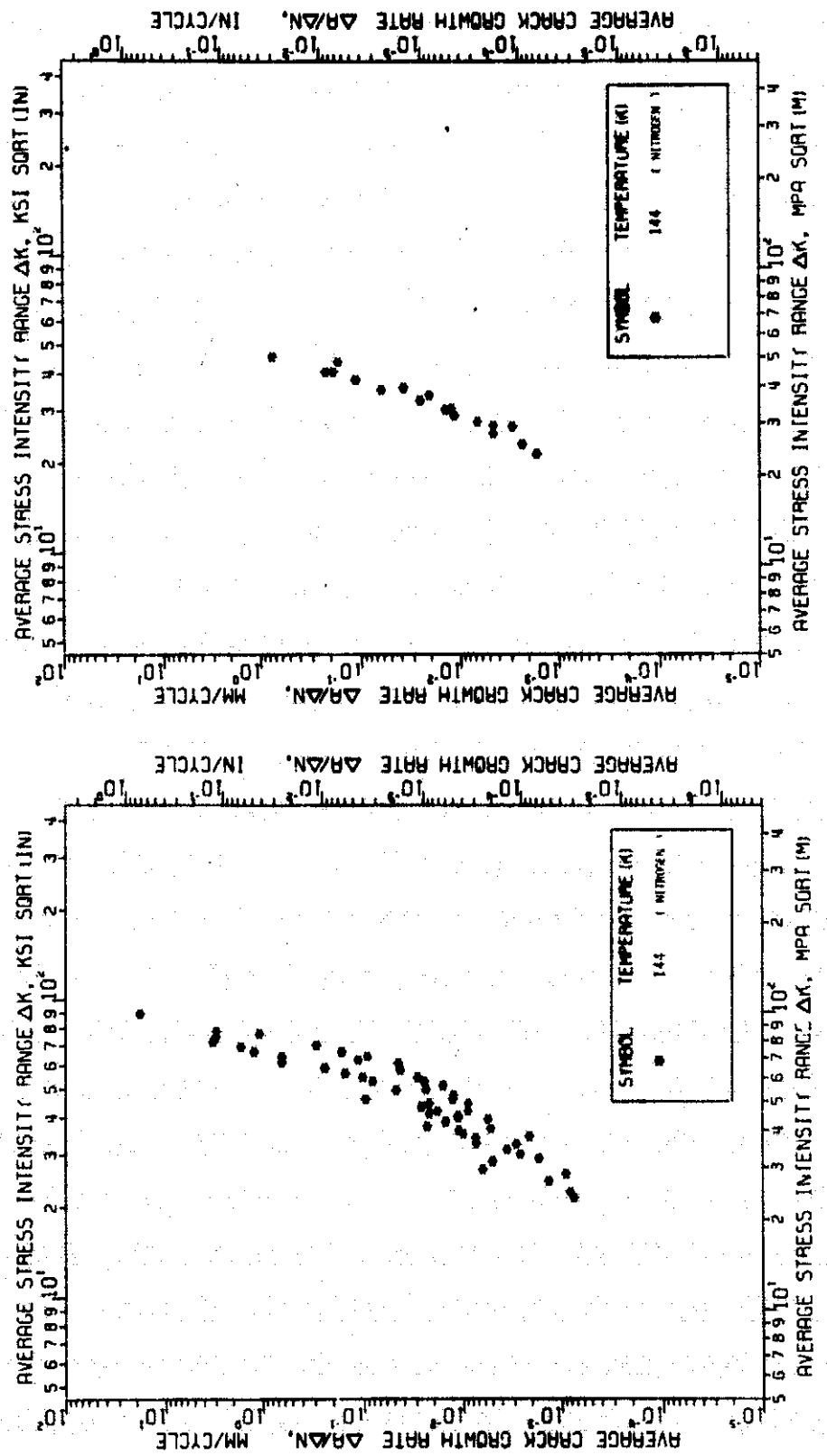
SPECIMEN NUMBER: 1L1-293-6
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNBUTTERED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 672. F
SPECIMEN THICKNESS: 6.53 MM (.2570 IN)
MAXIMUM STRESS: 144.8 MPA (21.0 KSI)
R-RATIO: .05
FREQUENCY: 280 CPM
CYCLES TO FAILURE: 8499 CYCLES
K(MAX) 474 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 7.9 FTY)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A1/DELTA(N) MM/CYCLE	DELTA(A1/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
5.69	.448	1				
6.51	.513	1043	.1980E-02	.6219E-04	27.65	24.62
7.24	.570	1636	.2569E-02	.1011E-03	28.74	26.16
8.06	.634	2222	.2699E-02	.1047E-03	30.35	27.62
1..28	.709	3421	.3707E-02	.1459E-03	33.32	31.33
11.03	.869	3761	.4416E-02	.1739E-03	36.05	32.80
11.76	.926	4018	.5685E-02	.2238E-03	37.35	33.99
12.48	.982	4247	.6243E-02	.2457E-03	38.59	35.12
13.25	1.043	4471	.6650E-02	.2617E-03	39.84	36.26
14.02	1.104	4718	.6918E-02	.2688E-03	41.12	37.42
14.70	1.157	4894	.7662E-02	.3309E-03	42.29	38.49
15.25	1.201	5056	.6927E-02	.2688E-03	43.28	39.38
16.31	1.284	5268	.1134E-01	.4147E-03	44.55	41.65
17.52	1.379	5524	.4797E-02	.3444E-01	46.33	42.16
18.97	1.493	5817	.1024E-01	.4033E-03	48.38	44.12
20.63	1.624	6133	.1120E-01	.4411E-03	50.78	45.18
22.31	1.757	6332	.1474E-01	.5789E-03	53.28	44.49
24.41	1.922	6573	.1744E-01	.6892E-03	56.15	51.10
26.75	2.108	6719	.1832E-01	.7211E-03	58.78	53.48
27.28	2.148	6857	.2214E-01	.8716E-03	61.01	55.51
30.08	2.369	7082	.2492E-01	.9809E-03	64.40	54.41
31.17	2.454	7229	.1737E-01	.6721E-03	67.54	61.47
34.23	2.696	7392	.3343E-01	.1316E-02	71.01	64.62
36.47	2.872	7512	.3747E-01	.1475E-02	75.67	69.86
39.09	3.078	7641	.3992E-01	.1572E-02	80.21	72.99
43.36	3.412	7828	.4594E-01	.1809E-02	87.19	79.35
44.11	3.473	7857	(NET STRESS GREATER THAN 7.9 FTY)			
44.68	3.518	7955	(NET STRESS GREATER THAN 7.9 FTY)			
44.01	3.469	8025	(NET STRESS GREATER THAN 7.9 FTY)			

TABLE D5-49

SPECIMEN NUMBER: 2T4-253-4
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 6.48 MM (.2550 IN)
MAXIMUM STRESS: 144.8 MPA (21.0 KSI)
R-RATIO: .05
FREQUENCY: 20D CPM
CYCLES TO FAILURE: 7306 CYCLES
K(MAX) 237 CYCLES PRIOR TO FAILURE (NET STRESS GREATER THAN 0.9 FTY)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
6.08	.479	1	.1149E-02	.6493E-04	27.95	25.44
6.96	.548	1038	.2642E-02	.1040E-03	29.82	27.14
7.84	.617	1721	.3979E-02	.1566E-03	31.59	24.74
8.69	.684	2146	.1586E-02	.6242E-04	32.70	29.76
8.99	.708	2522	.4521E-02	.1781E-03	33.69	30.66
9.73	.766	2852	.6876E-02	.1920E-03	35.44	32.25
10.89	.858	3327	.3360E-02	.1323E-03	36.69	33.39
11.14	.877	3477	.5964E-02	.2344E-03	37.63	34.25
11.97	.943	3756	.5543E-02	.2182E-03	38.87	35.37
12.59	.991	3977	.5891E-02	.2319E-03	40.08	36.48
13.42	1.057	4261	.9662E-02	.3765E-03	41.40	37.68
14.19	1.117	4421	.6393E-02	.2122E-03	42.87	39.01
15.24	1.230	4811	.9612E-02	.3190E-03	44.58	40.58
16.36	1.288	5071	.8479E-02	.3338E-03	46.96	42.74
18.28	1.439	5524	.1725E-01	.6791E-03	49.50	45.04
19.66	1.548	5684	.1173E-01	.4853E-03	51.18	46.58
20.49	1.614	5819	.1444E-01	.5699E-03	52.51	47.79
21.42	1.686	5947	.1257E-01	.4951E-03	53.66	48.83
21.86	1.721	6029	.1276E-01	.1290E-02	54.94	50.00
23.25	1.831	6114	.1719E-01	.6765E-03	57.17	52.03
24.79	1.952	6294	.4287E-01	.1659E-02	59.43	54.09
26.27	2.063	6367	.3383E-01	.1331E-02	61.39	55.87
27.32	2.151	6429	.3062E-01	.1205E-02	63.26	57.56
28.57	2.250	6511	.3287E-01	.1294E-02	65.17	59.27
29.67	2.336	6578	.4723E-01	.1859E-02	67.19	61.15
31.11	2.451	6639	.4923E-01	.1939E-02	69.96	63.67
33.01	2.599	6716	.4447E-01	.1751E-02	74.50	67.80
36.34	2.862	6866	.1051E+00	.4137E-02	80.23	73.01
39.18	3.085	6923	.8642E-01	.3402E-02	84.91	77.29
41.04	3.231	6951	.1043E+00	.4265E-02	90.04	81.95
43.91	3.457	7016	(NET STRESS GREATER THAN 0.9 FTY)			
46.42	3.655	7058	(NET STRESS GREATER THAN 0.9 FTY)			
48.68	3.812	7093				



Alloy: 2124-T851 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 6.35 mm (.250 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D5-1

(a) Longitudinal

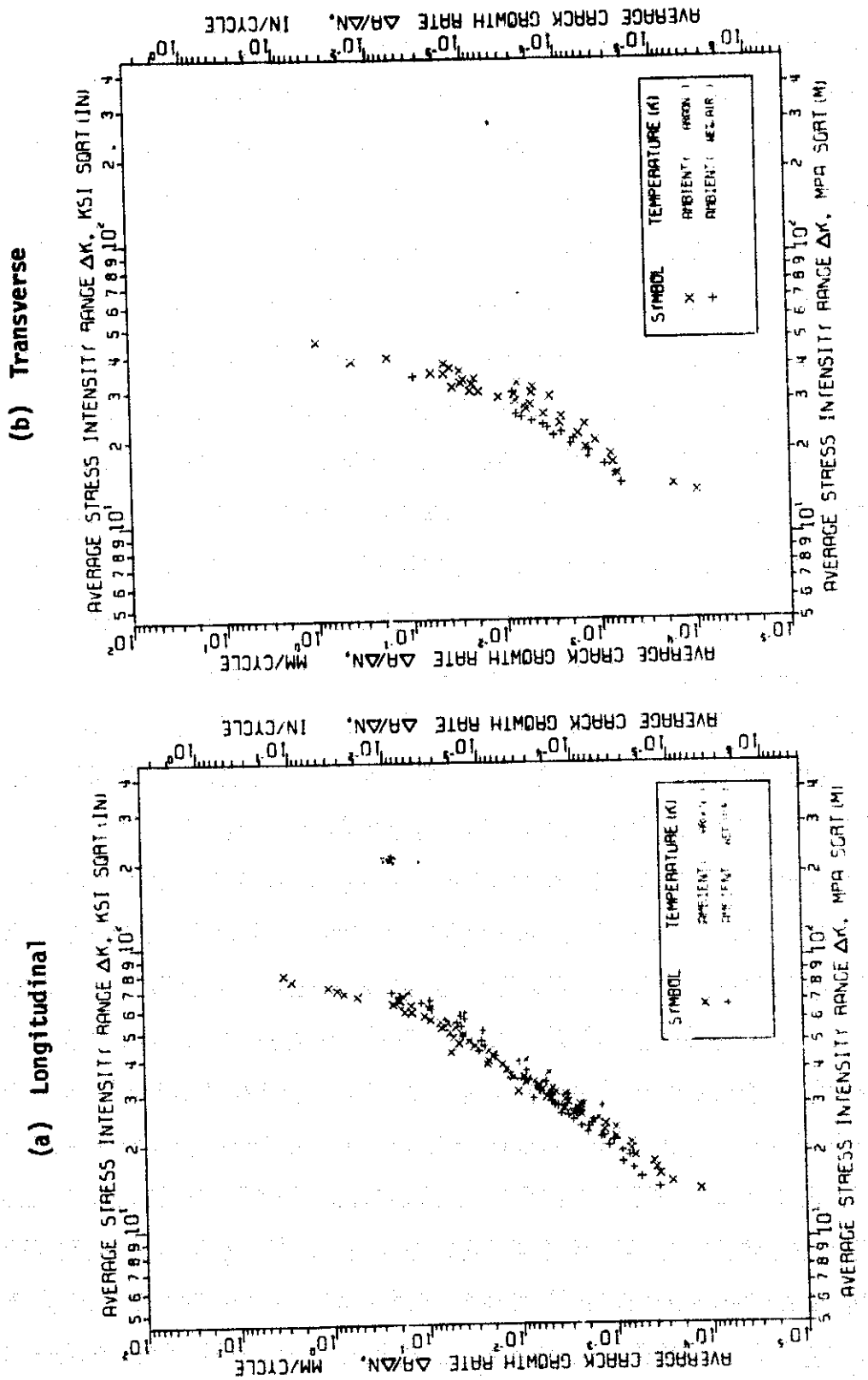
(b) Transverse

Alloy: 2124-T851 **Stress Ratio:** .50 **Frequency:** 200 cpm

Thickness: 6.35 mm (.250 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D5-2

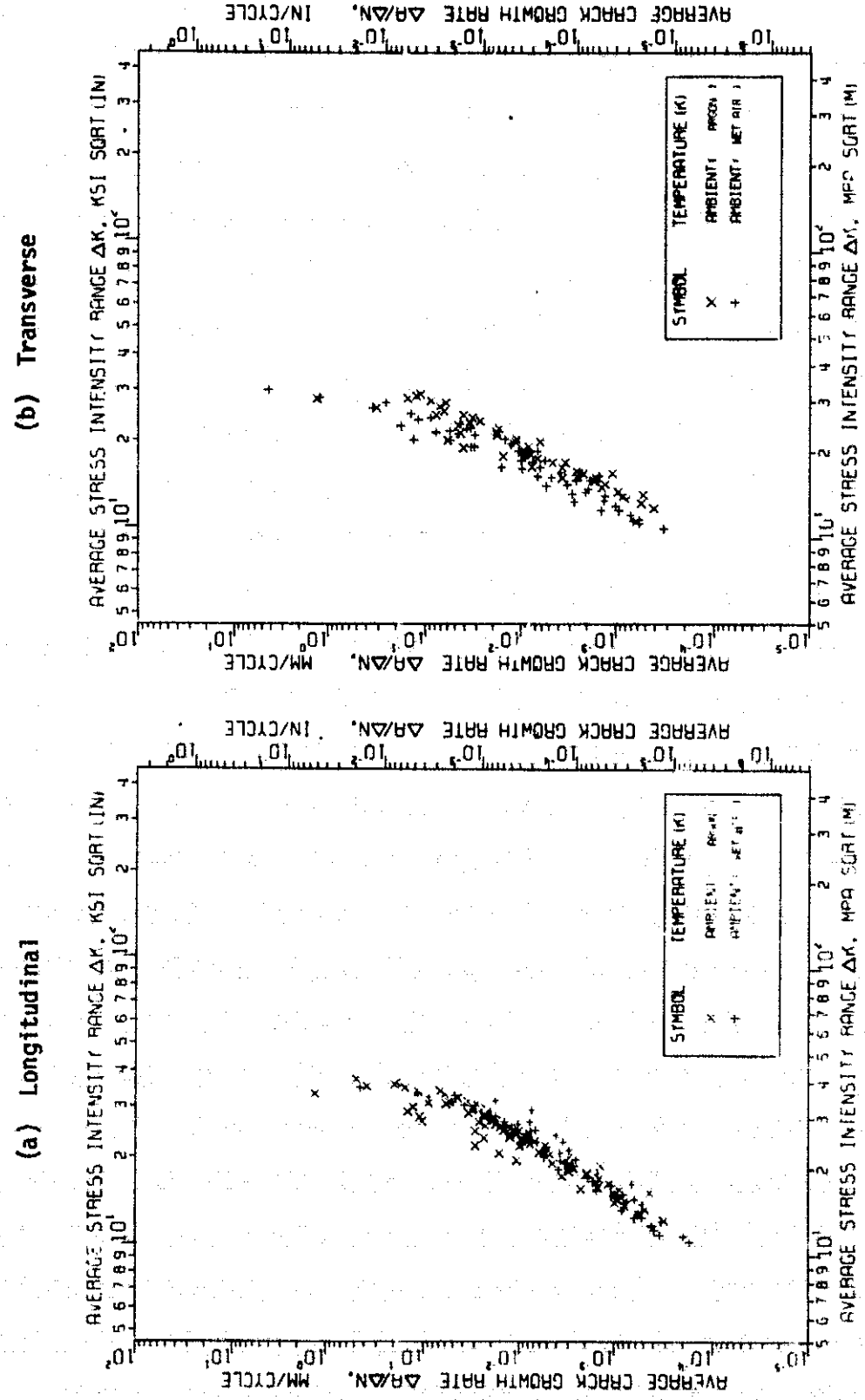


Alloy: 2124-T851 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 6.35 mm (.250 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D5-3

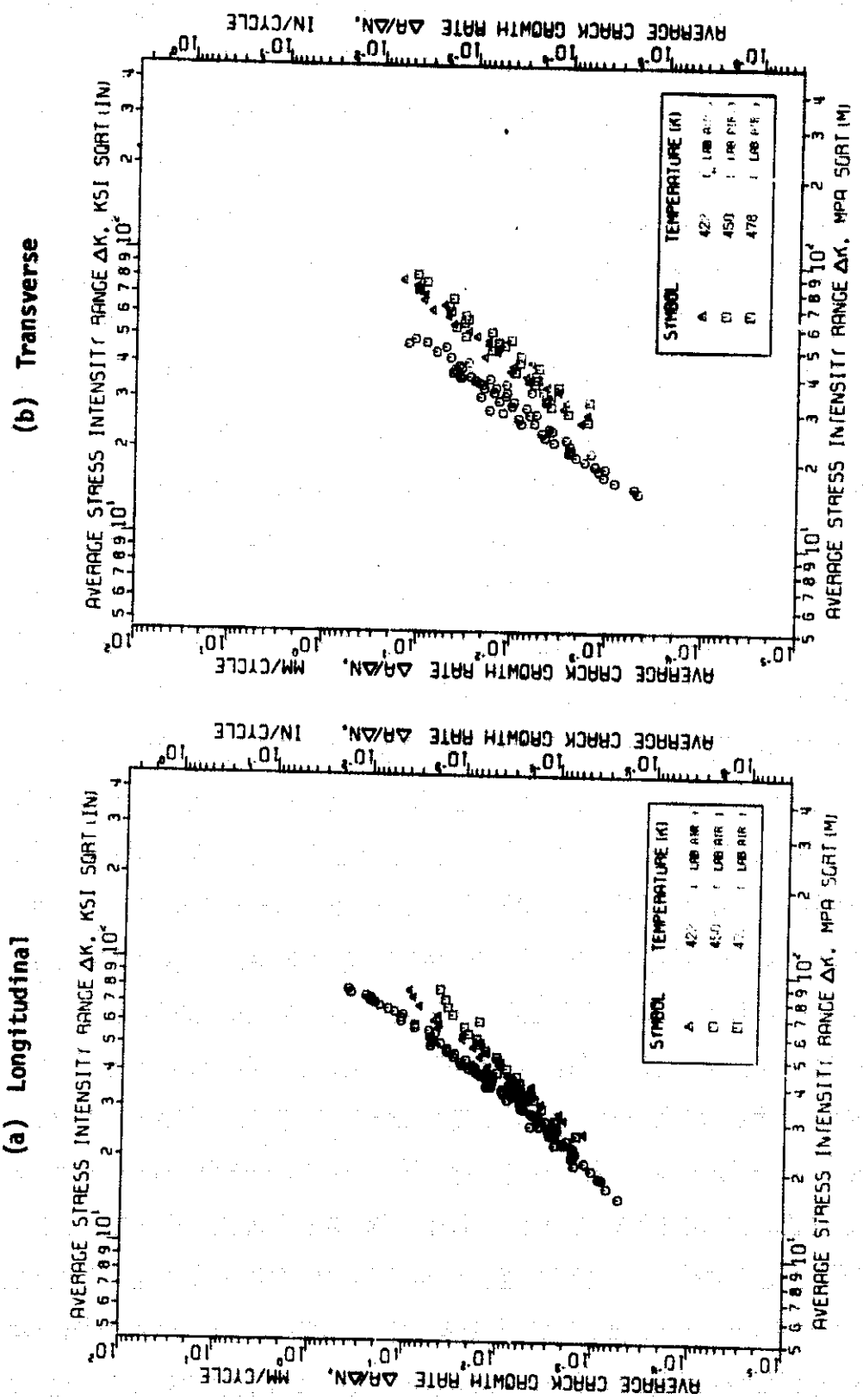


Alloy: 2124-T851 **Stress Ratio:** .50 **Frequency:** 200 cpm

Thickness: 6.35 mm (.250 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D5-4



Alloy: 2124-T851 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 6.35 mm (.250 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D5-5

(a) Longitudinal

(b) Transverse

Alloy: 2124-T851 **Stress Ratio:** .50 **Frequency:** 200 cpm

Thickness: 6.35 mm (.250 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D5-6

SECTION D6 - - FLAW GROWTH RATE DATA

FOR 11.47 mm (.450 INCH) THICK 2124-T851

PRECEDING PAGE BLANK NOT FILMED

TABLE D6-1. SUMMARY OF SPECIMEN TEST CONDITIONS FOR 200 CPM TESTS OF 11.47 mm (.450 INCH) THICK 2124-T851.

Test Temperature (°K)	Stress Ratio	Test Direction	Specimen I.D.	Data Table No.	Figure No.
144	.05	L	4L4-456-1	D6-2	D6-1(a)
			4L4-459-2	D6-3	D6-1(a)
		T	3T7-456-1	D6-4	D6-1(b)
			3T6-459-2	D6-5	D6-1(b)
	.50	L	4L11-456-2	D6-6	D6-2(a)
			4L3-459-2	D6-7	D6-2(a)
		T	3T2-456-2	D6-8	D6-2(b)
			5T4-459-1	D6-9	D6-2(b)
298 (Argon)	.05	L	4L12-453-1	D6-10	D6-3(a)
			4L7-456-2	D6-11	D6-3(a)
			4L7-459-1	D6-12	D6-3(a)
		T	2T2-453-3	D6-13	D6-3(b)
			3T1-456-1	D6-14	D6-3(b)
			1T2-459-1	D6-15	D6-3(b)
	.50	L	4L9-453-1	D6-16	D6-4(a)
			5L4-456-2	D6-17	D6-4(a)
			4L10-459-2	D6-18	D6-4(a)
		T	1T3-453-1	D6-19	D6-4(b)
			5T3-456-1	D6-20	D6-4(b)
			3T2-459-1	D6-21	D6-4(b)
298 (Wet Air)	.05	L	4L9-453-3	D6-22	D6-3(a)
			5L6-456-2	D6-23	D6-3(a)
			5L6-459-1	D6-24	D6-3(a)
		T	1T3-453-3	D6-25	D6-3(b)
			1T5-456-2	D6-26	D6-3(b)
			2T5-459-2	D6-27	D6-3(b)
	.50	L	5L2-453-1	D6-28	D6-4(a)
			4L10-456-1	D6-29	D6-4(a)
			5L4-459-1	D6-30	D6-4(a)
		T	1T7-453-2	D6-31	D6-4(b)
			1T2-456-2	D6-32	D6-4(b)
			3T4-459-2	D6-33	D6-4(b)

TABLE D6-1 (Continued)

Test Temperature (°K)	Stress Ratio	Test Direction	Specimen I.D.	Data Table No.	Figure No.
422	.05	L	5L1-453-3	D6-34	D6-5(a)
		T	2T8-453-1	D6-35	D6-5(b)
450	.05	L	5L1-453-2	D6-36	D6-5(a)
			4L8-456-1	D6-37	D6-5(a)
			4L2-459-2	D6-38	D6-5(a)
		T	2T5-456-1	D6-39	D6-5(b)
			2T8-459-2	D6-40	D6-5(b)
			5T3-459-1	D6-41	D6-5(b)
	.50	L	4L2-453-1	D6-42	D6-6(a)
			5L3-456-1	D6-43	D6-6(a)
			4L11-459-1	D6-44	D6-6(a)
		T	1T3-453-2	D6-45	D6-6(b)
			3T4-456-1	D6-46	D6-6(b)
			6T1-459-1	D6-47	D6-6(b)
478	.05	L	4L12-453-2	D6-48	D6-5(a)
		T	2T2-453-1	D6-49	D6-5(b)

TABLE D6-2

SPECIMEN NUMBER: 4L4-4T6-1
ALLOY TYPE: 2124-T851
SPECIMEN CRIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 11.52 MM (.4535 IN)
MAXIMUM STRESS: 213.3 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 6449 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 74.74 MPA SQRT(M) (71.66 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	2.64	.104	1	.4162E-03	.1638E-04	20.94	19.05
	3.91	.154	3068	.7866E-03	.3097E-04	24.53	22.32
	5.07	.200	4542	.1458E-02	.5709E-04	27.64	25.16
	6.33	.249	5417	.2932E-02	.1154E-03	30.88	28.10
	7.58	.310	5939	.5072E-02	.1996E-03	33.88	30.83
	9.21	.362	6230	.8956E-02	.3523E-03	36.45	33.17
	13.94	.415	6349	.1593E-01	.6270E-03	38.72	35.24
	11.72	.461	6423	.2196E-01	.8645E-03	40.78	37.11
	12.93	.509	6478	.2989E-01	.1177E-02	42.78	38.93
	14.15	.557	6519	.4762E-01	.1875E-02	44.88	40.84
	15.58	.613	6549	.5339E-01	.2102E-02	47.01	42.79
	16.97	.668	6575	.8172E-01	.3218E-02	49.22	44.79
	18.42	.732	6595	.7578E-01	.2983E-02	51.49	46.86
	20.19	.795	6616	.1947E+00	.7664E-02	53.51	48.69
	21.56	.849	6623	.1543E+00	.6063E-02	55.23	50.26
	22.79	.897	6631	.4203E+00	.1655E-01	59.00	53.69
	27.41	1.079	6642	.1273E+01	.5014E-01	64.95	59.11
	32.51	1.280	6646	.1911E+01	.7525E-01	69.39	62.87
F	34.42	1.355	6647	.4300E+01	.1575E+00	72.61	65.99
F	38.42	1.512	6648				

TABLE D6-3

SPECIMEN NUMBER: 4L4-4T9-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.0 K
SPECIMEN THICKNESS: 11.48 MM (.4520 IN)
MAXIMUM STRESS: 209.3 MPA (30.3 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1780 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 76.61 MPA SQRT(M) (74.72 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	2.77	.109	1	.8413E-03	.3311E-04	27.28	24.82
	3.39	.134	824	.2166E-02	.8526E-04	30.37	27.68
	4.14	.163	1174	.3895E-02	.1533E-03	33.14	30.14
	4.95	.195	1367	.6781E-02	.2669E-03	35.68	32.46
	5.48	.216	1492	.8721E-02	.3433E-03	37.36	34.00
	6.17	.243	1542	.1295E-01	.5098E-03	38.94	35.48
	6.81	.268	1617	.1911E-01	.7523E-03	41.66	37.91
	7.34	.289	1638	.2125E-01	.8367E-03	42.94	39.08
	7.89	.311	1653	.2775E-01	.1092E-02	44.97	40.92
	8.71	.343	1673	.4658E-01	.1834E-02	47.37	43.11
	9.62	.379	1707	.4175E-01	.1643E-02	48.37	44.02
	10.14	.399	1718	.7478E-01	.2944E-02	51.94	46.35
	11.13	.438	1729	.7722E-01	.3041E-02	53.47	48.66
	12.07	.483	1743	.2144E+01	.8444E-02	56.38	51.31
	13.56	.534	1754	.4842E+01	.1906E-01	61.86	56.22
	17.11	.674	1769	.3163E+01	.1245E-01	74.17	67.74
	26.61	1.047	1779				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D6-4

SPECIMEN NUMBER: 3T7-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 11.60 MM (.4569 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 4029 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 62.51 MPA SQRT(M) (56.49 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.96	.115	1				
			.2799E-03	.1086E-04	19.44	18.05
3.22	.127	2032				
			.6296E-03	.2479E-04	21.61	19.67
3.76	.148	2845				
			.9188E-03	.3617E-04	23.26	21.17
4.33	.170	3513				
			.2229E-02	.8696E-04	24.69	22.47
4.78	.188	3713				
			.2915E-02	.1146E-03	26.27	23.91
5.52	.217	3963				
			.3179E-01	.1251E-02	28.31	25.49
6.19	.244	3984				
			.1880E-01	.7403E-03	29.47	26.82
6.77	.267	4015				
			.2179E+00	.8577E-02	32.64	29.74
9.14	.361	4026				
			.8143E+01	.3206E+00	48.48	44.12
F 25.43	1.001	4029				

TABLE D6-5

SPECIMEN NUMBER: 3T6-459-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.3 K
SPECIMEN THICKNESS: 11.36 MM (.4477 IN)
MAXIMUM STRESS: 104.2 MPA (14.1 KSI)
R-RATIO: .5
FREQUENCY: 288 CPM
CYCLES TO FAILURE: 751 CYCLES
K(MAX) 9 CYCLES PRIOR TO FAILURE: 34.46 MPA SQRT(M) (31.36 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.54	.100	1				
			.5723E-02	.2254E-03	29.45	27.12
4.06	.160	748				

TABLE D6-6

SPECIMEN NUMBER: 4L11-456-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 11.51 MM (.4530 IN)
MAXIMUM STRESS: 211.3 MPA (30.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 28126 CYCLES
KI(MAX) 16 CYCLES PRIOR TO FAILURE: 74.59 MPA SQRT(M) (67.88 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.69	.106	1				
			.5645E-04	.2222E-05	10.71	9.74
3.52	.139	15457				
			.1084E-03	.7416E-05	12.39	11.27
4.76	.196	21898				
			.4792E-03	.1887E-04	14.19	12.91
6.10	.240	24737				
			.9383E-03	.3576E-04	15.75	14.33
7.23	.285	25987				
			.1654E-02	.6512E-04	17.05	15.51
8.38	.330	26972				
			.3440E-02	.1354E-03	18.50	16.84
9.98	.393	27145				
			.8346E-02	.3286E-03	19.95	18.15
11.33	.446	27306				
			.8714E-02	.3431E-03	21.21	19.30
12.71	.516	27465				
			.1356E-01	.5143E-03	22.47	20.45
14.21	.560	27580				
			.1388E-01	.5386E-03	23.57	21.45
15.39	.606	27663				
			.2354E-01	.9885E-03	24.41	22.21
17.11	.642	27710				
			.2348E-01	.9244E-03	25.52	23.22
18.19	.716	27799				
			.1620E-01	.6378E-03	26.48	24.47
19.99	.787	27931				
			.2508E-01	.9875E-03	27.04	25.58
21.50	.846	27961				
			.4240E-01	.1669E-02	28.15	26.52
23.02	.936	27997				
			.3214E-01	.1265E-02	30.06	27.36
24.18	.952	28033				
			.5641E-01	.2221E-02	31.34	28.29
26.93	1.021	28064				
			.1359E+00	.4147E-02	32.27	29.37
27.99	1.110	28083				
			.9167E-01	.3609E-02	35.14	31.98
34.99	1.377	28150				

TABLE D6-7

SPECIMEN NUMBER: 4L3-459-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: NITROGEN
TEST TEMPERATURE: 144.8 K
SPECIMEN THICKNESS: 11.51 MM (.4530 IN)
MAXIMUM STRESS: 283.7 MPA (42.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4043 CYCLES
KI(MAX) 1 CYCLES PRIOR TO FAILURE: 78.72 MPA SQRT(M) (71.64 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.62	.103	1				
				.4004E-03	.1578E-04	14.12	12.85
	3.28	.129	1593				
				.6174E-03	.2391E-04	15.47	14.26
	3.96	.156	2817				
				.1312E-02	.5166E-04	17.04	15.50
	4.69	.181	3296				
				.3864E-02	.1522E-03	18.34	16.69
	5.71	.219	3485				
				.7422E-02	.1347E-03	19.76	17.98
F	6.19	.244	3743				
				.5569E-02	.2350E-03	20.99	19.10
F	6.78	.267	3845				
				.2915E-01	.1138E-02	22.77	20.73
F	8.47	.334	3980				
				.2565E-01	.1145E-02	24.79	22.56
F	9.68	.377	3994				
				.2455E-01	.9667E-03	26.04	23.69
F	10.31	.406	3998				
				.6545E-01	.2575E-02	27.36	24.90
F	11.42	.457	3998				
				.7313E-01	.2879E-02	29.14	26.49
F	11.18	.515	4038				
				.1273E+00	.5008E-02	30.65	27.90
F	14.15	.565	4038				
				.2159E+00	.8500E-02	32.54	29.63
F	14.61	.653	4038				
				.1776E+00	.7000E-02	34.18	31.10
F	17.48	.688	4033				
				.4657E+00	.1833E-01	35.35	32.17
F	18.81	.740	4038				
				.6585E+00	.2750E-01	36.74	33.44
F	21.19	.735	4038				
				.2192E+01	.8603E-01	38.48	34.95
F	22.72	.895	4038				

TABLE D6-8

SPECIMEN NUMBER:			3T2-456-2
ALLOY TYPE:			2124-T851
SPECIMEN ORIENTATION:			TRANSVERSE
CONSTRAINT:			UNSTIFFENED
ENVIRONMENT:			NITROGEN
TEST TEMPERATURE:			144.5 K
SPECIMEN THICKNESS:			11.48 MM (.4520 IN)
MAXIMUM STRESS:			217.2 MPA (31.5 KSI)
R-RATIO:			.05
FREQUENCY:			200 CPM
CYCLES TO FAILURE:			18478 CYCLES
K(MAX)	1 CYCLES PRIOR TO FAILURE:	40.63 MPA SQRT(M)	(36.43 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.99	.181	1				
3.18	.125	5051	.1872E-03	.4222E-05	10.31	9.38
3.98	.154	8979	.2386E-03	.9879E-05	11.46	13.48
4.53	.178	10888	.6122E-03	.2410E-04	12.98	11.38
5.03	.198	10193	.2691E-02	.1059E-03	13.32	12.12
6.78	.264	10395	.8249E-02	.3248E-03	14.75	13.42
7.81	.307	10461	.1588E-01	.6644E-03	16.41	14.94
13.75	.423	10477	.1036E+00	.7228E-02	18.58	16.91

TABLE D6-9

SPECIMEN NUMBER:			5T4-449-1
ALLOY TYPE:			2124-T851
SPECIMEN ORIENTATION:			TRANSVERSE
CONSTRAINT:			UNSTIFFENED
ENVIRONMENT:			NITROGEN
TEST TEMPERATURE:			144.5 K
SPECIMEN THICKNESS:			11.46 MM (.4512 IN)
MAXIMUM STRESS:			279.3 MPA (40.4 KSI)
R-RATIO:			.10
FREQUENCY:			200 CPM
CYCLES TO FAILURE:			2502 CYCLES
K(MAX)	3 CYCLES PRIOR TO FAILURE:	41.01 MPA SQRT(M)	(37.32 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.77	.109	1				
3.19	.126	1828	.2332E-03	.9181E-05	13.47	12.25
3.88	.153	2456	.9965E-03	.3766E-04	14.99	13.27
4.22	.166	2473	.2465E-01	.9706E-03	15.62	14.22
6.89	.271	2499	.1029E+00	.4052E-02	18.48	16.75

TABLE D6-10

SPECIMEN NUMBER: 4L12-457-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 333.0 K
SPECIMEN THICKNESS: 11.69 MM (.460) IN
MAXIMUM STRESS: 144.1 MPA (23.9 KSI)
R-RATIO: .05
FREQUENCY: 233 CPM
CYCLES TO FAILURE: 1734. CYCLES

K(MAX) 2 CYCLES PRIOR TO FAILURE: 53.09 MPA SQRT(M) (48.31 KSI SQRT(IN))

	CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	KSI SQRT(IN)
	3.76	.148	1				
	4.38	.169	2055	.2535E-03	.9941E-05	15.40	14.01
	4.79	.189	3346	.3749E-03	.1491E-04	16.35	14.88
	5.67	.223	4737	.2991E-03	.1174E-04	17.96	15.98
	6.03	.257	6417	.4166E-03	.1641E-04	19.97	17.27
	7.43	.289	8081	.5159E-03	.2031E-04	21.23	18.41
	8.43	.332	11316	.7344E-03	.2894E-04	21.67	19.43
	9.14	.36.	12872	.1134E-02	.4149E-04	22.79	20.74
	9.74	.384	12812	.1124E-02	.4426E-04	23.64	21.51
	1.+28	.4.5	13C.9	.1344E-02	.5293E-04	24.35	22.16
	11.30	.446	13542	.1913E-02	.7533E-04	25.98	23.61
	12.21	.48.	13832	.2828E-02	.1113E-03	26.40	24.03
	13.13	.514	14146	.2491E-02	.9805E-04	27.19	24.92
	13.84	.537	14434	.2519E-02	.9917E-04	28.16	25.63
	14.15	.565	14641	.3472E-02	.1367E-03	28.98	26.27
	14.79	.594	14864	.3275E-02	.1289E-03	29.61	26.95
	15.31	.642	15165	.4053E-02	.1596E-03	31.60	27.85
	17.49	.688	15438	.4902E-02	.1930E-03	31.79	28.93
	18.74	.738	15621	.5473E-02	.2312E-03	32.98	29.99
	23.15	.791	15737	.7469E-02	.2941E-03	34.15	31.08
	21.24	.836	15934	.6372E-02	.2508E-03	35.29	32.11
	22.48	.885	16126	.8729E-02	.3437E-03	36.37	33.09
	23.69	.933	16215	.1345E-01	.5294E-03	37.47	34.16
	25. 4	.986	16328	.1202E-01	.4732E-03	38.62	35.25
F	39.57	1.555	17C.8	.2126E-01	.8370E-03	44.90	40.86

TABLE D6-11

SPECIMEN NUMBER: 4L7-466-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 258.0 K
SPECIMEN THICKNESS: 11.99 MM (.472) IN
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 4563 CYCLES

K(MAX) 3 CYCLES PRIOR TO FAILURE: 106.77 MPA SQRT(M) (97.16 KSI SQRT(IN))

	CRACK LENGTH MM	IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	KSI SQRT(IN)
	2.62	.103	1				
	3.69	.144	1235	.8456E-03	.3329E-04	20.48	18.64
	4.73	.186	1971	.1447E-02	.5698E-04	23.69	21.56
	5.53	.217	2741	.1583E-02	.6232E-04	24.94	24.43
	7.32	.288	3232	.3139E-02	.1236E-03	29.91	27.22
	8.47	.333	3637	.3546E-02	.1396E-03	32.54	29.62
	9.03	.347	3744	.5358E-02	.2109E-03	35.25	31.10
	11.43	.450	4021	.7231E-02	.2847E-03	38.17	34.74
	13.45	.529	4143	.1656E-01	.6523E-03	41.76	37.67
	14.44	.569	4217	.1266E-01	.4987E-03	43.41	39.41
	15.31	.603	4252	.8611E-02	.3389E-03	45.33	41.25
	16.39	.646	4337	.1213E-01	.4800E-03	46.42	42.59
	16.9	.671	4357	.3302E-01	.1300E-02	48.37	44.02
	17.79	.775	4417	.3317E-01	.1306E-02	50.77	46.17
	23.47	.924	4447	.7549E-01	.2972E-02	54.47	49.53
F	32.39	1.275	4435	.1678E+01	.7788E-02	61.62	56.07
F	33.15	1.305	4438	.7197E+01	.2833E-01	67.42	61.36
F	44.17	1.735	4412	.2735E+01	.1075E-01	74.95	68.24
F	61.34	2.415	4548	.5757E+01	.2267E-01	81.11	82.92

TABLE D6-12

SPECIMEN NUMBER	417-489-1
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	LONGITUDINAL
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	ARGON
TEST TEMPERATURE	299.8 K
SPECIMEN THICKNESS	11.48 MM (.4520 IN)
MAXIMUM STRESS	380.4 MPA (55.2 KSI)
R-RATIO	.05
FREQUENCY	20 CPM
CYCLES TO FAILURE	231 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE: 79.89 MPA SQRT(M) (72.44 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA-STRESS INTENSITY MPA SQRT(M)	DELTA-STRESS INTENSITY KSI SQRT(IN)
	2.83	.111	1				
	3.73	.147	48	.1292E-01	.5088E-03	36.40	33.13
	4.71	.185	162	.1292E-01	.5086E-03	41.95	38.17
	6.38	.251	221	.2926E-01	.1113E-02	48.10	43.77
F	13.44	.411	229	.5804E+00	.2285E-01	98.31	93.97
F	13.47	.927	230	.1440E+01	.5825E-01	78.75	64.39

TABLE D6-13

SPECIMEN NUMBER	2T2-453-3
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	ARGON
TEST TEMPERATURE	299.8 K
SPECIMEN THICKNESS	11.48 MM (.4520 IN)
MAXIMUM STRESS	140.0 MPA (20.3 KSI)
R-RATIO	.05
FREQUENCY	200 CPM
CYCLES TO FAILURE	15974 CYCLES

K(MAX) 6.6 CYCLES PRIOR TO FAILURE: 34.68 MPA SQRT(M) (31.56 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA-STRESS INTENSITY MPA SQRT(M)	DELTA-STRESS INTENSITY KSI SQRT(IN)
3.57	.141	1				
4.42	.174	3478	.1578E-03	.6211E-05	14.70	13.37
5.24	.206	7818	.2726E-03	.1073E-04	16.20	14.75
6.48	.255	8245	.4144E-03	.1632E-04	17.57	15.99
6.91	.272	11146	.3474E-03	.1368E-04	18.54	16.88
7.14	.281	12158	.6275E-03	.2470E-04	19.49	17.73
7.44	.293	12954	.6318E-03	.2487E-04	20.29	18.46
8.41	.331	14761	.8788E-03	.3460E-04	21.24	19.37
8.67	.341	14784	.1169E-02	.4603E-04	22.43	20.41
10.10	.397	15468	.9136E-03	.3678E-04	23.34	21.24
10.80	.425	15877	.1733E-02	.6822E-04	24.16	21.99
11.48	.452	16211	.2438E-02	.8924E-04	24.96	22.71
11.99	.472	16422	.2423E-02	.9526E-04	25.63	23.32
12.78	.503	16763	.2309E-02	.9091E-04	26.34	23.97
13.31	.524	17012	.2127E-02	.8373E-04	27.04	24.61
13.80	.543	17175	.3339E-02	.1196E-03	27.58	25.10
14.24	.680	17588	.3478E-02	.1369E-03	28.57	26.00
14.67	.648	17855	.4623E-02	.1820E-03	29.89	27.20
17.74	.698	18237	.3960E-02	.1613E-03	31.08	28.28
19.14	.754	18368	.8732E-02	.3438E-03	32.31	29.40

TABLE D6-14

SPECIMEN NUMBER: ST4-456-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 288.9 K
SPECIMEN THICKNESS: 11.38 MM (.4480 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 172. CYCLES
KMAX) 1 CYCLES PRIOR TO FAILURE: 50.14 MPA SQRT(M) (45.64 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.95	.112	1				
			.1754E-02	.6905E-04	20.97	19.08
3.72	.142	437				
			.2519E-02	.9916E-04	24.34	21.68
4.31	.194	871				
			.4863E-02	.1914E-03	29.13	26.51
7.24	.329	1553				
			.2151E-31	.8468E-03	33.28	30.29
9.77	.368	1631				
			.7587E-32	.3144E-03	34.84	31.53
9.11	.339	1645				
			.4425E-01	.1742E-02	38.98	34.56
11.11	.437	1691				
			.1587E+01	.7589E-02	43.70	39.41
F 16.64	.655	1719				

TABLE D6-15

SPECIMEN NUMBER: ST2-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 288.9 K
SPECIMEN THICKNESS: 11.44 MM (.4520 IN)
MAXIMUM STRESS: 172.4 MPA (64.. KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 15 CYCLES
KMAX) 14 CYCLES PRIOR TO FAILURE: 33.64 MPA SQRT(M) (31.41 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.49	.112	1				

TABLE D6-16

SPECIMEN NUMBER: [illegible]
ALLOY TYPE: [illegible]
SPECIMEN ORIENTATION: [illegible]
CONSTRAINT: [illegible]
ENVIRONMENT: [illegible]
TEST TEMPERATURE: [illegible]
SPECIMEN THICKNESS: 11.43 MM (.[illegible] IN)
PASS/RUN STRESS: 144.1 MPA (20.9 KSI)
R-RATIO: .10
FREQUENCY: 20[illegible] CPM
CYCLES TO FAILURE: 39842 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 112.66 MPA SQRT(M) (102.53 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.73	.265	1				
	7.20	.283	6758	.6935E-04	.2731E-05	10.67	9.71
	7.79	.307	14411	.7706E-04	.3455E-05	11.07	10.08
	8.54	.336	18249	.1537E-03	.7627E-05	11.56	10.52
	8.94	.352	20361	.1903E-03	.7481E-05	11.96	10.89
	9.72	.383	23127	.2839E-03	.1116E-04	12.36	11.25
	10.69	.421	25444	.4393E-03	.1811E-04	12.94	11.77
	11.28	.444	26694	.4901E-03	.1929E-04	13.43	12.22
	11.73	.462	27615	.6264E-03	.2462E-04	13.79	12.51
	12.07	.483	28443	.5255E-03	.2067E-04	14.05	12.78
	13.01	.512	29[illegible]9	.6187E-03	.2436E-04	14.42	13.12
	13.54	.533	30446	.6241E-03	.2457E-04	14.78	13.45
	14.33	.564	31[illegible]9	.7234E-03	.2769E-04	15.15	13.80
	14.99	.589	32322	.8674E-03	.3415E-04	15.56	14.15
	15.65	.617	33262	.9578E-03	.3770E-04	15.90	14.47
	16.37	.644	33[illegible]6	.1214E-02	.4779E-04	16.28	14.81
	17.04	.671	34213	.1181E-02	.4645E-04	16.64	15.14
	17.72	.698	34[illegible]3	.1422E-02	.5597E-04	16.98	15.45
	18.26	.719	35128	.1232E-02	.4852E-04	17.28	15.73
	18.86	.743	35[illegible]9	.1474E-02	.5803E-04	17.57	15.99
	19.64	.773	35[illegible]3	.1897E-02	.7471E-04	17.91	16.29
	21.13	.832	36[illegible]4	.2343E-02	.9226E-04	18.43	16.77
	22.25	.876	37135	.2471E-02	.9725E-04	19.14	17.42
	23.[illegible]	.929	37394	.9771E-02	.1495E-03	19.62	17.86
	24.[illegible]	.[illegible]	37673	.4643E-02	.1828E-03	21.29	19.40
	26.[illegible]	1.024	37893	.5123E-02	.1977E-03	20.79	18.88
F	34.77	1.369	38737	.9703E-02	.3821E-03	22.65	21.01
F	37.37	1.470	39033	.1356E-01	.5341E-03	24.22	22.05
F	39.29	1.547	39115	.1521E-01	.6010E-03	24.12	23.77
F	41.11	1.619	39213	.2773E-01	.0161E-03	26.42	24.41
F	45.29	1.743	39347	.2913E-01	.1146E-02	28.32	25.50
F	46.91	1.835	39391	.3022E-01	.1192E-02	29.11	26.49
F	48.74	1.[illegible]1	1949[illegible]	.2627E-01	.1153E-02	29.72	27.05
F	51.14	1.[illegible]4	[illegible]9[illegible]	.4219E-01	.2448E-02	30.42	27.69
F	51.59	2.023	39[illegible]2	.5411E-01	.2130E-02	31.14	28.25
F	53.78	2.[illegible]8	39536	.4109E-01	.1618E-02	31.67	28.73
F	54.33	2.139	39675	.3978E-01	.1564E-02	32.17	29.28
F	56.[illegible]6	2.2[illegible]7	39[illegible]4	.5956E-01	.2345E-02	32.44	29.69
F	62.53	2.[illegible]65	39624	.7366E-01	.2901E-02	33.51	30.49
F	55.42	2.[illegible]39	39[illegible]4	.7322E-01	.2755E-02	34.17	31.23
F	61.49	2.421	39634	.6357E-01	.2346E-02	35.15	32.01
F	63.99	2.515	39712	.8529E-01	.3357E-02	36.11	32.77
F	67.94	2.677	39749	.1[illegible]9E+[illegible]	.4365E-02	37.45	34.08
F	74.17	2.[illegible]3	39834	.2322E+[illegible]	.7995E-02	42.55	38.73
F	76.64	3.[illegible]1	39839	.1471E+01	.5802E-01	47.73	43.43
F	81.73	3.412	39836	.5[illegible]93E-01	.2[illegible]75E+00	49.77	45.29
F	83.[illegible]	3.[illegible]7	39[illegible]	.9317E+[illegible]	.3551E-01	51.79	47.10
F	84.[illegible]	3.728	39[illegible]	.6859E+00	.2701E-01	52.79	48.03
F	86.[illegible]	3.[illegible]4	39[illegible]	.1[illegible]4E+01	.[illegible]44.E-01	54.99	49.95

TABLE D6-17

SPECIMEN NUMBER: 514-456-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 296.0 K
SPECIMEN THICKNESS: 11.35 MM (.4470 IN)
MAXIMUM STRESS: 217.1 MPA (31.5 KSI)
R-RATIO: [illegible]
FREQUENCY: 220 CPM
CYCLES TO FAILURE: 31556 CYCLES
K(MAX) 10 CYCLES PRIOR TO FAILURE: 89.56 MPA SQRT(M) (81.50 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.77	.107	1	.1122E-03	.4416E-05	10.62	9.66
3.37	.133	5776	.9373E-04	.3690E-05	11.37	10.35
4.31	.169	15776	.1882E-03	.7410E-05	13.31	12.11
5.25	.207	22776	.2934E-03	.1155E-04	14.89	13.55
6.71	.264	25776	.8346E-03	.3287E-04	16.51	15.02
7.97	.314	27276	.6985E-03	.2750E-04	17.76	16.17
9.01	.355	28776	.1676E-02	.6600E-04	18.90	17.20
10.19	.401	29476	.1977E-02	.7783E-04	20.34	18.24
11.37	.448	30176	.3450E-02	.1358E-03	21.06	19.17
12.41	.498	30276	.4819E-02	.1893E-03	22.15	20.16
13.85	.545	30476	.6209E-02	.2444E-03	23.25	21.16
13.02	.592	30856	.1167E-01	.4594E-03	24.34	22.15
16.54	.651	30935	.1468E-01	.5778E-03	25.37	23.10
17.70	.697	31074	.1619E-01	.6374E-03	26.35	23.98
19.11	.752	31151	.1996E-01	.7860E-03	27.47	24.95
20.61	.811	31236	.2993E-01	.1160E-02	28.46	25.90
22.03	.867	31259	.3667E-01	.1442E-02	29.49	26.83
23.57	.928	31331	.6164E-01	.2427E-02	30.94	28.16
26.35	1.037	31376	.5391E-01	.2122E-02	32.50	29.62
28.50	1.122	31416	.6124E-01	.2411E-	33.77	30.73
30.16	1.187	31443	.6346E-01	.2381E-	35.01	31.86
32.45	1.278	31481	.1607E+00	.6345E-02	36.66	33.36
35.50	1.397	31503	.1495E+00	.5883E-02	38.17	34.74
37.44	1.474	31513	.1812E+00	.7133E-02	39.41	35.87
39.61	1.560	31525	.2734E+00	.1076E-01	40.64	36.99
41.53	1.635	31532	.4251E+00	.1674E-01	43.02	39.13
47.45	1.859	31546				

TABLE D6-18

SPECIMEN NUMBER: 4L10-453-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 297.3 K
SPECIMEN THICKNESS: 11.52 MM (.4535 IN)
MAXIMUM STRESS: 381.8 MPA (55.? KSI)
R-RATIO: [illegible]
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 2187 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN .9 FTY)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES I	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.79	.097	1	.5211E-03	.2053E-04	17.52	15.74
3.09	.122	1840	.1501E-02	.6111E-04	18.9	17.13
3.62	.143	1844	.2490E-02	.1141E-03	21.16	19.06
4.11	.16	[illegible]	.1142E+0	.41.E-0	[illegible]	32.48
17.77	.700	2134				

TABLE D6-19

SPECIMEN NUMBER: 1T3-453-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 288.8 K
SPECIMEN THICKNESS: 11.47 MM (.4500 IN)
PASTUP STRESS: 140.0 MPA (20.3 KSI)
R-RATIO: .05
FREQUENCY: 20Ø CPS
CYCLES TO FAILURE: 37595 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 72.72 MPA SQRT(M) (66.14 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	6.43	.253	1				
	7.19	.283	8838	.6440E-04	.2536E-05	13.32	9.48
	7.64	.301	14287	.8015E-04	.3156E-05	13.70	9.73
	8.27	.325	19256	.1255E-03	.4941E-05	13.38	10.08
	8.95	.352	22542	.1892E-03	.7449E-05	13.51	10.48
	9.37	.369	25040	.2796E-03	.1078E-04	13.99	10.87
	10.27	.404	27239	.3281E-03	.1292E-04	12.39	11.27
	11.12	.438	29152	.3869E-03	.1523E-04	12.94	11.68
	11.51	.453	30747	.3384E-03	.1214E-04	13.21	12.02
	11.97	.471	31539	.4578E-03	.1802E-04	13.46	12.25
	12.79	.503	32436	.1141E-02	.4491E-04	13.93	12.59
	13.45	.529	33112	.1149E-02	.4523E-04	14.28	12.99
	14.13	.556	33619	.1134E-02	.4464E-04	14.64	13.33
	14.88	.586	34247	.1015E-02	.3997E-04	15.02	13.67
	15.46	.613	34695	.1141E-02	.4491E-04	15.40	14.02
	16.14	.637	35059	.1596E-02	.6285E-04	15.74	14.32
	16.76	.660	35332	.2142E-02	.8431E-04	16.14	14.68
	17.55	.691	35724	.2012E-02	.7921E-04	16.38	14.91
	18.24	.718	35913	.7777E-03	.3062E-03	16.74	15.23
	19.11	.752	36091	.4523E-02	.1780E-03	17.12	15.58
	19.71	.776	36159	.4717E-02	.1857E-03	17.51	15.94
F	23.11	.910	37018	.3792E-02	.1493E-03	18.43	16.77
F	25.15	.990	37319	.1129E-01	.4446E-03	19.59	17.83
F	26.42	1.040	37439	.3302E-01	.1300E-02	20.37	18.54
F	29.17	1.149	37575	.3176E-01	.1250E-02	23.99	19.10
F	32.15	1.266	37715	.9719E-01	.2250E-02	21.72	19.77
F	32.39	1.275	37735	.5590E-01	.2200E-02	22.59	20.56
F	33.41	1.315	37795	.6771E-01	.2667E-02	23.30	21.21
F	35.34	1.415	37915	.3349E-01	.1320E-02	24.70	21.84
F	37.46	1.475	37995	.7723E-01	.2875E-02	25.96	23.26
F	41.39	1.594	38135	.1397E+00	.5500E-02	26.67	24.27
F	43.19	1.701	38235	.1101E+00	.4333E-02	27.52	25.05
F	44.83	1.765	38343	.1651E+00	.6500E-02	28.16	25.63
F	46.49	1.830	38450	.2822E+00	.1111E-01	29.97	26.36
F	46.32	1.930	38559	.2064E+00	.8125E-02	25.79	27.11
F	51.67	1.935	38647	.2359E+00	.9266E-02	30.43	27.69
F	52.42	2.064	38774	.2117E+00	.8333E-02	31.01	28.22
F	53.59	2.111	38840	.3810E+00	.1500E-01	31.64	28.79
F	55.50	2.185	38946	.5080E+00	.2000E-01	32.43	29.51
F	57.51	2.265	39066	.7620E+00	.3000E-01	33.15	30.17
F	59.15	2.329	39171	.3048E+01	.1200E+00	34.99	31.82
F	62.17	2.446	39392	.2286E+01	.9000E-01	35.21	32.04
F	64.39	2.535	39593	.1524E+01	.6000E-01	36.07	32.79
F	65.31	2.571	39734				

TABLE D6-20

SPECIMEN NUMBER: CT3-456-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 297.0 K
SPECIMEN THICKNESS: 11.42 MM (.4494 IN)
MAXIMUM STRESS: 217.7 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 2.0 CPS
CYCLES TO FAILURE: 6294 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 45.51 MPA SQRT(M) (41.42 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.73	.108	1				
3.89	.153	2945	.4563E-03	.1796E-04	11.38	10.36
5.31	.219	5794	.4373E-03	.1721E-04	13.34	11.99
6.41	.252	6693	.3784E-02	.1489E-03	14.79	13.42
7.48	.295	6797	.1034E-01	.4072E-03	16.08	14.61
8.43	.348	6881	.1434E-01	.5660E-03	17.41	15.85
13.97	.544	6897	.3123E+00	.1230E-01	20.56	15.71

TABLE D6-21

SPECIMEN NUMBER: ST2-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: ARGON
TEST TEMPERATURE: 297.0 K
SPECIMEN THICKNESS: 11.33 MM (.4460 IN)
MAXIMUM STRESS: 372.1 MPA (54.0 KSI)
R-RATIO: .05
FREQUENCY: 2.0 CPS
CYCLES TO FAILURE: 265 CYCLES
K(MAX) 45 CYCLES PRIOR TO FAILURE: 32.69 MPA SQRT(M) (29.75 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.13	.084	1				
2.32	.091	55	.3888E-02	.1531E-03	15.58	14.18
2.34	.092	100	.3810E-03	.1500E-04	15.92	14.49
2.46	.097	220	.9525E-03	.3750E-04	16.19	14.70

TABLE D6-22

SPECIMEN NUMBER: 4L9-453-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 322 °K
SPECIMEN THICKNESS: 11.67 MM (.460 IN)
PEAKUP STRESS: 118.5 MPA (17.2 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 24487 CYCLES
K(MAX) 383 CYCLES PRIOR TO FAILURE: 52.81 MPA SQRT(M) (48.06 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.14	.123	1				
	3.78	.148	2741	.2251E-03	.8869E-05	11.75	10.70
	4.56	.18.	5649	.2782E-03	.1095E-04	12.92	11.75
	5.18	.204	7937	.3276E-03	.1290E-04	13.98	12.72
	5.41	.229	8949	.4134E-03	.1708E-04	14.85	13.52
	6.49	.255	10633	.5103E-03	.2008E-04	15.77	14.35
	7.19	.283	11674	.5649E-03	.2224E-04	16.68	15.18
	7.98	.315	12892	.7081E-03	.2788E-04	17.52	15.94
	9.07	.345	13929	.7673E-03	.3021E-04	18.42	16.76
	9.83	.379	14749	.8243E-03	.3261E-04	19.30	17.57
	10.39	.435	15476	.1122E-02	.4023E-04	20.08	18.27
	11.19	.436	16221	.9445E-03	.3716E-04	20.85	18.93
	11.68	.436	16617	.1728E-02	.6801E-04	21.39	19.47
	12.42	.489	17250	.1111E-02	.4374E-04	22.02	20.04
	13.79	.543	17855	.1462E-02	.5754E-04	22.90	20.75
	13.91	.548	18254	.1566E-02	.6165E-04	23.47	21.36
	14.48	.569	18598	.1635E-02	.6437E-04	23.98	21.82
	15.06	.594	18890	.2090E-02	.8228E-04	24.49	22.28
	15.71	.618	19199	.2023E-02	.7961E-04	25.01	22.76
	16.34	.643	19497	.2161E-02	.8272E-04	25.53	23.23
	17.11	.669	19831	.1644E-02	.7748E-04	26.35	23.71
	17.73	.698	20140	.2376E-02	.9353E-04	26.60	24.21
	18.71	.718	20312	.2094E-02	.1141E-03	27.29	24.65
	19.71	.748	20534	.2761E-02	.1087E-03	27.58	25.18
	20.33	.800	21019	.3106E-02	.1222E-03	28.34	25.83
	21.09	.844	21328	.3576E-02	.1408E-03	29.20	26.65
	22.67	.892	21667	.3685E-02	.1451E-03	30.14	27.43
	23.42	.942	21952	.4337E-02	.1708E-03	31.23	28.24
	25.15	.990	22230	.5149E-02	.2027E-03	31.97	29.09
	26.62	1.048	22459	.5542E-02	.2182E-03	32.84	29.94
	28.32	1.112	22658	.6972E-02	.2745E-03	33.79	30.75
F	29.84	1.175	22795	.1431E-01	.5643E-03	34.47	31.73
F	30.96	1.219	22919	.8194E-02	.3226E-03	35.81	32.59
F	32.13	1.265	23114	.6199E-02	.2439E-03	36.55	33.26
F	33.91	1.335	23329	.9118E-02	.3590E-03	37.51	34.16
F	35.46	1.435	23459	.1185E-01	.4667E-03	38.67	35.19
F	37.22	1.465	23559	.1397E-01	.5500E-03	39.67	36.10
F	38.35	1.510	23659	.1275E-01	.5000E-03	40.51	36.87
F	40.13	1.580	23729	.3998E-01	.1400E-02	41.47	37.74
F	41.27	1.625	23759	.2288E-01	.9008E-03	42.38	38.57
F	42.47	1.673	23819	.2794E-01	.1100E-02	43.17	39.29
F	44.23	1.741	23859	.3348E-01	.1282E-02	44.08	40.12
F	45.47	1.790	23909	.2540E-01	.1000E-02	44.95	40.91
F	46.99	1.850	23959	.3348E-01	.1200E-02	45.92	41.78
F	48.26	1.900	24009	.2946E-01	.1000E-02	46.78	42.58
F	49.53	1.950	24059	.2546E-01	.1000E-02	47.55	43.22
F	51.71	2.036	24109	.3596E-01	.1400E-02	48.46	44.10
F	53.34	2.100	24156	.4323E-01	.1702E-02	49.67	45.20

TABLE D6-23

SPECIMEN NUMBER: SLE-456-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 297.1 K
SPECIMEN THICKNESS: 11.35 MM (.446 IN)
MAXIMUM STRESS: 217.2 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 3793 CYCLES
KIMAX) 2 CYCLES PRIOR TO FAILURE: 87.81 MPA SQRT(M) (79.91 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.49	.098	1				
			.9144E-03	.3601E-04	20.34	18.51
2.70	.106	1723				
			.1707E-02	.6721E-04	24.13	21.96
2.91	.115	2631				
			.2579E-02	.1.15E-03	27.35	24.89
3.17	.125	2941				
			.3779E-02	.1486E-03	30.17	27.45
3.43	.135	3071				
			.5713E-02	.2249E-03	32.79	29.84
3.63	.143	3143				
			.8744E-02	.3444E-03	35.35	32.17
3.89	.153	3227				
			.1347E-01	.4122E-03	37.54	34.17
4.19	.165	3302				
			.1971E-01	.6185E-03	39.39	36.19
4.57	.180	3377				
			.1617E-01	.6364E-03	42.24	38.44
4.83	.190	3417				
			.2325E-01	.9154E-03	43.47	39.42
5.11	.201	3451				
			.3351E-01	.1555E-02	45.43	41.34
5.41	.213	3479				
			.4831E-01	.1901E-02	47.19	42.96
5.69	.224	3504				
			.4305E-01	.1673E-02	48.89	44.50
5.93	.234	3524				
			.5555E-01	.2187E-02	50.79	46.21
6.22	.245	3544				
			.5933E-01	.2335E-02	52.71	47.97
6.53	.257	3564				
			.6319E-01	.2557E-02	54.69	49.82
6.87	.270	3584				
			.8139E-01	.3205E-02	56.41	51.33
7.23	.285	3604				
			.8712E-01	.3430E-02	58.27	53.03
7.63	.300	3624				
			.1173E-00	.4617E-02	60.37	54.78
8.03	.316	3643				
			.1777E-01	.6996E-02	62.37	56.76
8.53	1.013	3664				
			.2581E-01	.1005E-01	64.99	59.14
9.09	1.033	3684				
			.8306E-01	.3283E-01	69.43	63.19
9.69	1.053	3704				
			.1184E-01	.4617E-01	74.37	67.68
10.39	1.073	3724				
			.2274E-01	.8868E-01	79.91	72.72
11.19	1.093	3744				

TABLE D6-24

SPECIMEN NUMBER: SL6-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 296.0 K
SPECIMEN THICKNESS: 11.43 MM (.540 IN)
MAXIMUM STRESS: 345.0 MPA (50.4 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 197 CYCLES
KIMAX) 1 CYCLES PRIOR TO FAILURE: 72.73 MPA SQRT(M) (66.18 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.39	.094	1				
			.4351E-02	.1713E-03	32.10	29.40
2.64	.104	62				
			.3525E-02	.1388E-03	34.17	31.10
2.97	.117	154				
			.5377E-02	.2117E-03	35.31	32.68
3.23	.127	213				
			.1423E-01	.5603E-03	36.35	33.63
3.34	.131	211				
			.6477E-02	.2549E-03	37.83	34.43
3.54	.139	243				
			.1521E-01	.5990E-03	40.39	36.72
4.95	.169	245				
			.2109E-01	.8305E-03	43.75	39.36
4.71	.185	311				
			.3302E-01	.1300E-02	46.48	41.39
5.23	.206	337				
			.4778E-01	.1882E-02	47.34	43.04
5.76	.227	334				
			.3615E-01	.1423E-02	47.98	43.63
6.06	.239	341				
			.5315E-01	.2093E-02	48.70	44.29
6.37	.251	350				
			.5395E-01	.2124E-02	49.41	44.88
6.74	.265	371				
			.7435E-01	.2928E-02	50.79	46.14
7.12	.280	391				
			.2284E-01	.8994E-02	53.01	48.19
7.60	.299	397				
			.3967E-01	.1562E-01	53.10	48.28
11.40	.449	437				

TABLE D6-25

SPECIMEN NUMBER: 173-493-3
ALLOY TYPE: 2124-T851
SPECIMEN CONFIGURATION: T.L.
CONSTRAINT: UNSTIFFENED
CRACK INCREMENT: WET
TEST TEMPERATURE: 301°F
SPECIMEN THICKNESS: 11.68 MM (.460 IN)
MAXIMUM STRESS: 138.6 MPA (20.1 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 10058 CYCLES
KEMAX: 1 CYCLES PRIOR TO FAILURE: 65.49 MPA SQRT(M) 59.60 KSI SQRT(IN)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.43	.134	1				
				.3545E-03	.1396E-04	14.19	12.92
	3.99	.153	1398	.6478E-03	.2550E-04	15.52	14.13
	4.93	.194	2837	.7858E-03	.2775E-04	17.36	15.52
	5.70	.224	4075	.1099E-02	.4328E-04	18.31	16.66
	6.42	.253	4793	.9002E-03	.3544E-04	19.17	17.45
	6.97	.274	5728	.1346E-02	.5300E-04	22.95	18.25
	7.65	.301	5811	.1479E-02	.5798E-04	20.98	19.18
	8.74	.329	6212	.1427E-02	.5616E-04	21.71	19.76
	8.76	.345	6577	.1054E-02	.7299E-04	22.58	20.55
	9.62	.379	7018	.1719E-02	.6769E-04	23.49	21.38
	10.27	.404	7414	.2163F-02	.8506E-04	24.32	22.04
	10.45	.427	7685	.2472E-02	.9731E-04	24.87	22.63
	11.40	.449	7908	.2989E-02	.1175E-03	25.57	23.27
	12.14	.478	8142	.2469E-02	.9703E-04	25.24	23.08
	12.64	.498	8361	.3889E-02	.1531E-03	26.97	24.54
	13.48	.530	8571	.5951E-02	.2343E-03	27.77	25.28
	14.15	.559	8795	.9769E-02	.3846E-03	29.43	26.78
F	16.76	.660	8958	.7622E-02	.3000E-03	31.37	28.55
F	18.25	.721	9158	.5715E-02	.2250E-03	32.59	29.66
F	19.43	.765	9358	.4467E-02	.3333E-03	33.66	30.63
F	20.73	.815	9534	.1524E-01	.6000E-03	34.97	31.73
F	22.22	.875	9638	.7620E-02	.3000E-03	35.84	32.61
F	22.99	.905	9738	.1778E-01	.7000E-03	36.53	33.24
F	23.99	.945	9759				
F	25.15	.990	9798	.3175E-01	.1250E-02	37.41	34.05
F	26.42	1.040	9838	.3175E-01	.1250E-02	38.44	34.98
F	27.69	1.090	9878	.3175E-01	.1250E-02	39.45	35.90
F	29.08	1.145	9918	.4657E-01	.1833E-02	40.50	36.86
F	30.23	1.190	9958	.2286E-01	.9000E-03	41.48	37.75
F	31.98	1.255	9978	.8255E-01	.3250E-02	42.55	38.73
F	33.65	1.325	9998	.8893E-01	.3500E-02	43.89	39.91
F	36.17	1.424	10013	.1609E+00	.6333E-02	45.42	41.33
F	37.72	1.485	10023	.1651E+00	.6500E-02	46.93	42.70
F	39.62	1.560	10033	.1905E+00	.7500E-02	48.23	43.90
F	41.78	1.645	10038	.4318E+00	.1700E-01	49.72	45.25
F	44.32	1.745	10043	.5080E+00	.2000E-01	51.44	46.81
F	45.47	1.790	10048	.2286E+00	.9000E-02	52.79	48.04
F	47.75	1.880	10051	.7620E+00	.3000E-01	54.04	49.18
F	49.56	1.951	10054	.6350E+00	.2500E-01	55.56	50.56
F	51.46	2.026	10056	.2339E+01	.8250E-01	57.40	52.24
F	57.51	2.265	10057	.3683E+01	.1450E+00	60.98	55.33

TABLE D6-26

SPECIMEN NUMBER: 175-456-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFNED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 299.8 K
SPECIMEN THICKNESS: 11.37 MM (.4476 IN)
MAXIMUM STRESS: 217.1 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 2174 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 52.53 MPA SQRT(M) (47.80 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.37	.093	1	.5465E-03	.2152E-04	18.67	16.99
	2.55	.112	854	.1312E-02	.5164E-04	20.45	18.61
	3.41	.134	1310	.2182E-02	.8591E-04	22.32	20.31
	4.04	.159	1601	.2322E-02	.9134E-04	23.92	21.77
	4.51	.178	1803	.4574E-02	.1802E-03	25.63	23.32
	5.31	.209	1977	.8751E-02	.3446E-03	27.45	24.98
	5.96	.234	2051	.8182E-02	.3536E-03	28.82	26.23
	6.45	.254	2106	.3413E-01	.1344E-02	30.91	29.13
	7.91	.308	2148	.1086E+03	.3973E-02	34.41	31.31
	9.83	.387	2166	.1159E+01	.4559E-01	41.42	37.70
F	15.62	.615	2171	.2261E+01	.8900E-01	47.68	43.48
F	17.88	.704	2172	.4364E+01	.1600E-01	46.81	45.15
F	18.29	.720	2173				

TABLE D6-27

SPECIMEN NUMBER: 175-459-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFNED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 295.0 K
SPECIMEN THICKNESS: 11.65 MM (.4585 IN)
MAXIMUM STRESS: 172.4 MPA (25.1 KSI)
R-RATIO: .15
FREQUENCY: 20.0 CPM
CYCLES TO FAILURE: 11 CYCLES
K(MAX) 11 CYCLES PRIOR TO FAILURE: 31.18 MPA SQRT(M) (28.39 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.03	.080	1				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D6-28

SPECIMEN NUMBER: SL2-493-1
SPECIMEN ORIENTATION: L-T/T-L
LONGITUDINAL
UNSTIFFENED
GRID SIZE
SKIN GAGE
TEST TEMPERATURE: 288°K
SPECIMEN THICKNESS: 11.48 MM (.452 IN)
MAXIMUM STRESS: 143.2 MPA (20.8 KSI)
R-RATIO: .10
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 45782 CYCLES
K(MAX) 537 CYCLES PRIOR TO FAILURE: 62.93 MPA SQRT(M) (57.27 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.51	.138	1				
	4.30	.169	8343	.9424E-04	.3710E-05	7.93	7.22
	4.85	.191	12624	.1298E-03	.5184E-05	8.59	7.82
	5.49	.216	16447	.1601E-03	.6610E-05	9.14	8.31
	6.31	.249	20742	.2158E-03	.8498E-05	9.76	8.88
	6.95	.274	22714	.2584E-03	.1017E-04	10.35	9.42
	7.57	.298	24739	.3119E-03	.1228E-04	10.87	9.46
	8.36	.330	27799	.3163E-03	.1245E-04	11.36	10.34
	9.17	.361	29120	.4281E-03	.1678E-04	11.92	10.85
	9.90	.390	31012	.3877E-03	.1525E-04	12.43	11.31
	10.62	.418	32386	.5232E-03	.2060E-04	12.90	11.74
	11.36	.447	33348	.7675E-03	.3022E-04	13.35	12.15
	12.34	.486	34641	.5229E-03	.2059E-04	13.78	12.54
	12.92	.539	35796	.7774E-03	.3061E-04	14.24	12.96
	13.48	.531	36502	.7765E-03	.3057E-04	14.66	13.34
	14.09	.553	37113	.9208E-03	.3625E-04	14.97	13.62
	14.74	.580	37774	.1159E-02	.4563E-04	15.32	13.94
	15.69	.618	38500	.1305E-02	.5138E-04	15.78	14.36
	16.21	.638	38877	.1384E-02	.5385E-04	16.14	14.69
	16.89	.665	39337	.1583E-02	.6233E-04	16.45	14.97
	17.63	.686	39688	.1417E-02	.5577E-04	16.78	15.25
	18.29	.718	40153	.1764E-02	.6946E-04	17.10	15.56
	18.94	.745	40535	.1802E-02	.7094E-04	17.47	15.90
	19.73	.777	40979	.2136E-02	.8409E-04	17.93	16.23
	21.42	.843	41687	.2503E-02	.1145E-03	19.42	16.77
	22.58	.889	41932	.2611E-02	.1028E-03	19.99	17.37
	23.97	.944	42253	.3324E-02	.1309E-03	19.66	17.89
	25.13	.989	42541	.5125E-02	.1974E-03	20.23	18.41
F	27.18	1.070	42902	.9275E-02	.3652E-03	20.93	19.04
F	28.45	1.120	43032	.8350E-02	.2500E-03	21.64	19.65
F	29.46	1.160	43202	.5143E-02	.2000E-03	22.12	20.13
F	30.99	1.220	43432	.7622E-02	.3003E-03	22.65	20.61
F	32.76	1.290	43632	.6350E-02	.2500E-03	23.22	21.13
F	34.74	1.368	43752	.1189E-01	.4667E-03	23.94	21.78
F	35.56	1.400	43932	.1016E-01	.4000E-03	24.51	22.30
F	37.08	1.460	44032	.1524E-01	.6000E-03	25.12	22.86
F	39.17	1.556	44132	.2286E-01	.9000E-03	25.98	23.65
F	41.40	1.630	44202	.2032E-01	.8000E-03	26.71	24.33
F	42.67	1.680	44277	.1693E-01	.6667E-03	27.38	24.92
F	44.45	1.750	44352	.2371E-01	.9333E-03	27.98	25.47
F	45.47	1.790	44412	.2032E-01	.8000E-03	28.53	25.97
F	46.74	1.840	44462	.2540E-01	.1000E-02	28.99	26.38
F	48.01	1.890	44512	.2540E-01	.1000E-02	29.40	26.84
F	49.28	1.940	44562	.2540E-01	.1000E-02	29.99	27.38
F	52.12	2.052	44665	.2697E-01	.1062E-02	30.95	28.08

TABLE D6-29

SPECIMEN NUMBER: 4L18-456-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 298.0 K
SPECIMEN THICKNESS: 11.61 MM (.4573 IN)
MAXIMUM STRESS: 213.7 MPA 31.5 KSI
R-RATIO: .05
FREQUENCY: 210 CPM
CYCLES TO FAILURE: 12466 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 93.94 [illegible] RT(M)(85.47 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.59	.102	1	.2254E-03	.8873E-05	10.84	9.86
3.75	.148	5163	.5392E-03	.2005E-04	12.72	11.58
4.94	.196	7643	.7742E-03	.3.44E-04	14.45	13.15
6.26	.247	9243	.1374E-02	.5404E-04	16.00	14.56
7.41	.236	10147	.2211E-02	.8702E-04	17.37	15.81
8.71	.343	10842	.3183E-02	.1253E-03	18.67	16.75
9.42	.371	11159	.4169E-02	.1641E-03	19.88	18.10
11.29	.444	11338	.5254E-02	.2069E-03	21.03	19.14
12.19	.488	11438	.1014E-01	.4009E-03	22.80	20.82
13.49	.531	11716	.1024E-01	.4033E-03	23.30	25.93
14.73	.580	11837	.1341E-01	.5467E-03	24.11	21.94
16.23	.639	11934	.1511E-01	.5934E-03	25.17	22.97
17.32	.682	12007	.2033E-01	.8006E-03	26.21	23.95
18.07	.751	12083	.2415E-01	.9505E-03	27.42	24.65
20.02	.812	12157	.2019E-01	.7909E-03	28.36	25.81
21.72	.855	12212	.2498E-01	.9836E-03	29.16	26.71
23.47	.924	12292	.3163E-01	.1323E-02	31.18	27.62
24.66	.971	12317	.3063E-01	.1256E-02	31.77	29.46
26.24	1.033	12369	.6274E-01	.2472E-02	32.49	29.76
29.11	1.142	12413	.6426E-01	.2294E-02	33.47	31.02
29.91	1.178	12429	.1141E-01	.4500E-02	34.56	31.45
31.19	1.228	1244[illegible]	.4384E-01	.1726E-01	35.77	32.55
37.42	1.332	12466	.4481E-01	.1757E-01	37.76	33.91
36.5	1.419	12441	.6877E-01	.2707E-01	38.36	34.91
37.43	1.474	12453	.4419E-00	.1899E-01	39.35	35.81
39.35	1.549	12457	.6481E-01	.2551E-01	41.[illegible]	37.[illegible]
41.45	1.631	12461	.1356E-01	.5340E-01	42.77	38.46
44.56	1.754	12463	.3244E-01	.1277E-00	45.31	40.95
51.[illegible]	2.[illegible]	12466				

TABLE D6-30

SPECIMEN NUMBER: 4L4-456-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: WET AIR
TEST TEMPERATURE: 298.0 K
SPECIMEN THICKNESS: 11.61 MM (.4571 IN)
MAXIMUM STRESS: 183.5 MPA (55.5 KSI)
R-RATIO: .5
FREQUENCY: 205 CPM
CYCLES TO FAILURE: 77[illegible] CYCLES
K(MAX) 4 CYCLES PRIOR TO FAILURE: 58.67 MPA SQRT(M)(52.94 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.22	.[illegible]	1	.2142E-02	.8439E-04	16.44	15.33
2.77	.1.7	231	.3178E-02	.1251E-03	17.79	16.37
3.92	.115	235	.4302E-02	.1576E-03	18.32	17.22
5.31	.[illegible]	334	.2244E-02	.8852E-04	20.35	18.52
3.49	.153	651	.6654E-02	.2622E-03	21.56	19.62
4.21	.165	647	.1917E-01	.7545E-03	23.35	20.47
5.4	.[illegible]38	741	.1331E+03	.5241E-02	24.48	22.63
5.71	.225	745	.7469E-01	.2941E-02	26.04	23.76
6.[illegible]8	.239	751	.6248E-01	.2461E-02	27.13	24.69
6.71	.264	761	.5531E-01	.2177E-02	28.41	25.85
7.31	.[illegible]28	772				

TABLE D6-31

SPECIMEN NUMBER	177-453-7
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	296.7 K
SPECIMEN THICKNESS	11.43 MM (.4503 IN)
MAXIMUM STRESS	140. MPA (21.3 KSI)
R-RATIO	.5
FREQUENCY	240 CPM
CYCLES TO FAILURE	14544 CYCLES
K(MAX) 522 CYCLES PRIOR TO FAILURE	35.20 MPA SQRT(M) (4.74 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
6.72	.265	1	.3468E-03	.1365E-04	12.64	9.47
7.11	.280	1062	.3739E-03	.1472E-04	12.96	9.95
7.19	.283	4056	.4476E-03	.1762E-04	11.92	10.49
7.61	.299	5869	.5434E-03	.2140E-04	11.98	11.91
7.99	.314	6953	.4372E-03	.3296E-04	12.44	11.32
8.42	.331	7939	.4431E-03	.3319E-04	12.97	11.91
8.82	.347	9011	.8791E-03	.3461E-04	13.38	12.18
9.79	.384	9837	.1354E-02	.5346E-04	13.79	12.64
12.73	.501	10213	.1142E-02	.4503E-04	14.27	13.42
13.26	.522	10737	.1357E-02	.5347E-04	14.54	13.23
13.96	.550	11293	.1396E-02	.5471E-04	14.98	13.64
14.49	.571	11692	.1723E-02	.6792E-04	13.18	13.46
15.04	.592	11979	.1573E-02	.7784E-04	15.49	14.11
15.74	.620	12234	.2543E-02	.1159E-03	15.84	14.42
16.41	.646	12491	.2889E-02	.1137E-03	16.19	14.73
17.11	.674	12695	.1584E-02	.7812E-04	16.49	15.01
17.65	.695	13077	.3687E-02	.1449E-03	16.91	15.29
18.37	.723	13273	.4306E-02	.1577E-03	17.20	15.65
19.61	.772	13516	.6543E-02	.2575E-03	17.39	16.33
21.59	.850	13854	.8375E-02	.3297E-03	18.74	17.09
23.31	.918	14024				

TABLE D6-32

SPECIMEN NUMBER	172-456-2
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	297.0 K
SPECIMEN THICKNESS	11.13 MM (.4380 IN)
MAXIMUM STRESS	21.3 MPA (21.6 KSI)
R-RATIO	.50
FREQUENCY	200 CPM
CYCLES TO FAILURE	7595 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE	53.69 MPA SQRT(M) (47.68 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	2.49	.098	1	.2426E-03	.9550E-05	10.68	9.72
	3.66	.144	4823	.6913E-03	.2722E-04	12.71	11.57
	5.16	.199	6942	.3157E-02	.1243E-03	14.70	13.38
	6.59	.259	7329	.9893E-02	.3777E-03	16.53	15.04
	8.12	.320	7497	.2559E-01	.1008E-02	18.50	16.84
	13.25	.475	7572	.8183E+00	.3222E-01	21.42	19.66
F	15.24	.599	7578	.1549E+00	.6103E-02	24.19	22.01
F	15.98	.629	7583	.1179E+00	.4250E-02	24.67	22.45
F	16.41	.646	7587	.5508E+00	.2208E-01	25.48	23.19
F	18.08	.712	7592	.3348E+00	.1208E-01	25.23	23.87
F	18.39	.724	7591	.1736E+00	.6833E-02	26.64	24.19
F	18.91	.744	7594				

TABLE D6-33

SPECIMEN NUMBER	3T4-459-2
ALLOY TYPE	2124-T851
SPECIMEN ORIENTATION	TRANSVERSE
CONSTRAINT	UNSTIFFENED
ENVIRONMENT	WET AIR
TEST TEMPERATURE	296.9 K
SPECIMEN THICKNESS	11.46 MM (.4510 IN)
MAXIMUM STRESS	372.[illegible] MPA (53.9 KSI)
R-RATIO	.50
FREQUENCY	200 CPM
CYCLES TO FAILURE	607 CYCLES
K(MAX) 506 CYCLES PRIOR TO FAILURE	31.29 MPA SQRT(M) (28.47 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
2.25	.089	1				

TABLE D6-34

SPECIMEN NUMBER: SL1-463-3
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 11.54 MM (.4545 IN)
MAXIMUM STRESS: 137.9 MPA (20.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: GRIP FAILURE

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.15	.124					
3.96	.156	2163	.3913E-03	.1383E-04	13.48	12.63
4.71	.185	5438	.6389E-03	.2389E-04	15.28	13.91
5.48	.216	4556	.6744E-03	.2657E-04	16.58	15.09
6.14	.242	632.	.8518E-03	.3392E-04	17.71	16.12
6.91	.272	5995	.9833E-03	.3919E-04	18.78	17.02
7.63	.300	6667	.1215E-02	.4762E-04	19.75	17.97
8.31	.327	7218	.1247E-02	.4909E-04	20.78	18.89
8.92	.351	7619	.1504E-02	.5935E-04	21.59	19.64
9.41	.370	7919	.2166E-02	.8527E-04	22.15	20.38
10.27	.404	8330	.1421E-02	.7169E-04	21.70	21.11
11.18	.435	8731	.2259E-02	.8134E-04	24.15	21.93
11.43	.450	9992	.2591E-02	.1020E-03	24.28	22.72
12.48	.441	9272	.2334E-02	.9193E-04	25.64	23.37
13.13	.529	9639	.2525E-02	.9943E-04	26.49	24.11
13.38	.552	9817	.3123E-02	.1230E-03	27.24	24.81
14.63	.575	9936	.3426E-02	.1349E-03	27.91	25.40

TABLE D6-35

SPECIMEN NUMBER: 2T8-463-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 422.0 K
SPECIMEN THICKNESS: 11.53 MM (.4568 IN)
MAXIMUM STRESS: 131.7 MPA (24.9 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: GRIP FAILURE
K(MAX) AT 9230 CYCLES PRIOR TO FAILURE: 24.27 MPA (SQRT(M)) 22.09 KSI SQRT(IN))

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES N	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.41	.095					
2.94	.116	1974	.2726E-03	.1075E-04	14.95	13.60
3.55	.140	3281	.4614E-03	.1817E-04	16.47	14.99
4.15	.163	4193	.6671E-03	.2390E-04	17.98	16.27
5.01	.197	5017	.1102E-02	.4339E-04	19.51	17.76
5.82	.229	5498	.1726E-02	.6794E-04	21.24	19.37
6.35	.250	5868	.1471E-02	.5792E-04	22.57	20.54

TABLE D6-36

SPECIMEN NUMBER: SL1-483-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONFIGURATION: UNSPECIFIED
FEATURE: LAB AIR
TEST TEMPERATURE: 288.9 K
SPECIMEN THICKNESS: 11.43 MM (.450 IN)
MAXIMUM STRESS: 107.0 MPA (15.0 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 39637 CYCLES
KMAX1 544 CYCLES PRIOR TO FAILURE: 54.67 MPA SQRT(M) (49.75 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	DELTA STRESS INTENSITY KSI SQRT(IN)
	2.97	.117	1	.1158E-03	.4561E-05	10.57	9.62
	3.66	.144	5932	.1549E-03	.6098E-05	11.70	10.65
	4.47	.176	11148	.2791E-03	.1099E-04	12.75	11.60
	5.17	.204	13695	.3242E-03	.1277E-04	13.95	12.33
	5.72	.225	15391	.4283E-03	.1686E-04	14.29	13.00
	6.38	.251	16924	.5110E-03	.2012E-04	15.34	13.69
	7.03	.277	18254	.5590E-03	.2201E-04	15.78	14.36
	7.71	.303	19415	.7847E-03	.3089E-04	16.79	15.28
	8.98	.353	21014	.6859E-03	.2697E-04	17.69	16.10
	9.55	.376	21865	.9786E-03	.3853E-04	18.29	16.65
	10.22	.403	22859	.9834E-03	.3872E-04	18.87	17.17
	10.80	.425	23143	.9431E-03	.3714E-04	19.47	17.72
	11.56	.455	23943	.9313E-03	.3667E-04	20.06	18.26
	12.17	.479	24600	.1264E-02	.4976E-04	20.55	18.70
	12.70	.500	25020	.1281E-02	.5043E-04	21.02	19.13
	13.25	.523	25445	.1277E-02	.5026E-04	21.55	19.62
	14.12	.556	26052	.1238E-02	.4873E-04	22.10	20.11
	14.65	.577	26564	.1389E-02	.5467E-04	22.54	20.53
	15.22	.599	26960	.1454E-02	.5725E-04	22.99	20.92
	15.78	.621	27360	.1758E-02	.6920E-04	23.53	21.41
	16.62	.654	27914	.1533E-02	.6037E-04	24.10	21.93
	17.33	.682	28297	.1911E-02	.7524E-04	24.57	22.36
	17.91	.705	28604	.1582E-02	.6230E-04	24.95	22.74
	18.50	.728	28974				
	19.22	.756	29421	.1571E-02	.6186E-04	25.44	23.16
	19.95	.785	29762	.2309E-02	.9091E-04	25.98	23.63
	20.67	.814	30021	.2644E-02	.1042E-03	26.47	24.09
	21.37	.841	30340	.2174E-02	.8574E-04	26.94	24.51
	22.78	.897	30898	.2524E-02	.9937E-04	27.64	25.15
	23.28	.917	31236	.1644E-02	.6487E-04	28.26	25.72
	24.79	.976	31494	.3615E-02	.1423E-03	28.76	26.17
	24.43	.962	31732	.2957E-02	.1164E-03	29.28	26.65
	25.54	1.005	31933	.3145E-02	.1238E-03	29.69	27.01
	26.43	1.041	32264	.3454E-02	.1360E-03	30.27	27.55
	27.18	1.070	32519	.3781E-02	.1489E-03	31.09	28.29
	29.26	1.152	32912	.5692E-02	.2241E-03	31.93	29.06
	30.34	1.194	33092	.4184E-02	.1647E-03	32.50	29.57
	31.69	1.247	33378	.4037E-02	.1590E-03	33.19	30.21
	32.77	1.290	33645	.4481E-02	.1764E-03	33.90	30.85
	34.17	1.345	33931	.6249E-02	.2066E-03	34.65	31.53
	35.44	1.395	34115	.6149E-02	.2421E-03	35.43	32.24
	36.43	1.434	34359	.5849E-02	.2304E-03	36.22	32.96
	38.53	1.517	34841	.7677E-02	.3023E-03	37.12	33.76
	40.07	1.577	34739	.6934E-02	.2731E-03	38.02	34.60
	41.32	1.627	34976	.7193E-02	.2834E-03	38.41	35.32
	43.19	1.701	35141	.9171E-02	.3581E-03	39.22	36.14
	44.63	1.757	35312	.1151E-01	.3939E-03	40.52	36.97
F	47.53	1.872	35463	.1548E-01	.7828E-03	41.95	38.09
F	48.51	1.910	35503	.1316E-01	.6000E-03	43.01	39.14
F	49.31	1.941	35613	.2794E-01	.1103E-02	43.70	39.77
F	50.19	1.976	35688	.1165E-01	.4667E-03	44.16	40.37
F	51.66	2.035	35743	.1614E-01	.6364E-03	44.98	40.84
F	52.70	2.076	35823	.1270E-01	.5003E-03	45.43	41.34
F	54.17	2.134	35913	.1592E-01	.6111E-03	46.13	41.98
F	54.17	2.134	35969	.2540E-01	.1000E-02	46.92	42.70
F	56.36	2.240	36043	.1505E-01	.7500E-03	47.75	43.45
				.1524E-01	.6000E-03	48.47	44.08

D6-36 (CON'T.)

F	57.48	2.27	36093	.2288E-01	.9050E-03	49.00	44.68
F	58.80	2.315	38149	.2540E-01	.1000E-02	49.74	45.26
F	60.07	2.366	36133	.2572E-01	.4080E-03	50.44	45.90
F	61.48	2.421	36243	.3815E-01	.1500E-02	51.34	46.72
F	62.95	2.479	36233				

TABLE D6-37

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
CONFIGURATION:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

ALLOY-ALLOY
2124-T851
LONGITUDINAL
UNSTIFFENED
LAB AIR
RT
11.63 MM (.458 IN)
211.1 MPA (31.5 KSI)
.10
20 CPM
3716 CYCLES

K(MAX) 1 CYCLES PRIOR TO FAILURE (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.90	.101	1	.9026E-03	.3554E-04	19.88	18.09
	3.33	.131	838	.1473E-02	.5800E-04	22.42	20.40
	4.18	.165	1413	.2198E-02	.8623E-04	24.90	22.66
	5.09	.238	1827	.3361E-02	.1323E-03	26.92	24.50
	5.74	.226	2022	.4253E-02	.1674E-03	28.48	25.85
	6.30	.248	2154	.3886E-02	.1530E-03	30.32	27.32
	7.15	.282	2372	.5278E-02	.2078E-03	31.94	29.06
	8.06	.318	2545	.6131E-02	.2414E-03	33.76	30.72
	8.92	.351	2684	.7514E-02	.2961E-03	35.50	32.30
	9.85	.388	2838	.8357E-02	.3293E-03	37.09	33.76
	10.63	.418	2931	.1322E-01	.4029E-03	39.43	35.88
	12.47	.491	3081	.1325E-01	.5219E-03	41.71	37.96
	13.33	.525	3146	.1622E-01	.6384E-03	43.14	39.26
	14.24	.562	3252	.1384E-01	.5449E-03	44.61	40.60
	15.19	.598	3271	.1898E-01	.7473E-03	45.88	41.75
	16.49	.626	3319	.1961E-01	.7721E-03	47.27	43.02
	17.25	.671	3367	.2009E-01	.7911E-03	48.59	44.31
	17.83	.702	3406	.2887E-01	.1059E-02	49.82	45.32
	18.61	.733	3435	.3023E-01	.1193E-02	50.94	46.36
	19.46	.766	3463	.3556E-01	.1398E-02	52.19	47.41
	20.27	.798	3486	.3749E-01	.1476E-02	53.28	48.49
	21.21	.835	3511	.4621E-01	.1783E-02	54.36	49.47
	21.49	.842	3525	.9884E-01	.3814E-02	66.37	57.35
	22.66	.892	3534	.9329E-01	.3662E-02	57.19	51.96
F	24.51	.965	3554	.7174E-01	.2820E-02	58.97	53.92
F	26.16	1.031	3577	.8194E-01	.3224E-02	61.47	56.28
F	28.72	1.130	3604	.1013E-00	.4211E-02	64.09	58.80
F	31.73	1.249	3627	.1159E-00	.4722E-02	67.11	61.57
F	32.49	1.279	3645	.1484E-01	.6025 E-02	68.89	63.17
F	33.47	1.318	3661	.1481E-01	.6051E-02	73.27	66.63
F	34.71	1.366	3681	.2245E-00	.8846E-02	76.69	69.86
F	41.68	1.641	3694	.2881E-01	.1134E-01	81.33	73.92
F	44.91	1.768	3705	.5233E-01	.2060E-01	89.33	79.74
F	47.31	1.862	3709	.5482E-01	.2158E-01	91.19	79.35
F	49.56	1.951	3713				
F	50.31	1.980	3716				

(NET STRESS GREATER THAN 0.9 FTY)

TABLE D6-38

SPECIMEN NUMBER: 4L2-459-7
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 453.0 K
SPECIMEN THICKNESS: 11.49 MM (.452 IN)
MAXIMUM STRESS: 197.0 MPA (28.5 KSI)
R-RATIO: .05
FREQUENCY: 230 CPM
CYCLES TO FAILURE: 799 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.0 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.90	.114	1				
	3.73	.147	244	.3764E-02	.1482E-03	29.52	26.87
	4.59	.179	430	.5233E-02	.2061E-03	33.27	30.27
	5.19	.204	511	.6736E-02	.2376E-03	36.39	32.84
	6.05	.246	591	.1546E-01	.6087E-03	35.12	35.60
	8.24	.324	637	.3486E-01	.1372E-02	44.36	40.19
	9.14	.357	659	.3916E-01	.1494E-02	48.19	43.85
	9.93	.331	678		(NET STRESS GREATER THAN 0.0 FTY)		
F	12.12	.477	714		(NET STRESS GREATER THAN 0.0 FTY)		
F	13.05	.518	730		(NET STRESS GREATER THAN 0.0 FTY)		
F	15.11	.622	745		(NET STRESS GREATER THAN 0.0 FTY)		
F	17.04	.667	760		(NET STRESS GREATER THAN 0.0 FTY)		
F	19.54	.736	771		(NET STRESS GREATER THAN 0.0 FTY)		
F	19.88	.742	776		(NET STRESS GREATER THAN 0.0 FTY)		
F	21.44	.904	794		(NET STRESS GREATER THAN 0.0 FTY)		
F	23.69	.933	799		(NET STRESS GREATER THAN 0.0 FTY)		
F	24.89	.996	791		(NET STRESS GREATER THAN 0.0 FTY)		
F	26.29	1.035	793		(NET STRESS GREATER THAN 0.0 FTY)		
F	28.11	1.112	795		(NET STRESS GREATER THAN 0.0 FTY)		
F	29.44	1.175	796		(NET STRESS GREATER THAN 0.0 FTY)		
F	31.37	1.249	797		(NET STRESS GREATER THAN 0.0 FTY)		
F	34.29	1.332	798		(NET STRESS GREATER THAN 0.0 FTY)		

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D6-39

SPECIMEN NUMBER:
ALLOY TYPE:
SPECIMEN ORIENTATION:
CONSTRAINT:
ENVIRONMENT:
TEST TEMPERATURE:
SPECIMEN THICKNESS:
MAXIMUM STRESS:
R-RATIO:
FREQUENCY:
CYCLES TO FAILURE:

K(MAX) 50 CYCLES PRIOR TO FAILURE: 60.61 MPA SQRT(M) (54.61 KSI SQRT(IN)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
3.12	.119	1	.1172E-03	.4616E-05	10.47	9.62
3.64	.143	532	.2187E-03	.8599E-05	11.56	10.52
4.19	.174	8629	.2466E-03	.1047E-04	12.50	11.38
4.99	.196	11130	.3176E-03	.1251E-04	13.40	12.19
5.70	.224	13369	.4349E-03	.1712E-04	14.22	12.94
6.36	.249	14838	.4371E-03	.1603E-04	14.93	13.58
6.91	.272	16248	.5341E-03	.2103E-04	15.53	14.23
7.61	.300	17553	.4416E-03	.1738E-04	16.30	14.94
8.19	.322	18843	.7334E-03	.2769E-04	16.99	15.46
8.85	.352	19945	.9846E-03	.3884E-04	17.67	16.08
9.56	.376	20859	.8139E-03	.2615E-04	18.38	16.73
10.46	.412	22035	.1611E-02	.6344E-04	19.19	17.47
11.35	.447	22582	.1162E-02	.4574E-04	19.49	18.10
12.04	.474	23161	.1126E-02	.4435E-04	20.43	18.59
12.61	.497	23713	.1423E-02	.5604E-04	21.01	19.12
13.43	.529	24266	.9519E-03	.3748E-04	21.72	19.77
14.39	.566	25268	.1531E-02	.6026E-04	22.33	20.32
14.97	.590	25853	.1334E-02	.5254E-04	22.77	20.72
15.52	.611	26363	.2111E-02	.8307E-04	23.18	21.10
16.16	.636	26817	.1777E-02	.6987E-04	23.58	21.46
16.59	.653	26614	.2119E-02	.8344E-04	24.31	21.85
17.23	.678	28914	.2567E-02	.1011E-03	24.44	22.26
17.43	.686	27151	.3170E-02	.1219E-03	24.47	22.63
18.36	.723	27323	.2795E-02	.1100E-03	25.29	23.00
18.48	.727	27547	.2629E-02	.1035E-03	25.72	23.48
18.82	.740	27749	.3336E-02	.1313E-03	26.14	23.79
19.21	.756	27967	.4374E-02	.1724E-03	26.66	24.26
19.62	.772	28175	.3126E-02	.1223E-03	27.18	24.73
19.78	.779	28336	.4886E-02	.1921E-03	27.62	25.14
20.46	.806	28626	.3974E-02	.1512E-03	28.04	25.52
20.86	.821	28792	.5642E-02	.2221E-03	28.48	25.91
21.42	.843	28913	.3851E-02	.1516E-03	28.97	26.27
21.79	.858	29037	.4642E-02	.1827E-03	29.44	26.79
22.43	1.033	29221	.5781E-02	.2276E-03	30.16	27.45
22.99	1.049	29333	.5452E-02	.2146E-03	30.98	28.20
23.25	1.112	29497	.6207E-02	.2444E-03	31.86	28.99
23.46	1.120	29632	.1093E-01	.4302E-03	32.66	29.72
23.92	1.217	30126	.8235E-02	.3242E-03	33.65	30.62
F 23.79	1.231	30253	.7201E-02	.2835E-03	34.61	31.50
F 24.19	1.346	30447	.1038E-01	.4086E-03	35.61	32.41
F 24.23	1.426	30644	.1339E-01	.5271E-03	36.70	33.40
F 27.38	1.435	30773	.1937E-01	.7234E-03	37.69	34.30
F 29.69	1.563	30867	.2291E-01	.9043E-03	38.79	35.30
F 41.45	1.648	30961	.3055E-01	.1203E-02	40.05	36.45
F 44.11	1.736	31038	.3427E-01	.1349E-02	41.31	37.59
F 46.27	1.822	31098	.5651E-01	.2225E-02	42.57	38.74
F 48.53	1.911	31134	.6574E-01	.2588E-02	44.14	40.21
F 51.48	2.043	31185	.1324E+00	.5212E-02	46.14	42.00
F 54.32	2.178	31215	.4610E-01	.1815E-02	47.90	43.59
F 57.41	2.276	31269	.9208E-01	.3625E-02	49.42	44.98
F 62.39	2.377	31297	.1223E+00	.4817E-02	51.34	46.72
F 64.36	2.522	31327	.1209E+00	.4760E-02	53.45	48.64
F 67.18	2.641	31352	.1439E+00	.5667E-02	55.78	50.7
F 70.47	2.774	31379				

TABLE D6-40

SPECIMEN NUMBER: 2T8-459-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.46 MM (.4513 IN)
MAXIMUM STRESS: 217.3 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 1901 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 36.62 MPA SQRT(M) (33.31 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.46	.097	1				
	3.17	.125	592	.1197E-02	.4712E-04	19.47	17.68
	4.11	.162	1019	.1465E-02	.7349E-04	21.49	19.92
	4.84	.191	1249	.1815E-02	.1197E-03	24.24	21.88
	5.22	.206	1411	.3834E-02	.1421E-03	25.67	23.38
	5.84	.230	1535	.4594E-02	.2597E-03	27.47	25.00
	6.49	.256	1612	.1107E-01	.4357E-03	29.44	26.79
	7.08	.279	1681	.1134E-01	.4464E-03	31.26	28.44
	7.78	.306	1744	.1754E-01	.6905E-03	33.23	30.24
	8.53	.336	1776	.2655E-01	.1045E-02	35.17	32.00
	1.04	.427	1819	.3644E-01	.1436E-02	37.11	33.76
	11.53	.453	1871	.5538E-01	.2179E-02	38.77	35.29
	12.42	.489	1815	.6595E-01	.2596E-02	40.19	36.54
	13.61	.536	1847	.9883E-01	.3892E-02	41.91	38.14
	14.58	.574	1868	.8844E-01	.3482E-02	43.65	39.72
	15.47	.609	1885	.1275E+00	.5021E-02	45.11	41.05
F	19.18	.724	1873	.3627E+00	.1428E-01	47.95	43.64
F	20.55	.809	1883	.2172E+00	.8551E-02	51.55	46.92
F	22.51	.886	1888	.2921E+00	.1150E-01	54.12	49.16
F	26.66	1.050	1899	.4648E+01	.1830E+00	58.00	52.78
F	28.59	1.126	1903	.1538E+01	.7680E-01	62.19	56.51

TABLE D6-41

SPECIMEN NUMBER: 5T3-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.61 MM (.4570 IN)
MAXIMUM STRESS: 307.5 MPA (44.6 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 425 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 7.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.69	.134	1				
	3.40	.134	212	.3575E-02	.1408E-03	28.48	25.91
	4.17	.164	319	.7255E-02	.2836E-03	31.47	29.00
	4.97	.196	367	.1662E-01	.6542E-03	35.02	31.87
	5.88	.231	390	.3954E-01	.1557E-02	38.16	34.73
	6.67	.263	406	.4969E-01	.1956E-02	41.06	37.37
	7.50	.295	412	.1383E+00	.9433E-02	43.49	39.72
F	9.64	.380	419	.3562E+01	.1403E-01	48.03	43.71
F	10.41	.410	422		(NET STRESS GREATER THAN 7.9 FTY)		
F	11.42	.450	423		(NET STRESS GREATER THAN 0.9 FTY)		
F	12.60	.496	424		(NET STRESS GREATER THAN 0.9 FTY)		

TABLE D6-42

SPECIMEN NUMBER: 4L2-453-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 450.0 K
SPECIMEN THICKNESS: 11.43 MM (.4500 IN)
MAXIMUM STRESS: 109.0 MPA (15.8 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 117072 CYCLES
K(MAX) 30 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	3.31	.130	1				
	4.63	.182	23938	.5523E-04	.2174E-05	6.09	5.54
	5.42	.213	32113	.9632E-04	.3792E-05	6.85	6.23
	5.82	.229	40392	.4869E-04	.1917E-05	7.25	6.59
	6.67	.263	49160	.9709E-04	.3822E-05	7.64	6.95
	7.44	.293	53886	.1631E-03	.6422E-05	8.12	7.39
	8.13	.316	57823	.1617E-03	.6365E-05	8.51	7.74
	8.47	.333	60412	.1508E-03	.5936E-05	8.79	8.00
	9.17	.361	64767	.1616E-03	.6361E-05	9.09	8.27
	9.66	.380	67458	.1808E-03	.7116E-05	9.19	8.55
	10.57	.416	69925	.3709E-03	.1460E-04	9.74	8.86
	11.22	.442	72838	.2228E-03	.8773E-05	10.11	9.20
	11.76	.463	75345	.2139E-03	.8423E-05	10.39	9.45
	11.95	.467	77806	.3671E-04	.1445E-05	10.51	9.56
	13.01	.512	79595	.9719E-03	.3826E-04	10.81	9.84
	13.69	.539	80934	.3560E-03	.1402E-04	11.21	10.20
	14.32	.564	82934	.3939E-03	.1551E-04	11.49	10.45
	14.95	.586	84152	.3505E-03	.1380E-04	11.74	10.68
	15.55	.611	86672	.4523E-03	.1783E-04	12.00	10.92
	16.26	.640	87059	.4804E-03	.1891E-04	12.27	11.17
	16.42	.656	88547	.4503E-03	.1773E-04	12.53	11.41
	17.54	.691	89733	.4964E-03	.1954E-04	12.78	11.63
	18.19	.716	90973	.5758E-03	.2267E-04	13.02	11.85
	18.74	.739	92058	.5212E-03	.2052E-04	13.25	12.06
	19.43	.765	93119	.6164E-03	.2427E-04	13.48	12.27
	20.15	.789	94216	.5557E-03	.2201E-04	13.72	12.48
	20.71	.815	95072	.7685E-03	.3026E-04	13.94	12.69
	21.36	.841	96024	.6512E-03	.2721E-04	14.18	12.90
	22.0[illegible]	.866	96960	.6539E-03	.2692E-04	14.41	13.11
	22.58	.889	97747	.7278E-03	.2865E-04	14.62	13.30
	23.45	.921	98759	.8113E-03	.3197E-04	14.86	13.52
	23.95	.941	99342	.9530E-03	.3752E-04	15.09	13.74
	24.37	.957	100049	.8688E-03	.3420E-04	15.35	13.92
	25.43	1.001	101533	.8833E-03	.3489E-04	15.61	14.20
	26.41	1.040	[illegible]	.9585E-03	.3774E-04	15.91	14.48
	27.12	1.068	102754	.1070E-02	.4169E-04	16.12	14.67
	28.3[illegible]	1.114	103837	.1287E-02	.4283E-04	16.47	14.95
	29.47	1.160	104447	.1181E-02	.4649E-04	16.80	15.29
	30.74	1.211	105817	.1315E-02	.5175E-04	17.20	15.65
	[illegible]	[illegible]	106642	.1358E-02	.5347E-04	17.61	16.03
	33.44	1.316	107631	.1620E-02	.6378E-04	18.23	16.41
	34.7[illegible]	1.367	108361	.1761E-02	.6931E-04	18.62	16.77
	[illegible]	1.417	109174	.1876E-02	.6947E-04	19.02	17.12
	[illegible]	1.462	[illegible]	.2426E-02	.9552E-04	19.22	17.48
	[illegible]	1.574	110124	.1945E-02	.7658E-04	19.54	17.78
	[illegible]	[illegible]	[illegible]	.2572E-02	.1012E-03	19.99	18.10
	41.1[illegible]	1.618	111051	.2581E-02	.1016E-03	[illegible]	18.[illegible]
	[illegible]	1.666	111716	.2614E-02	.1029E-03	20.77	18.87
	[illegible]	1.719	112147	.2873E-02	.1131E-03	21.12	19.22
	[illegible]	[illegible]	[illegible]	.3446E-02	.1356E-03	21.56	19.61
	46.4[illegible]	[illegible]	[illegible]	.3945E-02	.1553E-03	[illegible]	19.99
F	[illegible]	[illegible]	[illegible]	.1370E-01	.5414E-03	22.34	20.33
F	51.33	[illegible]	[illegible]	.1483E-01	.5843E-03	23.17	20.99
F	51.71	[illegible]	117471	.1322E-01	.5723E-03	[illegible]	21.86
F	[illegible]	[illegible]	[illegible]	.4319E-02	.1651E-03	24.76	22.53
F	[illegible]	[illegible]	[illegible]	.4350E-02	.1712E-03	25.53	23.24
				[illegible]	[illegible]	26.13	24.01

D6-42 (CON'T.)

F	61.65	2.427	114932	.5763E-02	.2271E-03	27.19	24.75
F	63.67	2.506	115311	.1554E-01	.6117E-03	28.35	25.53
F	65.41	2.575	115637	.9151E-02	.3603E-03	29.06	26.35
F	68.93	2.713	115766	.1114E-01	.4387E-03	29.64	26.97
F	71.71	2.794	115929	.1477E-01	.5816E-03	30.35	27.62
F	72.49	2.470	116176	.1552E-01	.6111E-03	31.23	28.24
F	74.42	2.930	116175	.1007E-01	.7114E-03	31.93	28.96
F	77.11	3.036	116324	.1991E-01	.7839E-03	32.96	29.99
F	80.20	3.157	116479	.1205E-01	.4746E-03	33.92	30.87
F	81.86	3.223	116617	.3359E-01	.1293E-02	34.72	31.59
F	83.97	3.306	116646	.3349E-01	.1203E-02	35.64	32.44
F	86.11	3.390	116756	.2863E-01	.1127E-02	36.48	33.28
F	87.64	3.452	116811	.3718E-01	.1464E-02	37.46	34.09
F	91.25	3.593	116880	.4623E-01	.1820E-02	39.25	35.72
F	94.87	3.735	116983	.8194E-01	.3226E-02	41.91	38.14
F	99.95	3.935	117042				

TABLE D6-43

SPECIMEN NUMBER: SL3-456-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSYMMETRICAL
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 448°K
SPECIMEN THICKNESS: 11.48 MM (.4520 IN)
MAXIMUM STRESS: 217.3 MPA (31.5 KSI)
R-RATIO: .50
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 11061 CYCLES
K(MAX) AT CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
2.69	.106	1				
3.61	.138	2575	.3182E-03	.1253E-04	10.72	9.76
4.39	.173	4747	.5271E-03	.2079E-04	12.15	11.02
5.17	.199	5213	.7937E-03	.2759E-04	13.25	12.06
5.87	.231	6035	.9826E-03	.3869E-04	14.25	12.97
6.60	.260	6695	.1314E-02	.5173E-04	15.22	13.85
7.24	.285	7121	.1211E-02	.4769E-04	16.14	14.69
8.09	.319	7564	.1950E-02	.7531E-04	16.48	15.37
8.53	.336	7942	.2300E-02	.8911E-04	17.48	16.25
8.92	.351	8312	.1769E-02	.6924E-04	18.64	16.96
9.39	.370	8574	.2535E-02	.9981E-04	19.24	17.53
10.29	.405	8974	.2514E-02	.9914E-04	19.34	18.15
10.82	.434	9209	.3315E-02	.1313E-03	21.67	18.74
11.51	.451	9472	.3973E-02	.1525E-03	21.22	19.11
12.02	.468	9649	.5591E-02	.2202E-03	21.79	19.83
12.98	.511	9857	.7741E-02	.2773E-03	22.28	20.28
13.56	.543	9936	.6411E-02	.3471E-03	22.77	20.73
14.15	.557	9979	.1467E-01	.4174E-03	23.33	21.23
14.48	.586	9994	.9521E-02	.3906E-03	23.31	21.76
15.16	.613	9941	.9955E-02	.3812E-03	24.68	22.46
15.43	.663	9774	.1344E-01	.5307E-03	25.40	23.12
17.42	.686	9814	.1139E-01	.4174E-03	25.94	23.52
17.94	.706	9872	.9831E-02	.3871E-03	26.48	24.08
18.48	.731	9944	.1135E-01	.4468E-03	27.19	24.92
2.[illegible]	.[illegible]7	10119				

D6-43 (CON'T.)

	21.[illegible]	.437	10175	.1137E-01	.4477E-03	18.16	25.63
	21.31	.993	10238	.1050E-01	.4136E-03	28.66	26.08
	22.45	.995	10256	.2752E-01	.1083E-02	26.79	26.47
F	24.45	.342	10343	.2331E-01	.9179E-03	29.86	27.26
F	26.71	1.012	10477	.1368E-01	.5388E-03	31.20	28.48
F	28.41	1.045	10511	.3128E-01	.1231E-02	32.19	29.29
F	28.58	1.129	10559	.2566E-01	.1010E-02	32.37	30.88
F	30.11	1.195	10615	.2585E-01	.1018E-02	33.67	30.78
F	31.34	1.234	10651	.3242E-01	.1276E-02	34.67	31.65
F	32.68	1.256	10697	.3485E-01	.1529E-02	35.66	32.27
F	33.79	1.33.	10715	.3491E-01	.1571E-02	36.21	32.96
F	34.39	1.377	10749	.3511E-01	.1382E-02	36.92	33.68
F	36.17	1.418	10794	.3104E-01	.1222E-02	37.71	34.32
F	37.[illegible]	1.455	10840	.4174E-01	.1846E-02	38.34	35.56
F	41.[illegible]	1.642	10891	.7324E-01	.2883E-02	42.67	37.62
F	43.74	1.722	10929	.5342E-01	.2300E-02	41.74	39.17
F	46.13	1.817	10963	.6353E-01	.2501E-02	43.94	39.38
F	47.29	1.861	10982	.1123E-01	.4421E-02	44.44	40.62
F	57.[illegible]	2.271	11039	.3471E-01	.1367E-01	49.13	43.60
F	5[illegible].44	2.379	11024		(NET STRESS GREATER THAN 0.9 FTY)		

TABLE D6-44

SPECIMEN NUMBER: 4111-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: LCO.0 K
SPECIMEN THICKNESS: 11.49 MM (.4520 IN)
MAXIMUM STRESS: 197.2 MPA (28.6 KSI)
R-RATIO: .05
FREQUENCY: 20 CPM
CYCLES TO FAILURE: 2738 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	LEAD CRACK LENGTH MM	IN.	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	IN/CYCLE	DELTA STRESS INTENSITY MPA SQRT(M)	KSI SQRT(IN)
	3.71	.147	1				
	3.78	.133	732	.9621E-03	.3787E-04	15.33	13.67
	4.60	.189	1412	.2329E-02	.7986E-04	17.62	15.86
	5.69	.224	1913	.2177E-02	.8952E-04	19.74	17.96
	6.16	.234	2011	.3532E-02	.1391E-03	21.15	19.25
	6.98	.275	2114	.5432E-02	.2154E-03	22.26	20.25
	7.87	.31.	2241	.7346E-02	.2772E-03	23.50	21.38
	8.35	.329	2314	.7643E-02	.3008E-03	24.57	22.36
	9.12	.359	2396	.9324E-02	.3671E-03	25.50	23.21
	9.76	.394	2422		(NET STRESS GREATER THAN 0.9 FTY)		
	10.07	.397	2471		(NET STRESS GREATER THAN 0.9 FTY)		
F	14.17	.558	2561		(NET STRESS GREATER THAN 0.9 FTY)		
F	15.91	.61.	2617		(NET STRESS GREATER THAN 0.9 FTY)		
F	17.51	.689	2659		(NET STRESS GREATER THAN 0.9 FTY)		
F	19.00	.748	2702		(NET STRESS GREATER THAN 0.9 FTY)		
F	2[illegible].02	.788	2719		(NET STRESS GREATER THAN 0.9 FTY)		
F	21.93	.86C	2743		(NET STRESS GREATER THAN 0.9 FTY)		
F	23.74	.934	2766		(NET STRESS GREATER THAN 0.9 FTY)		
F	25.51	1.005	2786		(NET STRESS GREAT- THAN 0.9 FTY)		
F	28.80	1.035	2796		(NET STRESS GREATER THAN 0.9 FTY)		
F	28.17	1.109	2806		(NET STRESS GREATER THAN 0.9 FTY)		
F	29.68	1.169	2816		(NET STRESS GREATER THAN 0.9 FTY)		
F	31.24	1.230	2826		(NET STRESS GREATER THAN 0.9 FTY)		
F	33.32	1.312	2834		(NET STRESS GREATER THAN 0.9 FTY)		
F	35.29	1.386	2837				

TABLE D6-45

SPECIMEN NUMBER: 173-483-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: T-L
CONSTRAINT: THICKNESS
FAILURE MODE: UNSTIFFENED
TEST TEMPERATURE: LAB AIR
SPECIMEN THICKNESS: 4.70 MM (0.185 IN)
MAXIMUM STRESS: 11.48 MM (0.452 IN)
R-RATIO: 183.9 MPA (26.6 KSI)
FREQUENCY: .05
CYCLES TO FAILURE: 200 CPS
K(MAX) 2613 CYCLES PRIOR TO FAILURE: 39.27 MPA SQRT(M) 35.74 KSI SQRT(IN) 84482 CYCLES

CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	CYCLIC STRESS INTENSITY MPA SQRT(M)	CYCLIC STRESS INTENSITY KSI SQRT(IN)
3.44	.135	1				
4.32	.170	10231	.5637E-04	.2219E-05	5.99	5.36
4.83	.174	19826	.4331E-04	.1693E-05	6.27	5.71
5.34	.139	29657	.6223E-04	.2449E-05	6.64	6.05
5.97	.223	36615	.9011E-04	.3548E-05	7.07	6.43
6.73	.248	41673	.1269E-03	.4995E-05	7.47	6.80
6.98	.271	45938	.1463E-03	.5759E-05	7.84	7.13
7.45	.295	49869	.1419E-03	.5585E-05	8.19	7.45
8.19	.322	53326	.2029E-03	.7987E-05	8.56	7.79
8.94	.348	55741	.2662E-03	.1047E-04	8.92	8.12
9.38	.369	57356	.1392E-03	.1335E-04	9.23	8.40
9.99	.334	59253	.3249E-03	.1278E-04	9.52	8.66
10.85	.416	60871	.4312E-03	.1580E-04	9.91	9.03
11.19	.441	62113	.4283E-03	.1686E-04	10.09	9.19
11.91	.465	63504	.4511E-03	.1776E-04	10.38	9.45
12.41	.449	64550	.5791E-03	.2279E-04	10.66	9.70
13.17	.512	65596	.5822E-03	.2213E-04	10.92	9.94
13.62	.536	66957	.4533E-03	.1783E-04	11.19	10.18
14.19	.559	67916	.5909E-03	.2326E-04	11.44	10.41
14.97	.589	68892	.7947E-03	.2774E-04	11.70	10.64
15.49	.614	69703	.7539E-03	.2960E-04	11.96	10.89
16.17	.633	70619	.6477E-03	.2550E-04	12.20	11.10
16.66	.657	71569	.6495E-03	.2557E-04	12.44	11.32
17.13	.652	72232	.9666E-03	.3806E-04	12.68	11.54
17.47	.729	72514	.8333E-03	.3280E-04	12.92	11.75
18.49	.728	73557	.9386E-03	.3577E-04	13.13	11.95
19.18	.752	74044	.1231E-02	.4847E-04	13.36	12.15
19.66	.774	74475	.1084E-02	.4269E-04	13.57	12.35
21.33	.833	75053	.1392E-02	.5481E-04	13.85	12.58
21.25	.833	75513	.1804E-02	.7101E-04	14.36	12.80
21.79	.858	75852	.1394E-02	.5487E-04	14.32	13.03
22.47	.881	76357	.1501E-02	.5911E-04	14.61	13.23
23.19	.915	76731	.1972E-02	.7765E-04	14.79	13.45
23.87	.940	77120	.1734E-02	.6814E-04	15.04	13.69
24.85	.978	77432	.1883E-02	.7218E-04	15.26	13.89
25.17	.991	77538	.1381E-02	.5437E-04	15.44	14.09
25.44	1.019	77814	.1464E-02	.7116E-04	15.69	14.28
26.73	1.052	78754	.2719E-02	.7947E-04	15.95	14.52
27.97	1.077	79191	.2121E-02	.8352E-04	16.28	14.82
29.15	1.140	79732	.2451E-02	.9649E-04	16.64	15.14
31.71	1.134	80104	.3524E-02	.1427E-03	17.17	15.69
31.54	1.243	80442	.3377E-02	.1329E-03	17.44	15.87
32.96	1.234	80832	.4021E-02	.1586E-03	17.86	16.25
34.77	1.368	81122	.4422E-02	.1693E-03	18.27	16.62
35.62	1.594	81429	.4162E-02	.1650E-03	18.65	16.98
36.74	1.442	81815	.5839E-02	.2297E-03	19.12	17.31
37.11	1.5..	81969	.5904E-02	.2325E-03	19.41	17.66

TABLE D6-46

SPECIMEN NUMBER: 314-456-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 453.0 K
SPECIMEN THICKNESS: 11.39 MM (.4480 IN)
MAXIMUM STRESS: 217.1 MPA (31.5 KSI)
R-RATIO: .05
FREQUENCY: 210 CPM
CYCLES TO FAILURE: 5739 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: 33.34 MPA SQRT(M) (30.21 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTASTRESS INTENSITY MPA SQRT(M)	DELTASTRESS INTENSITY KSI SQRT(IN)
	9.93	.115	1	.3356E-03	.1302E-04	10.96	9.97
	1.56	.140	1914	.1352E-02	.5324E-04	12.46	11.34
	4.43	.191	2856	.8315E-13	.3273E-04	13.76	12.52
	5.44	.213	3536	.2519E-12	.1031E-03	14.68	13.36
	6.24	.246	3867	.2906E-12	.1144E-03	15.72	14.31
	7.10	.28.	4103	.2906E-12	.1145E-03	16.85	15.36
	7.47	.3.2	4327	.6844E-13	.2696E-04	17.35	15.79
	8.37	.331	4439	.3116E-12	.1187E-03	17.83	16.23
	8.75	.346	4547	.1318E-01	.4174E-03	18.33	16.68
	9.33	.367	4641	.2177E-12	.8178E-04	18.75	17.06
	9.63	.378	4771	.7.6.E-12	.2764E-03	19.21	17.48
	1.25	.426	4853	.1985E-11	.7821E-03	20.25	18.43
	11.78	.464	4944	.1251E-11	.4926E-03	21.47	19.54
	12.96	.517	5035	.1111E-11	.4383E-03	22.30	20.29
	13.47	.538	5112	.1991E-11	.6686E-03	23.17	21.05
	14.07	.578	5161	.17.1E-11	.7.34E-03	23.98	21.74
	15.79	.622	5224	.3235E-11	.1274E-02	24.62	22.41
	16.54	.651	5247	.1744E-01	.7.65E-03	25.35	23.07
	17.17	.6.1	531.	.3387E-11	.1234E-02	26.21	23.85
	18.42	.741	5345	.2237E-11	.8811E-03	26.93	24.50
	19.64	.771	5373	.3617E-11	.1425E-02	27.45	25.16
F	20.44	.802	5414	.2967E-11	.1129E-02	28.93	26.94
F	21.91	.865	5454	.2921E-11	.115.E-02	29.31	26.57
F	22.46	.884	5444	.3344E-11	.1317E-02	30.84	27.16
F	23.46	.923	5514	.4994E-11	.1967E-02	31.08	27.32
F	25.16	.939	5544	.4784E-11	.1883E-02	31.65	28.80
F	26.41	1.035	5574	.5521E-11	.2175E-02	32.48	29.55
F	27.16	1.034	5634	.7451E-11	.2933E-02	33.19	30.20
F	28.42	1.142	5619	.7795E-11	.3.07E-02	33.91	30.96
F	30.19	1.199	5634	.7113E-11	.2801E-02	34.62	31.40
F	3..31	1.217	5614	.113.E-10	.4457E-02	35.75	32..8
F	3..11	1.243	5643	.4.4.E-11	.2127E-02	36.19	32.93
F	33.31	1.311	5654	.9584E-11	.3771E-02	37.19	33.94
F	35.45	1.411	5644	.2477E-1.	.975.E-02	38.51	35.15
F	36.13	1.43.9	5643	.1614E-10	.6356E-02	39.74	36.16
F	37.39	1.471	57.3	.2375E-1.	.935.E-02	42.17	37.78
F	40.17	1.5.4	5715	.1704E-1.	.6.7.E-02	41.43	38.16
F	41.22	1.7.2	5774	.1496E-1.	.7417E-02	42.53	38.70
F	44.35	1.746	5791	.6954E-11	.2736E-02	43.44	39.56
F	45.41	1.787	5814	.2127E-10	.8375E-02	44.35	4..15
F	47.24	1.861	5837	.9117E-1.	.359.E-1	44.47	40.44
F	49.25	1.94.	5859				

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE D6-47

SPECIMEN NUMBER: ET1-459-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 459.0 K
SPECIMEN THICKNESS: 11.43 MM (.4500 IN)
MAXIMUM STRESS: 307.3 MPA (44.6 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 1309 CYCLES
K(MAX) 1 CYCLES PRIOR TO FAILURE: (NET STRESS GREATER THAN 0.9 FTY)

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	2.72	.107	1				
	3.18	.122	705	.1093E-02	.4304E-04	14.17	12.90
	3.73	.147	861	.4371E-02	.1603E-03	15.91	14.48
	4.34	.171	982	.5070E-02	.1996E-03	17.39	15.75
	5.64	.222	1103	.1070E-01	.4211E-03	19.25	17.51
	6.38	.251	1134	.2391E-01	.9419E-03	21.13	19.22
	7.36	.290	1162	.3524E-01	.1387E-02	22.60	20.57
F	7.96	.313	1193	.2748E-01	.1098E-02	23.87	21.72
F	8.32	.328	1213	.1224E-01	.4833E-03	24.60	22.39
F	8.83	.348	1233	.2542E-01	.1000E-02	25.26	22.99
F	10.22	.402	1253	(NET STRESS GREATER THAN 0.9 FTY)			
F	10.97	.432	1273	(NET STRESS GREATER THAN 0.9 FTY)			
F	11.89	.468	1283	(NET STRESS GREATER THAN 0.9 FTY)			
F	13.75	.541	1293	(NET STRESS GREATER THAN 0.9 FTY)			
F	14.33	.564	1298	(NET STRESS GREATER THAN 0.9 FTY)			
F	15.99	.630	1303	(NET STRESS GREATER THAN 0.9 FTY)			
F	16.57	.652	1305	(NET STRESS GREATER THAN 0.9 FTY)			
F	17.96	.707	1307	(NET STRESS GREATER THAN 0.9 FTY)			
F	19.60	.771	1308				

TABLE D6-48

SPECIMEN NUMBER: 4L12-451-2
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: LONGITUDINAL
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 11.64 MM (.4559 IN)
MAXIMUM STRESS: 137.9 MPA (20.0 KSI)
R-RATIO: .5
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 9673 CYCLES
K(MAX) 1941 CYCLES PRIOR TO FAILURE: 39.48 MPA SQRT(M) (35.91 KSI SQRT(IN))

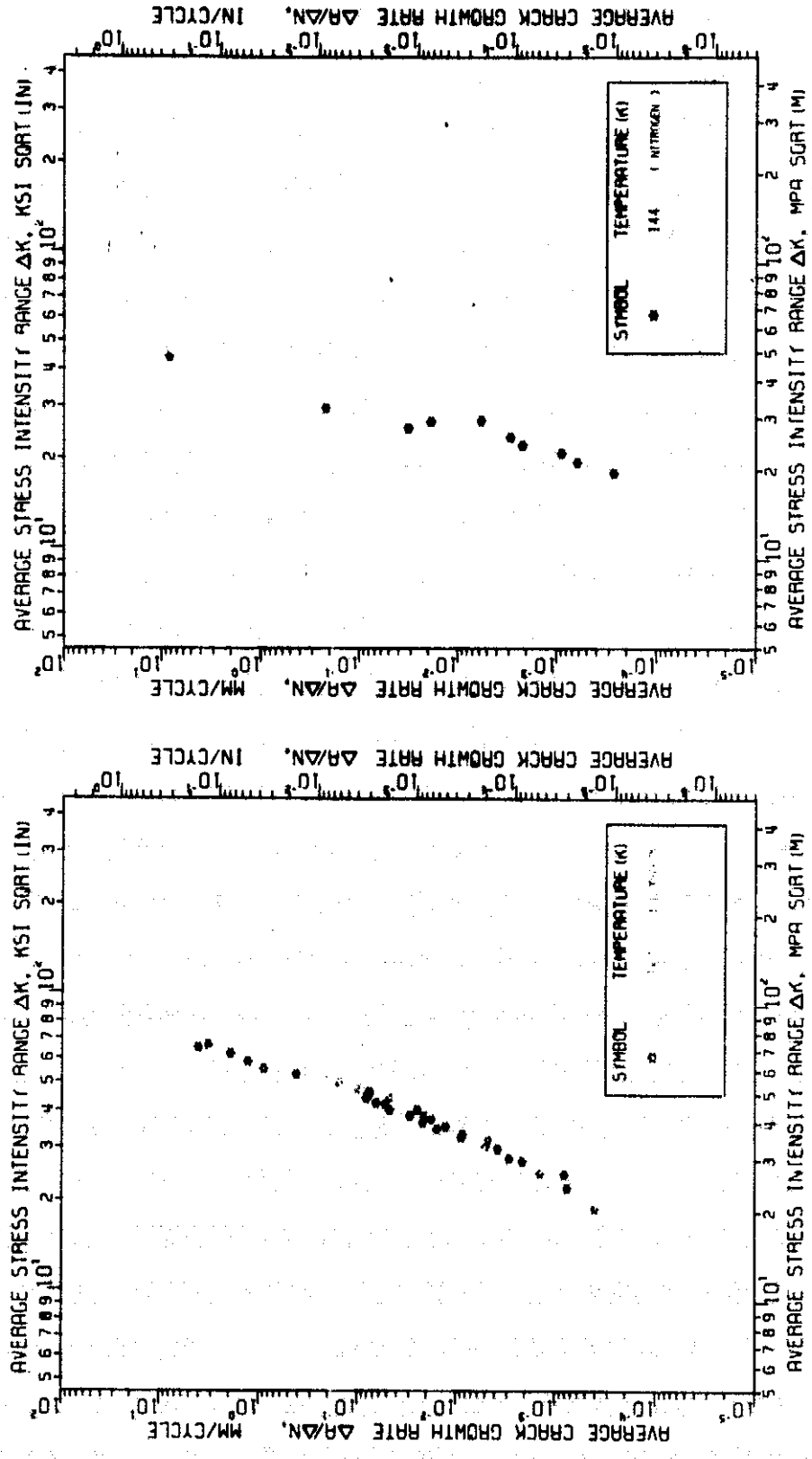
	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	6.83	.269	1				
	7.32	.288	713	.6849E-03	.2697E-04	19.95	17.79
	7.76	.306	1264	.8021E-03	.3158E-04	20.19	18.37
	8.66	.341	1958	.1294E-02	.5094E-04	21.87	19.18
	9.22	.363	2373	.1356E-02	.5337E-04	22.80	20.02
	9.91	.390	2777	.1713E-02	.6745E-04	22.76	20.71
	10.42	.410	3099	.1566E-02	.6165E-04	23.47	21.36
	11.16	.439	3445	.2144E-02	.8439E-04	24.19	22.01
	11.87	.468	3787	.2087E-02	.8216E-04	25.00	22.75
	13.26	.522	4336	.2526E-02	.9945E-04	26.14	23.78
	14.13	.556	4583	.3103E-02	.1221E-03	27.25	24.88
	14.99	.590	4911	.2923E-02	.1151E-03	28.12	25.59
	15.60	.614	5113	.3024E-02	.1191E-03	28.99	26.29
	16.57	.652	5341	.4283E-02	.1686E-03	29.65	26.98
	17.11	.674	5477	.3243E-02	.1276E-03	30.32	27.59
	17.52	.690	5640	.3117E-02	.1227E-03	30.76	27.99
	18.29	.720	5739	.7710E-02	.3035E-03	31.34	28.52
	18.87	.743	5864	.4499E-02	.1771E-03	31.34	29.07
	19.87	.782	6012	.6749E-02	.2944E-03	32.64	29.71
	20.40	.803	6072	.7656E-02	.3014E-03	33.31	30.32
	21.08	.830	6154	.7325E-02	.2766E-03	33.94	30.79
	21.34	.840	6302	.8694E-02	.2243E-03	34.45	31.35
	22.56	.888	6437	.6422E-02	.2686E-03	35.37	31.91
	23.66	.932	6513	.1071E-01	.4219E-03	35.82	32.60
	24.23	.954	6614	.6351E-02	.2343E-03	36.50	33.22
	25.19	.992	6732	.7421E-02	.2961E-03	37.17	33.78

TABLE D6-49

SPECIMEN NUMBER: 2T2-453-1
ALLOY TYPE: 2124-T851
SPECIMEN ORIENTATION: TRANSVERSE
CONSTRAINT: UNSTIFFENED
ENVIRONMENT: LAB AIR
TEST TEMPERATURE: 478.0 K
SPECIMEN THICKNESS: 11.43 MM (.4500 IN)
MAXIMUM STRESS: 137.9 MPA (20.0 KSI)
R-RATIO: .05
FREQUENCY: 200 CPM
CYCLES TO FAILURE: 6386 CYCLES

K(MAX) 1 CYCLE PRIOR TO FAILURE: 58.62 MPA SQRT(M) (53.35 KSI SQRT(IN))

	CRACK LENGTH MM	CRACK LENGTH IN	CYCLES	DELTA(A)/DELTA(N) MM/CYCLE	DELTA(A)/DELTA(N) IN/CYCLE	DELTA(STRESS INTENSITY) MPA SQRT(M)	DELTA(STRESS INTENSITY) KSI SQRT(IN)
	7.23	.277	1	.6743E-03	.2655E-04	19.69	18.18
	7.59	.299	824	.1164E-02	.4585E-04	20.69	18.93
	8.23	.324	1428	.1521E-02	.5987E-04	21.49	19.56
	8.92	.347	1813	.1955E-02	.7700E-04	22.27	20.28
	9.47	.373	2159	.1976E-02	.7780E-04	22.01	20.04
	10.04	.395	2498	.1773E-02	.6982E-04	23.68	21.55
	10.62	.418	2764	.2747E-02	.1082E-03	24.33	22.14
	11.18	.440	2965	.2819E-02	.1110E-03	25.05	22.80
	11.71	.459	3225	.2716E-02	.1069E-03	25.92	23.49
	12.55	.494	3477	.3228E-02	.1186E-03	26.57	24.18
	13.17	.525	3721	.3595E-02	.1415E-03	27.29	24.84
	13.96	.551	3936	.4681E-02	.1844E-03	27.99	25.39
	14.52	.572	4119	.4369E-02	.1716E-03	28.41	25.85
	15.13	.595	4334	.4121E-02	.4021E-03	29.29	26.62
F	15.76	.620	4556	.6396E-02	.2480E-03	30.55	27.80
F	17.78	.730	4636	.6196E-02	.2400E-03	31.94	29.06
F	19.32	.784	4756	.9662E-02	.3802E-03	33.66	30.63
F	21.72	.855	5034	.9525E-02	.3750E-03	35.48	32.29
F	23.69	.933	5236	.9317E-02	.3667E-03	36.49	33.52
F	25.32	.996	5356	.1609E-01	.6333E-03	38.35	34.90
F	27.43	1.080	5506	.1397E-01	.5503E-03	39.44	36.26
F	28.93	1.139	5606	.1778E-01	.7003E-03	41.04	37.36
F	30.61	1.205	5726	.2032E-01	.8000E-03	42.50	38.67
F	32.64	1.285	5866				
F	34.19	1.346	5956	.3556E-01	.1400E-02	44.67	40.56
F	35.79	1.409	6056	.3144E-01	.1238E-02	46.43	42.26
F	38.74	1.525	6236	.3144E-01	.1238E-02	47.54	43.26
F	41.17	1.621	6386	.4444E-01	.1750E-02	48.74	44.35
F	43.64	1.718	6536	.5080E-01	.2000E-02	49.97	45.44
F	47.31	1.863	6736	.6350E-01	.2500E-02	50.94	46.35
F	48.69	1.917	6836	.6667E-01	.2625E-02	52.14	47.65
F	51.43	2.025	6986	.1397E-02	.5500E-02	54.49	49.95
F	54.43	2.143	7136	.6032E-01	.2375E-02	57.35	52.19
F	57.21	2.252	7286	.1143E+00	.4500E-02	58.66	53.39
F	59.74	2.351	7436	.7620E-01	.3000E-02	59.66	54.29
F	62.48	2.459	7586	.9525E-01	.3750E-02	60.94	55.46
F	64.77	2.550	7736	.1778E+00	.7000E-02	62.14	56.74
F	66.84	2.632	7886	.1524E+00	.6000E-02	63.42	57.89
F	69.16	2.723	8036	.1397E+00	.5500E-02	64.39	58.71
F	71.58	2.818	8186	.2159E+00	.8500E-02	66.57	60.58
F	74.15	2.919	8336	.2794E+00	.1100E-01	68.90	61.89
F	76.73	3.021	8486	.2794E+00	.1100E-01	69.19	62.93
F	79.34	3.124	8636	.1905E+00	.7500E-02	70.69	64.18
F	81.95	3.227	8786	.2540E+00	.1000E-01	71.98	65.41
F	84.53	3.328	8936	.3302E+00	.1300E-01	73.14	66.56
F	87.12	3.430	9086	.2921E+00	.1150E-01	75.17	68.41
F	89.68	3.531	9236	.5207E+00	.2050E-01	77.69	70.69
F	92.23	3.631	9386	.1041E+01	.4100E-01	79.98	72.73
F	94.79	3.732	9536	.1067E+01	.4200E-01	82.56	75.14
F	97.33	3.832	9686				



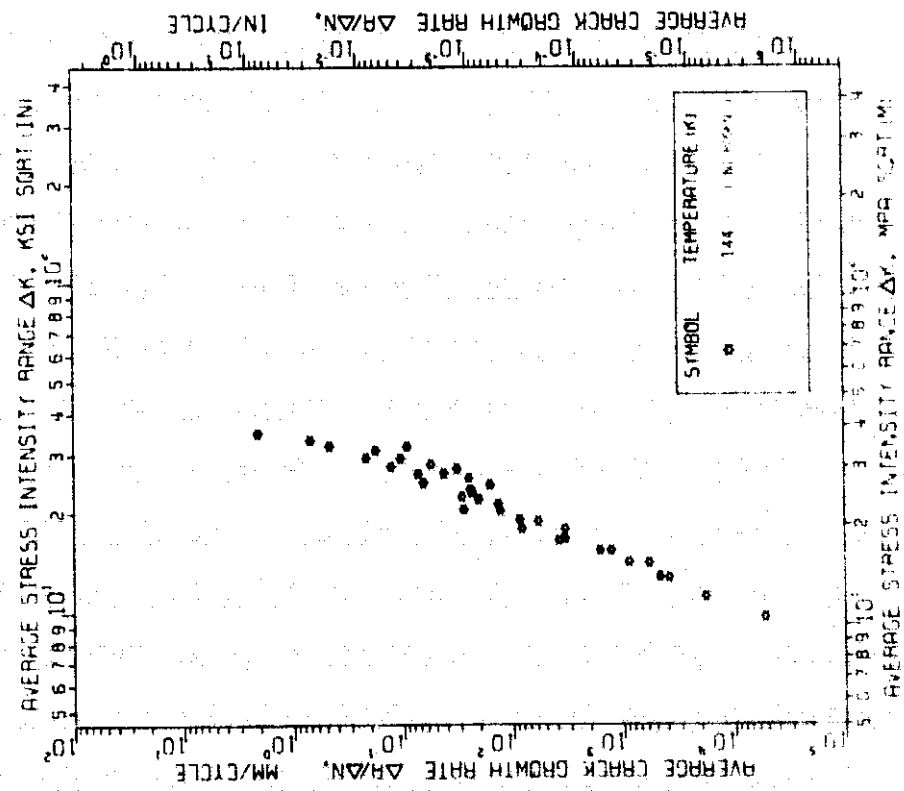
Alloy: 2124-T851 **Stress Ratio:** .05 **Frequency:** 200 cpm

Thickness: 11.47 mm (.450 inch) **Constraint:** Unstiffened

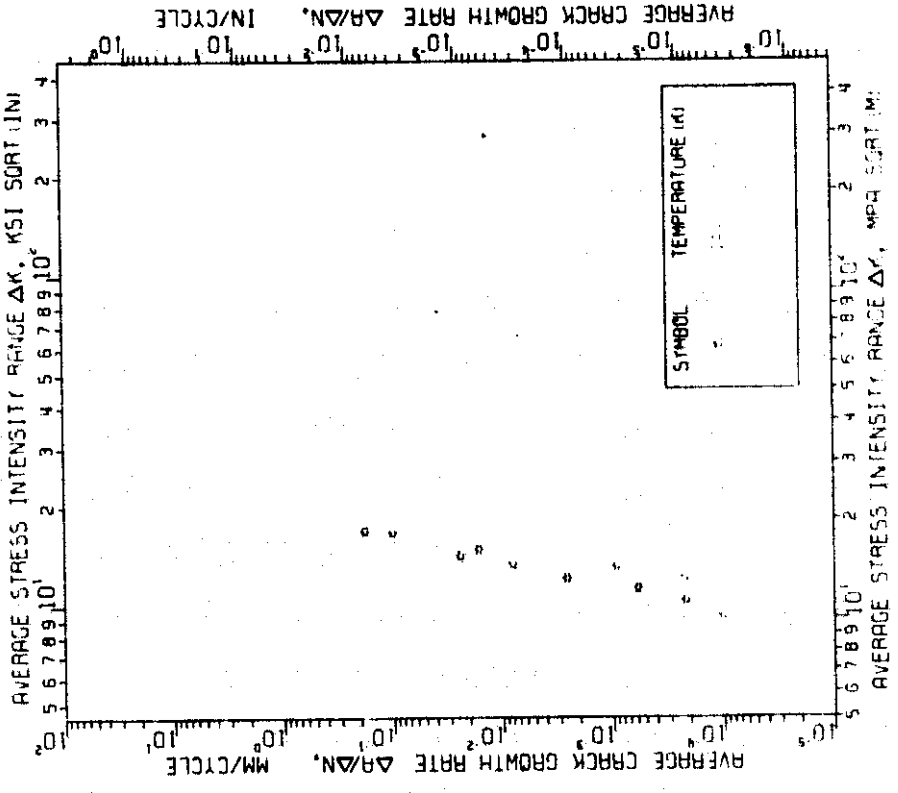
AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D6-1

(a) Longitudinal



(b) Transverse

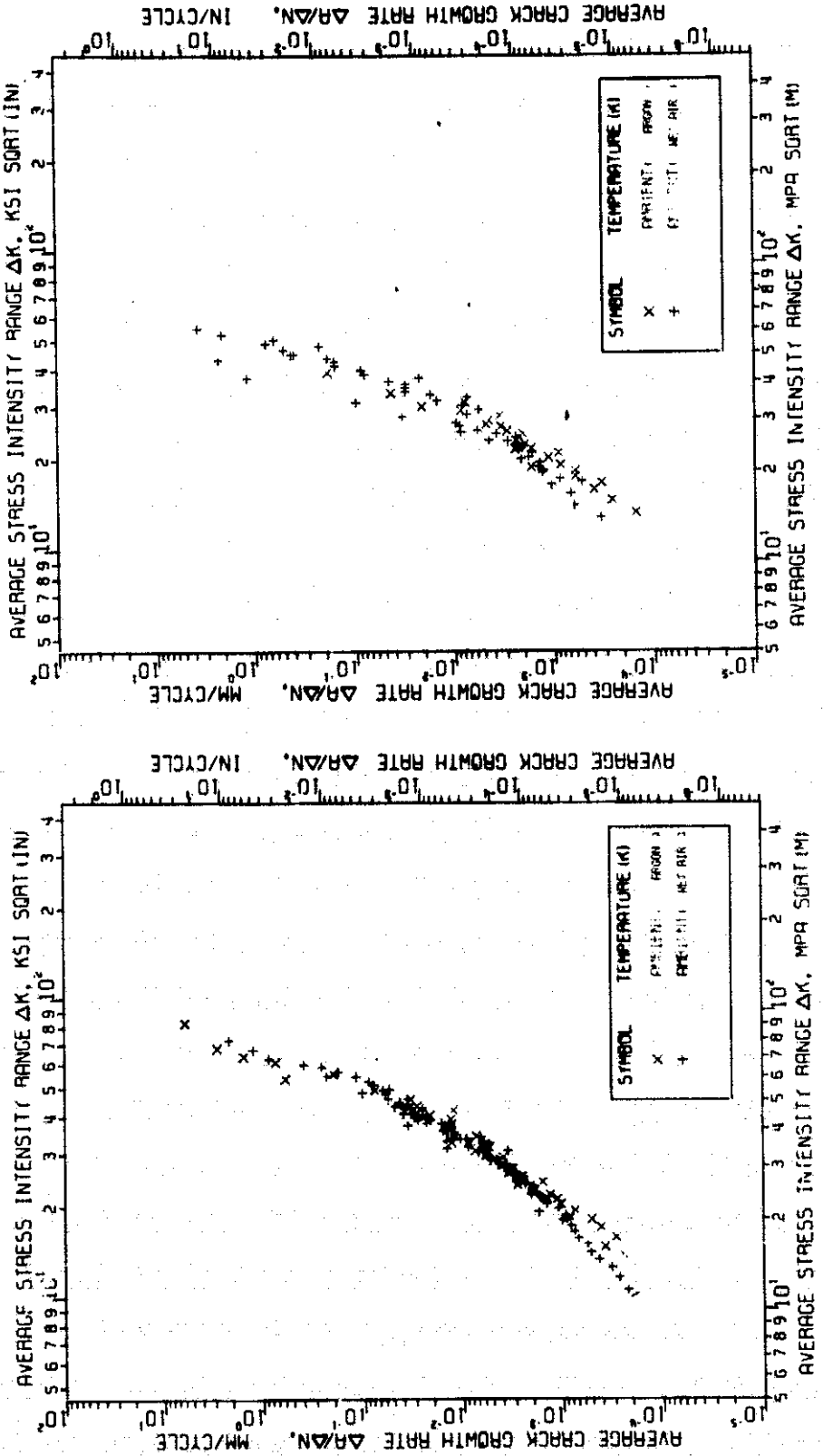


Alloy: 2124-T851 **Stress Ratio:** .50 **Frequency:** 200 cpm

Thickness: 11.47 mm (.450 inch) **Constraint:** Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D6-2

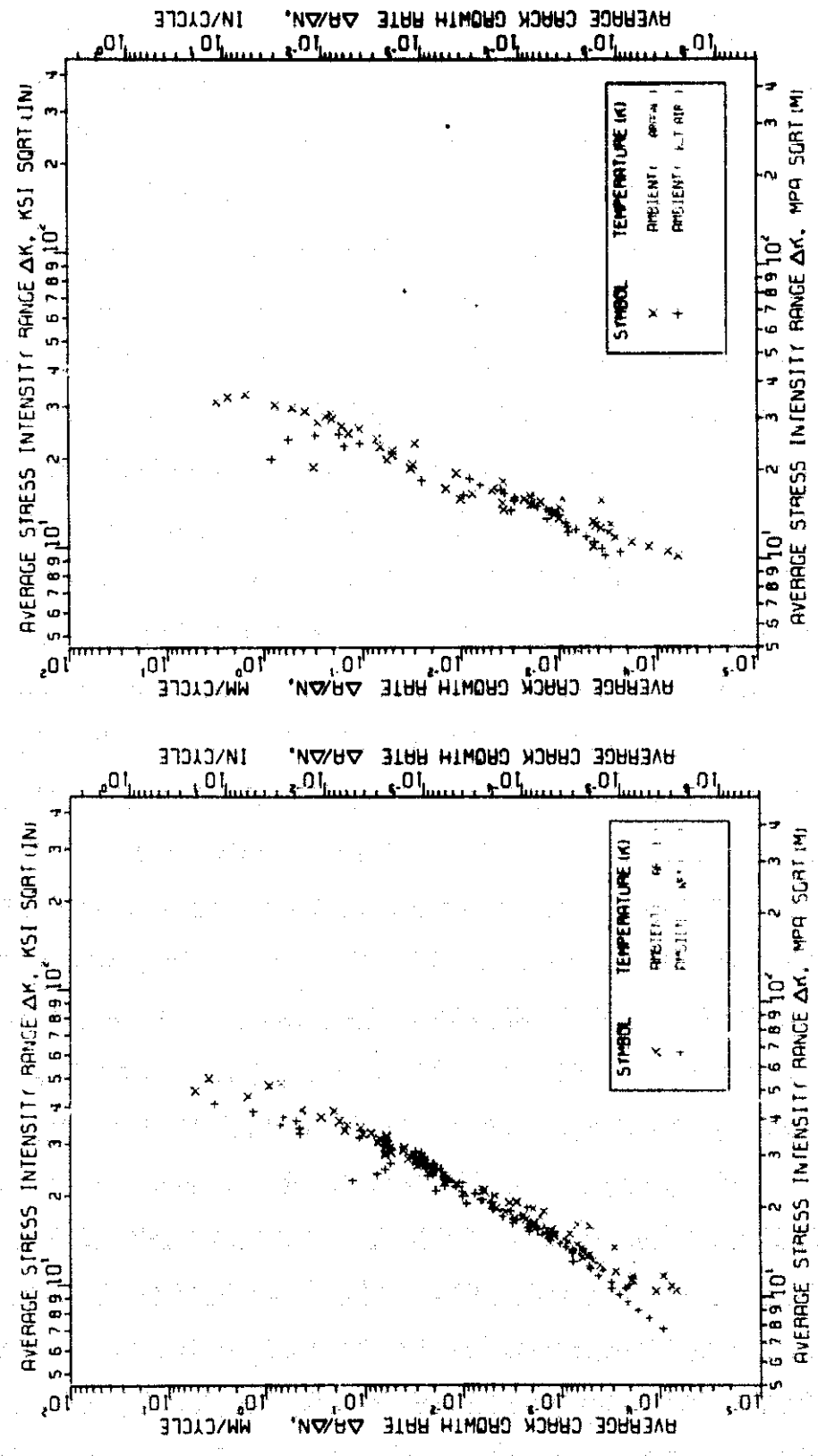


Alloy: 2124-T851 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 11.47 mm (.450 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D6-3



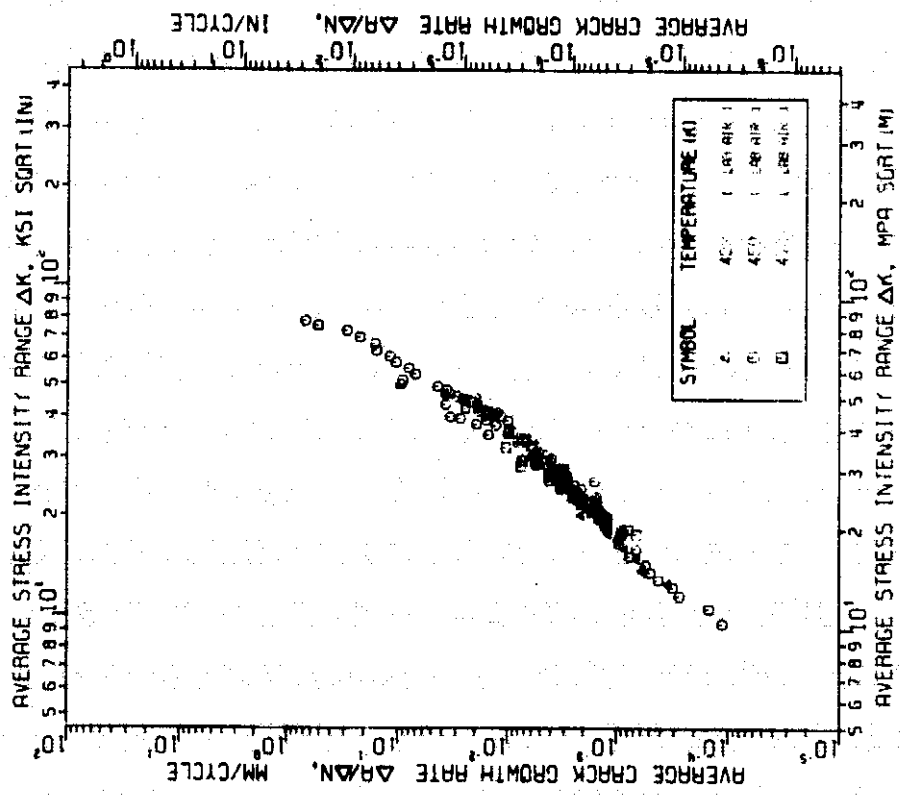
Alloy: 2124-T851 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 11.47 mm (.450 inch) Constraint: Unstiffened

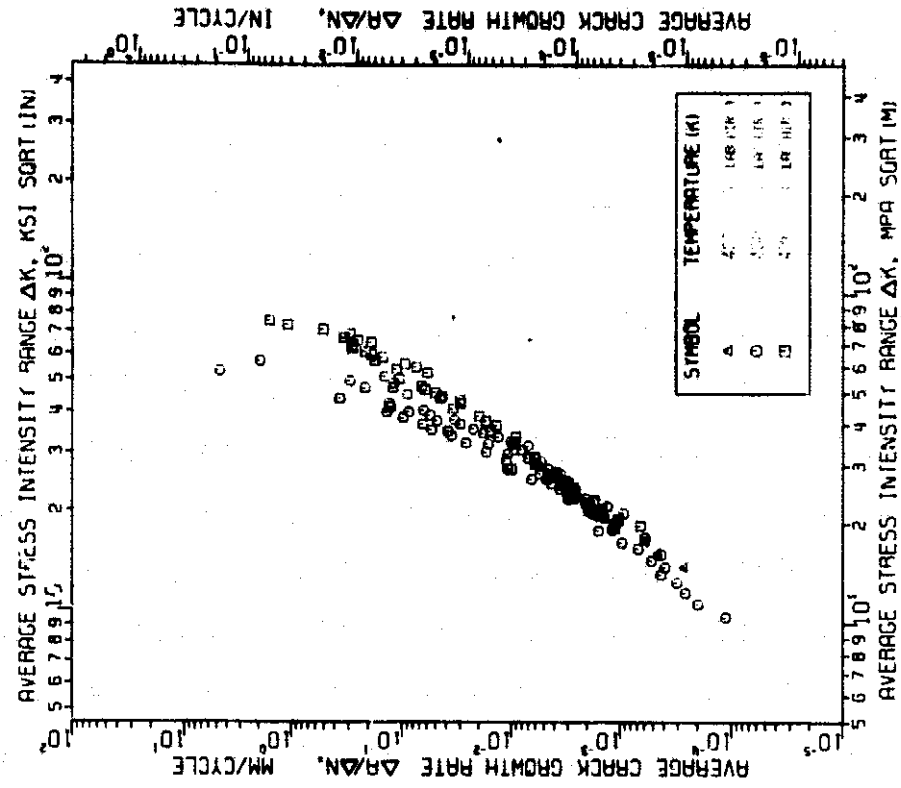
AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D6-4

(a) Longitudinal



(b) Transverse

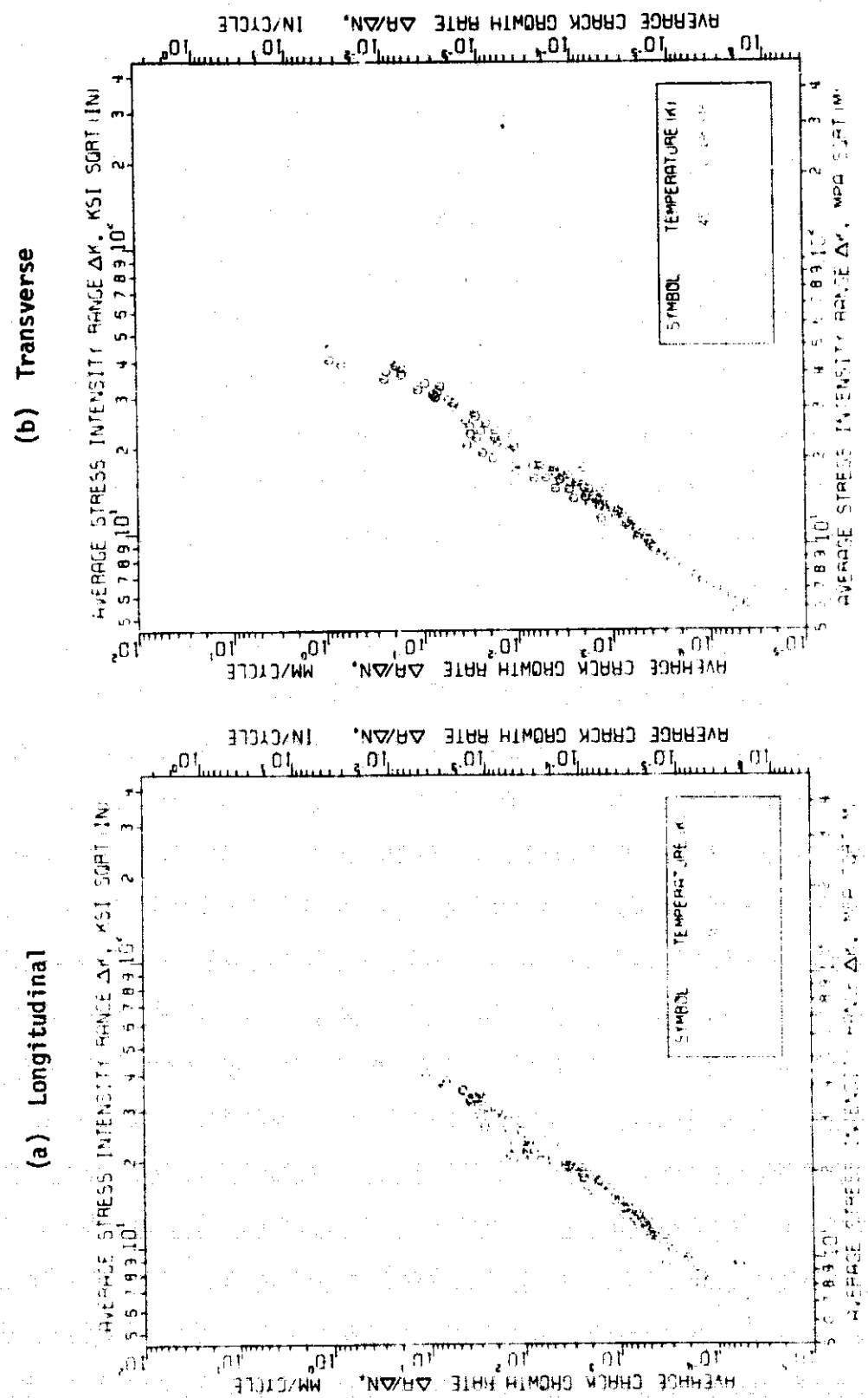


Alloy: 2124-T851 Stress Ratio: .05 Frequency: 200 cpm

Thickness: 11.47 mm (.450 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D6-5



Alloy: 2124-T851 Stress Ratio: .50 Frequency: 200 cpm

Thickness: 11.47 mm (.450 inch) Constraint: Unstiffened

AVERAGE CRACK GROWTH RATE AS A FUNCTION OF STRESS INTENSITY

FIGURE D6-6

Appendix E

ANALYSIS OF CYCLIC TEST DATA

The following tables contain the results of an extensive analysis of the cyclic test data presented in Appendix D. This data was analyzed using both the Forman (Equation 4-3) and the Colliepriest (Equation 4-4) model for crack growth under cyclic loading conditions. The analysis employed a regression/convergence technique in which the rate coefficients and exponents for each model were determined using least squares techniques and the K_c and ΔK_o values were optimized using iterative convergence routines. This technique is described in greater detail in Section 4.2.2.

A number of conventions have been followed in the preparation of the tables contained in this Appendix. Failure to converge on a K_c or ΔK_o value is donated by "FC". In addition, the results of each analysis are expressed in both SI units and the equivalent English system of units. Because the units on the coefficient term for the Forman and Paris rate models (i.e., C and C(P), respectively) are a function of the exponent term, the values of these parameters are reported in the appropriate data tables only as "SI UNITS" or "ENGLISH UNITS". For the Forman model, the coefficient term has units of

$$\frac{\text{(growth rate units)}}{\text{(stress intensity units)}^{n-1}}$$

For the Paris model, this term has units of

$$\frac{\text{(growth rate units)}}{\text{(stress intensity units)}^{n}}$$

When reported as SI units, these parameters yield a growth rate with units of m/cycle provided stress intensity has units of $MPa\sqrt{m}$. When reported in English

units, these parameters yield a growth rate with units of inch/cycle, provided stress intensity has units of ksi$\sqrt{in}$.

Since both models account for stress ratio effects, both analyses were conducted first using data from only one stress ratio (R = .05) and then using data from both stress ratios. Because of the large quantity of information contained in this appendix, the tabulated results are divided into the same sections as those used in Appendix D; na

Section	Frequency	Alloy	Thickness	
			mm	in
E1	200	2024-T861	1.60	.063
E2	200	2024-T861	3.18	.125
E3	200	2024-T861	6.35	.250
E4	20	2024-T861 2124-T851	6.35	.250
E5	200	2124-T851	6.35	.250
E6	200	2124-T851	11.47	.450

SECTION E1. ANALYSIS OF FLAW GROWTH RATE DATA FOR 1.60 mm (.063 INCH) THICK 2024-T861

TABLE E1-1 OPTIMIZED FORMAN RATE PARAMETERS

FOR 1.60 mm (.063 inch) THICK 2024-T861 ALUMINUM

(R = .05, f = 200 cpm, BUCKLING RESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	63.2	57.5	.8214 E-12	.2043 E-10	5.870	.127
	T	44.2	40.2	.2142 E-10	.5881 E-9	4.825	.078
298 (ARGON)	L	74.0	67.3	.1554 E-8	.4851 E-7	3.461	.141
	T	57.6	52.4	.8477 E-10	.2414 E-8	4.438	.031
422	L	81.8	74.4	.9367 E-8	.3066 E-6	2.958	.109
	T	179.8	163.6	.2658 E-8	.8045 E-7	3.788	.196
450	L	99.9	90.9	.5407 E-8	.1702 E-6	3.262	.078
	T		*		FC	*	*
478	L	117.6	107.0	.5975 E-8	.1897 E-6	3.284	.182
	T		*		FC	*	*

TABLE E1-2

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 1.60 mm (.063 INCH) THICK 2024-T861 ALUMINUM

(.05 stress ratio, 200 cpm frequency, buckling restrained)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) C(P) SI UNITS	C(P) ENGLISH UNITS	N(P)	STND. DEV.
144	L	*		*		FC		*	*		*	*
	T	12.4	11.2	43.9	39.9	.3950 E-5	.1555 E-3	3.609	.6483 E-13	.4365 E-11	5.695	.080
294 (AMBIENT)	L	7.8	7.1	79.5	72.3	.2295 E-5	.9034 E-4	4.238	.1829 E-10	.1016 E-8	3.652	.130
	T	*		*		FC		*	*		*	*
422	L	8.6	7.9	86.2	78.5	.3270 E-5	.1287 E-3	3.669	.8576 E-10	.4561 E-8	3.190	.098
	T	*		*		FC		*	*		*	*
450	L	1.4	1.3	145.6	132.5	.4155 E-6	.1636 E-4	7.372	.8126 E-10	.4323 E-8	3.195	.069
	T	8.1	7.3	102.0	92.8	.5302 E-5	.2087 E-3	4.337	.5493 E-10	.2985 E-8	3.420	.054
478	L	3.9	3.5	166.8	151.8	.2675 E-5	.1053 E-3	6.524	.3587 E-10	.1958 E-8	3.468	.183
	T	*		*		FC		*	*		*	*

TABLE E1-3 OPTIMIZED FORMAN RATE PARAMETERS

FOR 1.60 mm (.063 inch) THICK 2024-T861 ALUMINUM

(R = .05, f = 200 cpm, BUCKLING UNRESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	*		FC		*	*
	T	55.1	50.1	.4021 E-12	.9647 E-11	6.255	.107
298 (ARGON)	L	76.7	69.8	.2894 E-9	.8557 E-8	4.038	.029
	T	53.0	48.2	.4975 E-9	.1489 E-7	3.910	.119
298 (WET)	L	67.5	61.4	.6670 E-9	.2013 E-7	3.818	.467
	T	50.1	45.6	.6631 E-9	.2005 E-7	3.802	.019
422	L	65.6	59.71	.3787 E-7	.1302 E-5	2.441	.025
	T			NT+			
450	L	80.1	72.8	.2416 E-7	.8124 E-6	2.671	.041
	T	71.5	65.0	.1154 E-6	.4040 E-5	2.248	.046
478	L	85.9	78.2	.3206 E-8	.1013 E-6	3.337	.121
	T	67.1	61.0	.1098 E-6	.3859 E-5	2.206	.052

\+ NO SPECIMENS TESTED

TABLE E1-4

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 1.60 mm (.063 INCH) THICK 2024-T861 ALUMINUM

(.05 stress ratio, 200 cpm frequency, buckling unrestrained)

TEMPERATURE		ΔK_o		K_c		EQUATION (4-2)			EQUATION (4-4)			STND.
						C_1			C(P)			
(°K)	ORIENTATION	MPa$\sqrt{m}$	ksi$\sqrt{in}$	MPa$\sqrt{m}$	ksi$\sqrt{in}$	SI UNITS	ENGLISH UNITS	C_2	SI UNITS	ENGLISH UNITS	N(P)	DEV.
144	L	*		*			FC ΔK_o	*	*		*	*
	T	*		*			FC ΔK_o	*	*		*	*
294 (ARGON)	L	6.2	5.6	85.3	77.6	.1676 E-5	.6598 E-4	5.540	.3119 E-11	.1827 E-9	4.214	.026
	T	6.1	5.6	59.3	54.0	.1497 E-5	.5892 E-4	4.868	.4824 E-11	.2845 E-9	4.289	.121
294 (WET)	L	*		*			FC ΔK_o	*	*		*	*
	T	*		*			FC ΔK_o	*	*		*	*
422	L	12.3	11.2	66.0	60.1	.3891 E-5	.1532 E-3	2.580	.1297 E-9	.6822 E-8	3.077	.024
	T						NT*					
450	L	11.8	10.7	81.8	74.5	.4978 E-5	.1960 E-3	3.053	.9964 E-10	.5279 E-8	3.149	.034
	T	10.0	9.1	73.1	66.5	.4488 E-5	.1767 E-3	2.807	.3965 E-9	.2038 E-7	2.829	.046
478	L	*		*			FC ΔK_o	*	*		*	*
	T	*		*			FC ΔK_o	*	*		*	*

* NO SPECIMENS TESTED

TABLE E1-5 OPTIMIZED FOREMAN RATE PARAMETERS

FOR 1.60 mm (.063 inch) THICK 2024-T861 ALUMINUM

(R = .05 & .50, f = 200 cpm, BUCKLING RESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	61.2	55.7	.8357 E-10	.2356 E-8	4.545	.227
	T	42.9	39.1	.1487 E-8	.4628 E-7	3.493	.105
298 (ARGON)	L	72.8	66.3	.2659 E-8	.8404 E-7	3.331	.176
	T	45.4	41.3	.1105 E-8	.3439 E-7	3.495	.114
450	L	107.7	98.0	.8206 E-8	.2630 E-6	3.183	.094
	T	74.8	68.0	.1451 E-7	.4784 E-6	2.880	.103

TABLE E1-6

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 1.60 mm (.063 INCH) THICK 2024-T861 ALUMINUM

(.05 & .50 stress ratio, 200 cpm frequency, buckling restrained)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o Ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) C(P) SI UNITS	C(P) ENGLISH UNITS	N(P)	STND. DEV.
144	L	6.3	5.7	65.6	59.7	.1130 E-5	.4449 E-4	5.733	.4661 E-12	.2908 E-10	4.885	.170
	T	9.7	8.8	42.8	38.9	.2779 E-5	.1094 E-3	2.366	.1840 E-9	.9787 E-8	3.193	.168
294 (ARGON)	L	5.1	4.6	79.2	72.1	.1023 E-5	.4026 E-4	4.457	.6064 E-10	.3242 E-8	3.245	.165
	T	5.7	5.2	48.0	43.7	.6442 E-6	.2536 E-4	3.812	.2939 E-10	.1619 E-8	3.567	.105
450	L	4.8	4.4	110.1	100.2	.1957 E-5	.7704 E-4	4.191	.4480 E-7	.2270 E-7	2.657	.227
	T	7.7	7.0	76.5	69.6	.2957 E-5	.1164 E-3	3.088	.5405 E-9	.2744 E-7	2.696	.134

SECTION E2. ANALYSIS OF FLAW GROWTH RATE DATA FOR 3.18 mm (.125 INCH) THICK 2024-T861

TABLE E2-1 OPTIMIZED FORMAN RATE PARAMETERS

FOR 3.18 mm (.125 inch) THICK 2024-T861 ALUMINUM

(R = .05, f = 200 cpm, BUCKLING RESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	60.0	54.6	.5756 E-11	.1503 E-9	5.359	.086
	T	*		FC		*	*
298 (ARGON)	L	61.5	56.0	.4234 E-10	.1174 E-8	4.718	.096
	T	41.9	38.1	.1767 E-11	.4475 E-10	5.680	.086
422	L	*		FC		*	*
	T	88.1	80.2	.7581 E-8	.2396 E-6	3.331	.091
450	L	*		FC		*	*
	T	133.8	121.8	.1189 E-7	.3743 E-6	3.374	.070
478	L	*		FC		*	*
	T	*		FC(K_c)		*	*

TABLE E2-2

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 3.18 mm (.125 INCH) THICK 2024-T861 ALUMINUM

(.05 stress ratio, 200 cpm frequency, buckling restrained)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	EQUATION (4-2) C_1 ENGLISH UNITS	EQUATION (4-2) C_2	EQUATION (4-4) C(P) SI UNITS	EQUATION (4-4) C(P) ENGLISH UNITS	EQUATION (4-4) N(P)	STND. DEV.
144	L	12.4	11.3	64.9	59.0	.1098 E-4	.4323 E-3	4.836	.3530 E-13	.2411 E-11	5.846	.081
	T	*		*		FC		*		*	*	*
294 (ARGON)	L	5.7	5.2	71.3	64.9	.1483 E-5	.5838 E-4	6.136	.6514 E-12	.4058 E-10	4.868	.093
	T	6.7	6.1	46.8	42.6	.9004 E-6	.3545 E-4	5.832	.2742 E-13	.1903 E-11	6.016	.085
422	L	*		*		$FC(\Delta K_o)$		*		*	*	*
	T	13.4	12.4	89.9	81.8	.2088 E-4	.8220 E-3	3.369	.7294 E-10	.4010 E-8	3.541	.073
450	L	13.6	12.4	180.4	164.2	.3596 E-4	.1416 E-2	3.510	.9084 E-9	.4619 E-7	2.713	.046
	T	12.4	11.3	123.2	112.2	.3097 E-4	.1219 E-2	3.819	.1583 E-9	.8525 E-8	3.324	.055
478	L	11.3	10.3	196.8	179.1	.3541 E-4	.1394 E-2	4.310	.3112 E-9	.1629 E-7	3.020	.031
	T	12.2	11.1	150.6	137.1	.3469 E-4	.1366 E-2	3.681	.5860 E-9	.3040 E-7	2.925	.069

TABLE E2-3 OPTIMIZED FORMAN RATE PARAMETERS

FOR 3.18 mm (.125 inch) THICK 2024-T861 ALUMINUM

(R = .05, f = 200 cpm, BUCKLING UNRESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	58.4	53.2	.9268 E-12	.2284 E-10	5.967	.049
	T	*		FC(K_c)		*	*
298 (ARGON)	L	*		FC		*	*
	T	52.1	47.4	.1299 E-11	.3223 E-10	5.893	.174
298 (WET)	L	66.0	60.0	.1950 E-5	.5622 E-8	4.306	.075
	T	37.4	34.1	.4325 E-9	.1305 E-7	3.819	.049
422	L	*		FC		*	*
	T	*		FC		*	*
450	L	133.0	121.0	.1945 E-7	.6280 E-6	3.103	.112
	T	99.7	90.8	.4281 E-7	.1416 E-5	2.848	.103
478	L	*		FC		*	*
	T	*		FC		*	&

TABLE E2-4

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 3.18 mm (.125 INCH) THICK 2024-T861 ALUMINUM

(.05 stress ratio, 200 cpm frequency, buckling unrestrained)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) $C(P)$ SI UNITS	$C(P)$ ENGLISH UNITS	N(P)	STND. DEV.
144	L	6.5	5.9	70.9	64.5	.2094 E-5	.8245 E-4	7.419	.1180 E-13	.8331 E-12	6.199	.044
	T	15.3	13.9	39.6	36.0	.1400 E-4	.5513 E-3	3.889	.5963 E-16	.5073 E-14	8.173	.032
294 (ARGON)	L	7.6	6.9	96.4	87.7	.9938 E-5	.3912 E-3	6.549	.3934 E-12	.2520 E-10	5.165	.344
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (WET)	L	0.55	0.50	82.9	75.4	.2892 E-7	.1139 E-5	8.412	.4868 E-10	.2628 E-8	3.350	.034
	T	*		*		FC(ΔK_o)		*	*		*	*
422	L	12.4	11.3	92.2	83.9	.1459 E-4	.5746 E-3	3.886	.1723 E-10	.9776 E-9	3.876	.012
	T	*		*		FC(ΔK_o)		*	*		*	*
450	L	12.2	11.1	128.6	117.0	.2006 E-4	.7896 E-3	3.770	.1536 E-9	.8175 E-8	3.202	.102
	T	13.3	12.1	1020	92.9	.2157 E-4	.8492 E-3	3.163	.2970 E-9	.1567 E-7	3.104	.082
478	L	*		*		FC(ΔK_o)		*	*		*	*
	T	*		*		FC(K_c)		*	*		*	*

TABLE E2-5 OPTIMIZED FORMAN RATE PARAMETERS

FOR 3.18 mm (.125 inch) THICK 2024-T861 ALUMINUM

(R = .05 & .50, f = 200 cpm, BUCKLING RESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	56.4	51.3	.1016 E-8	.3055 E-7	3.856	.309
	T	*		FC(K_c)		*	*
298 (ARGON)	L	71.7	65.3	.3321 E-9	.9567 E-8	4.314	.345
	T	48.3	44.0	.7854 E-10	.2147 E-8	4.868	.700
450	L	129.1	117.5	.1589 E-6	.5424 E-5	2.514	.104
	T	102.0	92.8	.4697 E-7	.1505 E-5	2.956	.356

TABLE E2-6

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 3.18 mm (.125 INCH) THICK 2024-T861 ALUMINUM

(.05 & .50 stress ratio, 200 cpm frequency, buckling restrained)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	EQUATION (4-2) C_1 ENGLISH UNITS	EQUATION (4-2) C_2	EQUATION (4-4) C(P) SI UNITS	EQUATION (4-4) C(P) ENGLISH UNITS	EQUATION (4-4) N(P)	STND. DEV.
144	L	5.7	5.2	61.2	55.7	.1290 E-5	.5080 E-4	5.116	.4172 E-11	.2467 E-9	4.317	.180
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (ARGON)	L	4.6	4.2	78.9	71.8	.1442 E-5	.5678 E-4	5.981	.5612 E-11	.3289 E-9	4.221	.254
	T	3.1	2.8	54.5	49.6	.2202 E-6	.8671 E-5	6.970	.8386 E-12	.5222 E-10	4.863	.228
450	L	*		*		FC(ΔK_o)		*	*		*	*
	T	*		*		FC(ΔK_o)		*	*		*	*

SECTION E3. ANALYSIS OF FLAW GROWTH RATE DATA FOR 6.35 mm (.250 INCH) THICK 2024-T861

PRECEDING PAGE BLANK NOT FILMED

TABLE E3-1 OPTIMIZED FORMAN RATE PARAMETERS

FOR 6.35 mm (.250 inch) THICK 2024-T861 ALUMINUM

(R = .05, f = 200 cpm)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	52.2	47.5	.4946 E-16	.9022 E-15	9.163	.147
	T	35.3	32.1	.3804 E-18	.5859 E-17	10.956	.672
298 (ARGON)	L	*		FC(K_c)		*	*
	T	28.1	25.6	.1562 E-11	.4030 E-10	5.485	.048
298 (WET)	L	28.5	25.9	.9966 E-8	.3432 E-6	2.421	.013
	T	*		FC(K_c)		*	*
422	L	158.7	144.4	.4776 E-8	.1479 E-6	3.549	.123
	T	81.6	74.3	.1617 E-11	.4103 E-10	5.659	.053
450	L	*		FC		*	*
	T	*		FC		*	*
478	L	*		FC		*	*
	T	*		FC		*	*

TABLE E3-2

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 6.35 mm (.250 INCH) THICK 2024-T861 ALUMINUM

(.05 stress ratio, 200 cpm frequency)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	EQUATION (4-2) C_1 ENGLISH UNITS	EQUATION (4-2) C_2	EQUATION (4-4) C(P) SI UNITS	EQUATION (4-4) C(P) ENGLISH UNITS	EQUATION (4-4) N(P)	STND. DEV.
144	L	*		*		FC		*	*		*	*
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (ARGON)	L	*		*		FC(ΔK_o)		*	*		*	*
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (WET)	L	0.09	0.08	36.9	33.6	.4018 E-8	.1582 E-6	5.509	.1347 E-8	.6301 E-7	1.830	.012
	T	*		*		FC(ΔK_o)		*	*		*	*
422	L	*		*		FC(K_c)		*	*		*	*
	T	8.5	7.7	111.0	101.1	.7762 E-5	.3056 E-3	7.920	.5536 E-14	.3893 E-12	6.153	.058
450	L	11.8	10.7	138.2	125.8	.9703 E-4	.3820 E-2	5.776	.2815 E-11	.1725 E-9	4.693	.042
	T	*		*		FC		*	*		*	*
478	L	*		*		FC(K_c)		*	*		*	*
	T	*		*		FC		8	8		*	*

SECTION E4. ANALYSIS OF FLAW GROWTH RATE DATA FOR 6.35 mm (.250 INCH) THICK 2024-T861 AND 2124-T851 (CYCLIC FREQUENCY: 20 CPM)

PRECEDING PAGE BLANK NOT FILMED

TABLE E4-1 OPTIMIZED FORMAN RATE PARAMETERS

FOR 6.35 mm (.250 inch) THICK 2024-T861 AND 2124-T851 ALUMINUM

(R = .05, f = 20 cpm)

TEMPERATURE (°K)	ALLOY	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
298 (ARGON)	2024-T861	*		FC(K_c)		*	*
	2124-T851	57.5	52.3	.3521 E-12	.8704 E-11	5.938	.661
298 (WET)	2024-T861	25.3	23.0	.6746 E-8	.2307 E-6	2.496	.036
	2124-T851	61.0	55.5	.9289 E-12	.2348 E-10	5.701	.485
450	2024-T861	132.8	120.8	.1791 E-9	.4887 E-8	4.889	.025
	2124-T851	99.3	90.3	.8477 E-8	.2743 E-6	3.081	.036

TABLE E4-2

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 6.35 mm (.250 INCH) THICK 2024-T861 AND 2124-T851 ALUMINUM

(.05 stress ratio, 20 cpm frequency)

TEMPERATURE (°K)	ALLOY	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) C(P) SI UNITS	C(P) ENGLISH UNITS	N(P)	STND. DEV.
294 (ARGON)	2024-T861	*		*			FC ΔK_o	*	*		*	*
	2124-T851	*		*			FC ΔK_o	*	*		*	*
294 (WET)	2024-T861	7.7	7.0	25.3	23.0	.4453 E-6	.1753 E-4	2.259	.1993 E-10	.1122 E-8	3.799	.037
	2124-T851	*		*			FC ΔK_o	*	*		*	*
450	2024-T861	4.0	3.6	201.6	183.5	.2046 E-4	.8056 E-3	9.914	.9227 E-12	.5851 E-10	5.056	.026
	2124-T851	7.4	6.8	116.8	106.3	.4119 E-5	.1621 E-3	4.723	.3777 E-10	.2054 E-8	3.429	.035

SECTION E5. ANALYSIS OF FLAW GROWTH RATE DATA FOR 6.35 mm (.250 INCH) THICK 2124-T851

PRECEDING PAGE BLANK NOT FILMED

TABLE E5-1 OPTIMIZED FORMAN RATE PARAMETERS

FOR 6.35 mm (.250 inch) THICK 2124-T851 ALUMINUM

(R = .05, f = 200 cpm)

TEMPERATURE (°K)	ORIENTATION	K_c MPa m	K_c ksi in	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	103.1	93.8	.6724 E-11	.1833 E-9	4.899	.634
	T	58.2	53.0	.4802 E-12	.1205 E-10	5.774	.114
298 (ARGON)	L	95.3	86.7	.4152 E-0	.1253 E-7	3.822	.111
	T	53.2	48.4	.2643 E-10	.7421 E-9	4.585	.316
298 (WET)	L	99.6	90.7	.1015 E-7	.3330 E-6	2.935	.066
	T	40.9	37.2	.9913 E-8	.3336 E-6	2.666	.065
422	L	203.4	185.1	.3636 E-8	.1145 E-6	3.373	.036
	T	*		FC		*	*
450	L	108.5	98.7	.8441 E-8	.2734 E-6	3.071	.019
	T	*		FC(K_c)		*	*
478	L	*		FC		*	*
	T	*		FC		*	*

TABLE E5-2

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 6.35 mm (.250 INCH) THICK 2124-T851 ALUMINUM

(.05 stress ratio, 200 cpm frequency)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) C(P) SI UNITS	C(P) ENGLISH UNITS	N(P)	STND. DEV.
144	L	*		*		FC		*	*		*	*
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (ARGON)	L	8.4	7.7	106.2	96.7	.2831 E-5	.1114 E-3	5.032	.3907 E-11	.2223 E-9	3.971	.116
	T	3.1	2.8	60.4	55.0	.1282 E-6	.5048 E-5	6.330	.2021 E-11	.1187 E-9	4.239	.300
294 (WET)	L	4.4	4.0	136.3	124.1	.1598 E-5	.6290 E-4	5.583	.4934 E-10	.2639 E-8	3.249	.068
	T	12.4	11.3	40.2	36.6	.2283 E-5	.8988 E-4	2.035	.4873 E-10	.2659 E-8	3.462	.065
422	L	*		*		FC(ΔK_o)		*	*		*	*
	T	*		*		FC		*	*		*	*
450	L	*		*		FC(ΔK_o)		*	*		*	*
	T	10.2	9.2	87.0	79.1	.7137 E-5	.2810 E-3	4.054	.1967 E-10	.1105 E-8	3.775	.093
478	L	16.0	14.6	290.4	264.3	.2454 E-4	.9660 E-3	3.551	.7799 E-9	.3869 E-7	2.452	.018
	T	*		*		FC(ΔK_o)		*	*		*	*

TABLE E5-3 OPTIMIZED FORMAN RATE PARAMETERS

FOR 6.35 mm (.250 inch) THICK 2124-T851 ALUMINUM

(R = .05 & .50, f = 200 cpm, BUCKLING RESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	102.2	93.0	.7572 E-9	.2286 E-7	3.816	.855
	T	62.9	57.2	.2583 E-10	.6957 E-9	5.026	.879
298 (ARGON)	L	93.7	85.3	.2790 E-8	.8770 E-7	3.389	.408
	T	66.8	60.8	.2030 E-9	.5883 E-8	4.252	.536
298 (WET)	L	85.2	77.5	.1067 E-7	.3535 E-6	2.834	.150
	T	67.0	60.9	.2953 E-9	.8468 E-8	4.362	.409
405	L	125.6	114.3	.9771 E-8	.3154 E-6	3.107	.047
	T	141.7	129.0	.4280 E-8	.1319 E-6	3.596	.102

TABLE E5-4

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 6.35 mm (.250 INCH) THICK 2124-T851 ALUMINUM

(.05 & .50 stress ratio, 200 cpm frequency)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) C(P) SI UNITS	C(P) ENGLISH UNITS	N(P)	STND. DEV.
144	L	1.04	.95	120.1	109.3	.3302 E-7	.1300 E-5	8.497	.5818 E-11	.3210 E-9	3.580	.330
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (ARGON)	L	1.83	1.67	155.2	141.2	.2341 E-6	.9217 E-5	8.883	.2886 E-11	.1657 E-9	4.002	.229
	T	8.6	7.8	77.7	70.7	.3772 E-5	.1485 E-3	5.000	.1467 E-11	.8857 E-10	4.539	.469
294 (WET)	L	7.6	6.9	96.1	87.4	.2137 E-5	.8413 E-4	3.834	.9947 E-10	.5208 E-8	3.025	.125
	T	*		*		FC(K_c)		*	*		*	*
450	L	9.0	8.2	100.6	91.5	.4025 E-5	.1585 E-3	3.030	.7612 E-9	.3799 E-7	2.516	.186
	T	9.0	8.2	114.9	104.5	.8421 E-5	.3315 E-3	3.591	.4731 E-9	.2430 E-7	2.820	.218

SECTION E6. ANALYSIS OF FLAW GROWTH RATE DATA FOR 11.47 mm (.450 INCH) THICK 2124-T851

PRECEDING PAGE BLANK NOT FILMED

TABLE E6-1 OPTIMIZED FORMAN RATE PARAMETERS

FOR 11.43 mm (.450 inch) THICK 2124-T851 ALUMINUM

(R = .05, f = 200 cpm)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	83.5	76.0	.1604 E-12	.3946 E-11	5.992	.084
	T	*		FC(K_c)		*	*
298 (ARGON)	L	100.8	91.7	.4824 E-10	.1360 E-8	4.542	.230
	T	47.4	43.1	.1410 E-9	.4224 E-8	3.900	.122
298 (WET)	L	86.7	78.9	.1694 E-8	.5276 E-7	3.489	.087
	T	66.3	60.3	.2794 E-10	.7695 E-9	4.791	.548
422	L	*		FC(K_c)		*	*
	T	*		FC(K_c)		*	*
450	L	99.2	90.3	.8119 E-8	.2637 E-6	3.040	.063
	T	67.1	61.1	.3724 E-9	.1109 E-7	3.964	.255
478	L	*		FC(K_c)		*	*
	T	95.5	86.9	.3113 E-8	.9781 E-7	3.394	.059

TABLE E6-2

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 11.43 mm (.450 INCH) THICK 2124-T851 ALUMINUM

(.05 stress ratio, 200 cpm frequency)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	C_1 ENGLISH UNITS	C_2	EQUATION (4-4) C(P) SI UNITS	C(P) ENGLISH UNITS	N(P)	STND. DEV.
144	L	*		*		FC(ΔK_o)		*	*		*	*
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (ARGON)	L	*		*		FC(K_c)		*	*		*	*
	T	5.7	5.2	51.8	47.2	.3105 E-6	.1222 E-4	4.713	.1604 E-11	.9348 E-10	4.277	.121
294 (WET)	L	*		*		FC(K_c)		*	*		*	*
	T					FC(ΔK_o)						
422	L	*		*		FC(ΔK_o)		*	*		*	*
	T	*		*		FC(ΔK_o)		*	*		*	*
450	L	0.06	0.05	187.5	170.7	.8387 E-8	.3302 E-6	9.724	.4568 E-9	.2258 E-7	2.414	.058
	T	*		*		FC(ΔK_o)		*	*		*	*
478	L	15.9	14.4	62.0	56.4	.4411 E-5	.1737 E-3	2.187	.7028 E-10	.3743 E-8	3.207	.046
	T	14.2	12.9	99.8	90.9	.1298 E-4	.5111 E-3	3.630	.1788 E-10	.9996 E-9	3.720	.055

TABLE E6-3 OPTIMIZED FORMAN RATE PARAMETERS

FOR 11.43 mm (.450 inch) THICK 2124-T851 ALUMINUM

(R = .05 & .50, f = 200 cpm, BUCKLING RESTRAINED)

TEMPERATURE (°K)	ORIENTATION	K_c MPa $\sqrt{m}$	K_c ksi $\sqrt{in}$	C SI UNITS	C ENGLISH UNITS	n	STND. DEV.
144	L	78.9	71.8	.5441 E-9	.1631 E-7	3.894	.589
	T	51.3	46.7	.4973 E-9	.1478 E-7	3.982	2.74
298 (ARGON)	L	112.2	102.1	.1380 E-9	.3926 E-8	4.445	.407
	T	72.8	66.3	.5910 E-10	.1629 E-8	4.782	1.21
298 (WET)	L	*		FC(K_c)		*	*
	T	65.0	59.2	.7687 E-9	.2301 E-7	3.907	.986
450	L	102.7	93.5	.9112 E-8	.2959 E-6	3.044	.114
	T	98.1	89.3	.2379 E-8	.7260 E-7	3.701	.344

TABLE E6-4

OPTIMIZED COLLIEPRIEST RATE PARAMETERS FOR 11.43 mm (.450 INCH) THICK 2124-T851 ALUMINUM

(.05 & .50 stress ratio, 200 cpm frequency)

TEMPERATURE (°K)	ORIENTATION	ΔK_o MPa$\sqrt{m}$	ΔK_o ksi$\sqrt{in}$	K_c MPa$\sqrt{m}$	K_c ksi$\sqrt{in}$	EQUATION (4-2) C_1 SI UNITS	EQUATION (4-2) C_1 ENGLISH UNITS	EQUATION (4-2) C_2	EQUATION (4-4) C(P) SI UNITS	EQUATION (4-4) C(P) ENGLISH UNITS	EQUATION (4-4) N(P)	STND. DEV.
144	L	2.2	2.0	107.4	97.8	.9730 E-7	.3831 E-5	8.922	.3824 E-12	.2316 E-10	4.569	.193
	T	*		*		FC(K_c)		*	*		*	*
294 (ARGON)	L	4.4	4.0	145.9	132.8	.1663 E-5	.6551 E-4	7.662	.1140 E-11	.6785 E-10	4.386	.208
	T	*		*		FC(ΔK_o)		*	*		*	*
294 (WET)	L	3.3	3.0	102.2	93.0	.6377 E-6	.2510 E-4	5.962	.2635 E-10	.1439 E-8	3.470	.135
	T	0.17	0.16	129.5	117.9	.1085 E-8	.4272 E-7	13.994	.1490 E-11	.8744 E-10	4.232	.563
450	L	4.5	4.1	109.2	99.4	.1318 E-5	.5189 E-4	4.407	.2632 E-9	.1343 E-7	2.754	.179
	T	*		*		FC(K_c)		*	*		*	*

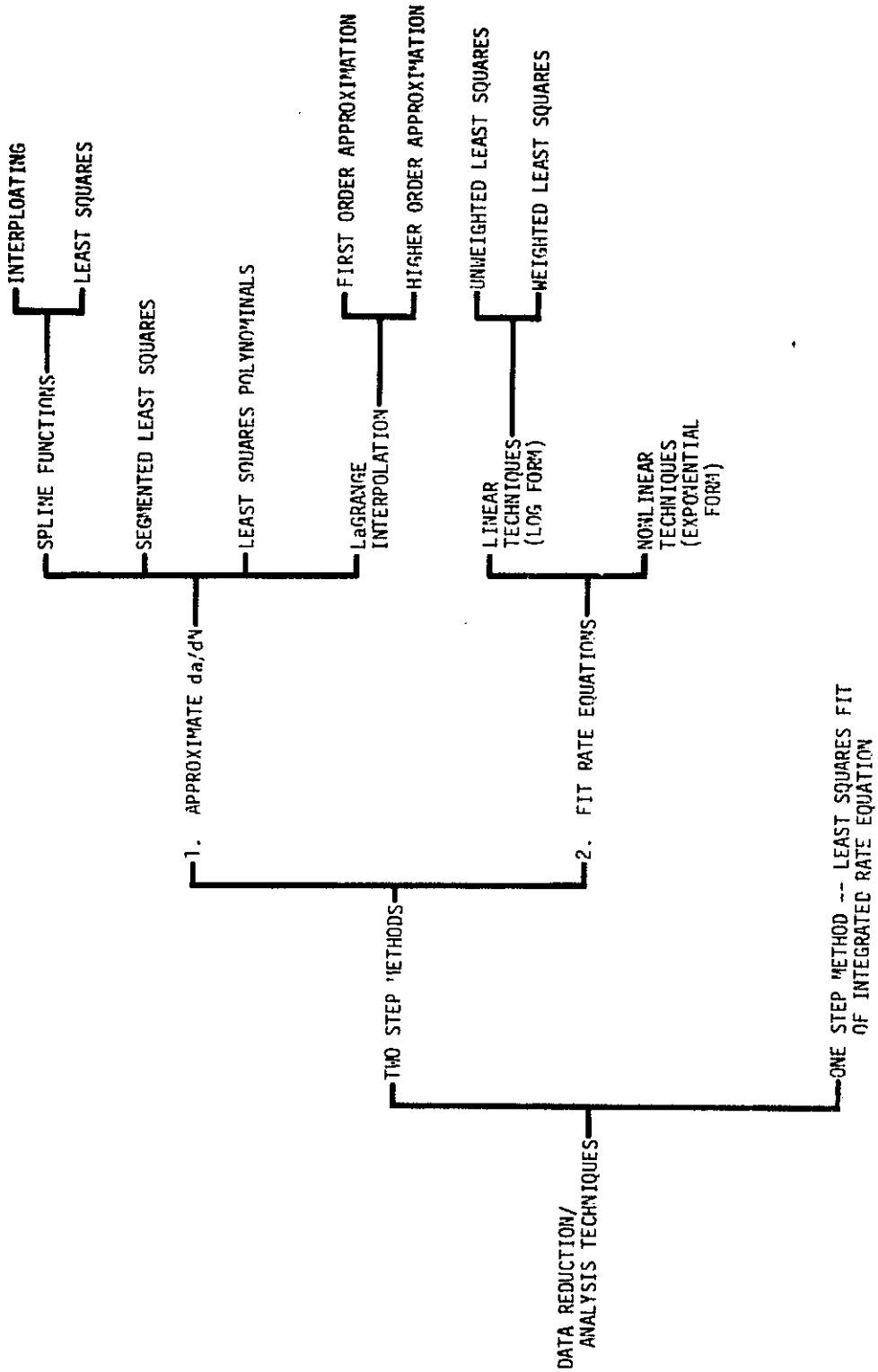
Appendix F

ALTERNATIVE CYCLIC DATA ANALYSIS TECHNIQUES

No standard technique has as yet been established to reduce raw specimen data (i.e., stress/crack length/cycle measurements) to (da/dN, ΔK) data or to analyze this data to establish the growth rate parameters associated with the Forman and Colliepriest rate models, equations (4-3) and 4-4). As a result, several techniques were considered, as summarized in Figure F-1.

Basically, two different approaches can be used to evaluate the growth rate parameters associated with these models. The more commonly used approach consists of two steps; first, approximations are used to establish the derivative of the (N,a) data; second, the desired rate equations are fit to this approximated data. As shown in Figure F-1, several techniques were considered for approximating the first derivative. The first considered involved the use of a spline function to fit the (N,a) data; this function is essentially a continuous segmented smooth function whose segments are sets of cubic polynomials. Two types were considered; the first, known as an interpolating spline function, produces a curve that is constrained to pass through each data point. Such a curve would not be desirable for this application, since experimental error could introduce unrealistic inflection points for da/dN. The second type considered involved the use of least squares regression techniques to fit the sets of cubic polynomials. While this technique may have been applicable, it was not investigated because it has only been developed relatively recently and the necessary computer software was not readily available.

The second approximation technique considered involved a segmented least squares approach in which the range of the independent variable (i.e., N) was broken up into three approximately equal intervals. The data in each of the first two



DATA REDUCTION/ANALYSIS TECHNIQUES CONSIDERED FOR CYCLIC TESTING

FIGURE F-1

intervals (corresponding to low and midrange N values) was fit by a polynomial in a least squares manner with the second polynomial constrained so that the two polynomials would have point and slope continuity at the point between the first and second segments. A rational function (bN+c)/(N+d) constrained to have point and slope continuity with the second polynomial at the point between the second and third segments then fit to the last segment in a least squares manner. A rational function was chosen for the third segment since the magnitude of the crack length values in this range seems to grow as though the desired curve were asymptotically approaching a vertical line. The curve fits using this approach showed too many points of inflection for this segmenting approach to be considered a good mathematical method.

A third approximation technique was considered which involved finding a low order polynomial, p, which passed through the point (N_i, a_i) and was fit in a least squares manner to the points closest to it. The derivative at the point (N_i, a_i) was then computed as:

$$\frac{da_i}{dN_i} = p'(N_i) \qquad \text{(F-1)}$$

For example, if the flaw growth rate was desired for the sixth point in a series of (N,a) measurements, a low order polynomial passing through the sixth point would be fit in a least squares manner to data points 4, 5, 7, 8 in the data set. The resulting polynomial would be differentiated and then evaluated for the value of (N) at the sixth data point. Although this technique has been used successively for data reduction (Reference F-1), it was not investigated further because other techniques seemed to be more promising.

The fourth approximation technique considered involved LaGrange interpolation. Calculating the derivative using the LaGrange polynomial of second or

higher degree was considered but not pursued because of the sensitivity of the technique to experimental error. Due to economic restraints and time limitations, a first order approximation (i.e., a simple divided difference) was finally adopted, as described in Section 4.2.1. The data reduction results indicated that this technique probably gives an adequate approximation to the derivative.

Once the first derivative of the (N,a) data was approximated, the resulting rate data had to be fit to the various rate models. Both linear and nonlinear techniques were investigated. The linear techniques involved the use of logarithmic transformations as described in Section 4.2.2; since the use of such transformations can introduce distortions into the analysis, both weighted and unweighted analyses were conducted. For this preliminary analysis, only the Forman rate model, equation (4-3), was investigated. As expressed in equation (4-9), the linearized form of this model is:

$$\ln\left[\frac{da}{dN} \cdot \left\{(1-R)\ K_c - \Delta K\right\}\right] = \ln C + n \ln \Delta K \qquad \text{(F-2)}$$

The unweighted least squares fit of the data to the linearized Forman model yielded values for C and n which resulted in a fairly good fit. However, it was observed that large residual values appeared as the dependent transformed variable in equation (F-2) became large. This effect, shown in Figure F-2, results from the nature of the logarithmic transformation used to linearize equation (4-3). This equation has the form

$$Y = CX^n \qquad \text{(F-3)}$$

The residual can be expressed as:

$$r_i = CX_i^n - Y_i \qquad \text{(F-4)}$$

If logarithmic transformations are used, the residual becomes:

$$d_i = (\log C) + n \log X_i - \log Y_i \qquad \text{(F-5)}$$

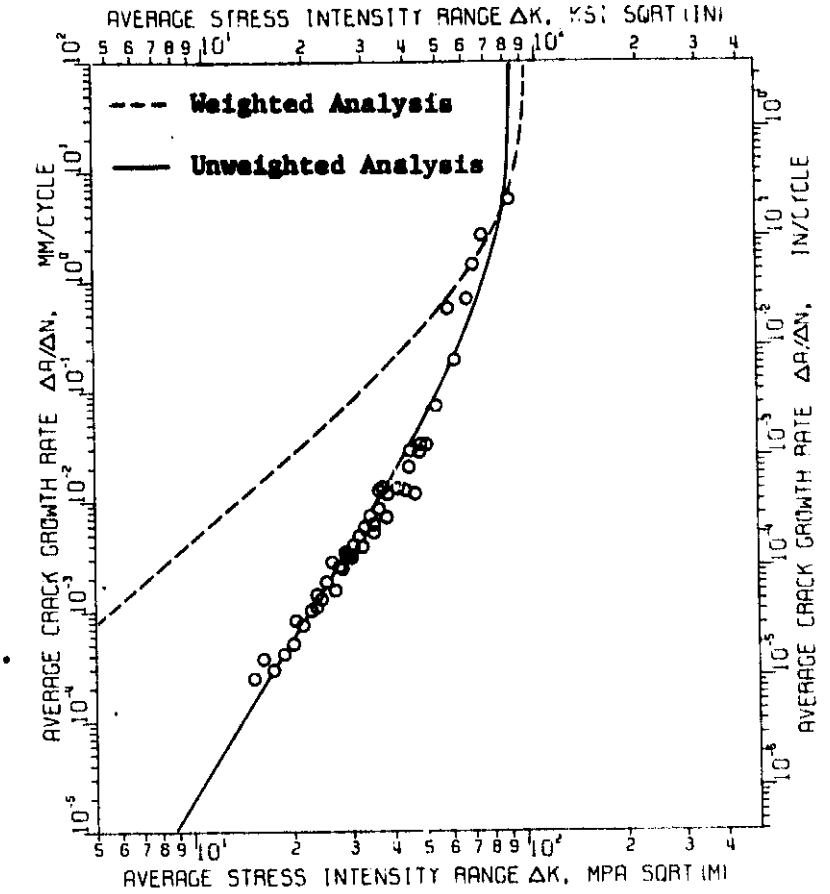


FIGURE F-2

COMPARISON OF WEIGHTED AND UNWEIGHTED LEAST SQUARES ANALYSES OF CYCLIC DATA

(Data from Appendix D, Figure D5-3a)

If $\Sigma\, d_i^2$ is minimized, the relative importance of the error for large values of Y is reduced. If Y has a small error ΔY, the error in log Y has an error roughly equivalent to $\Delta Y/Y$. Therefore,

$$d_i \cong \frac{r_i}{Y_i} \qquad \text{(F-6)}$$

Minimizing $\Sigma\, d_i^2$ is roughly equivalent to minimizing $\Sigma\, (r_i/Y_i)^2$. As a result, performing a least squares regression using logarithmic values unintentionally

weights the error for small values of Y more than that for the larger values. (It has been assumed that X_i contains no error; this not really true, since $X = \Delta K$, and thus contains some experimental error because this term is a function of the crack length, a.)

To weight all errors approximately equally, the quantity

$$\Sigma\ Y_i^2 d_i^2$$

must be minimized. This was attempted with the (N_i, a_i) data but the results were not satisfactory because the weights Y_i^2 varied over several orders of magnitude. This resulted in the larger data points completely dominating the remainder of the points in the fitting process. As shown in Figure F-2, the results were predictably poor for the range where the transformed variable, Y_i, was very small although there was reasonable agreement with the curve for the unweighted fit when da/dN was large.

An alternative weighting technique has been suggested (Reference 7-2); it involves the use of a weighting factor equal to the inverse square root of the sum of the squares of the expected errors in log (da/dN) and log (ΔK). To employ this technique, an estimate of error would have to be made for every data point; such a procedure was considered too lengthy for the quantity of data generated under this program.

Nonlinear techniques were also investigated in an attempt to evaluate the parameters associated with equation (4-3) directly, without resorting to logarithmic transformations. In this investigation the value of K_c was also varied using a bisection technique within the least squares program to minimize the sum of the squares of the residuals. The results of this procedure are shown in Figure F-3. Unfortunately, the resulting fit showed poor agreement with the data for the range where da/dN was small. Reasonable agreement was obtained for the larger da/dN values.

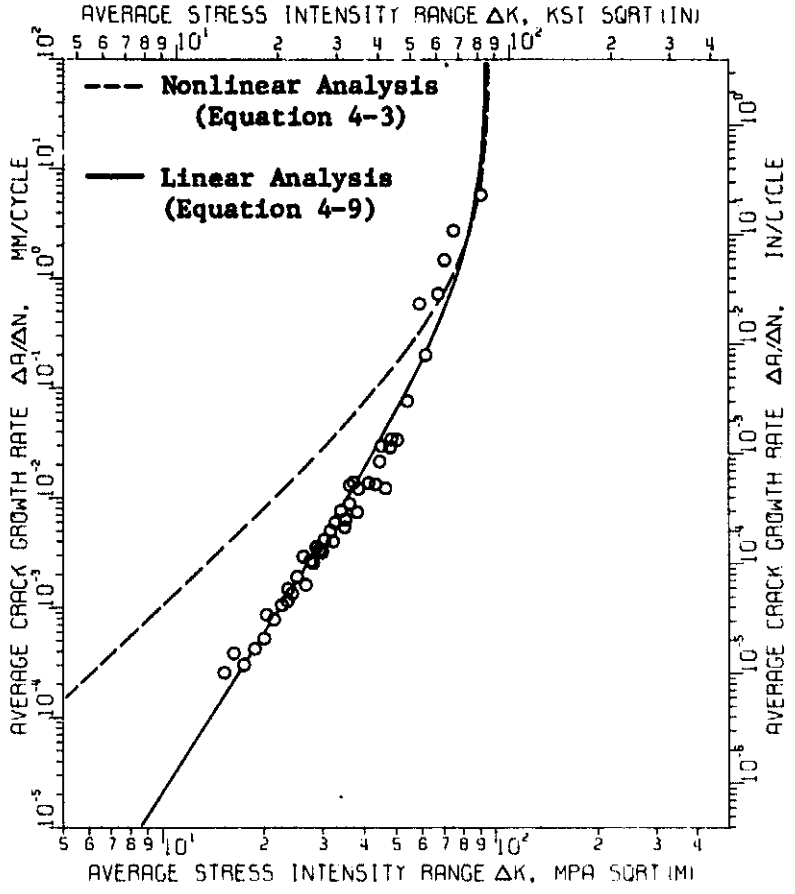


FIGURE F-3

COMPARISON OF LINEAR AND NON-LINEAR LEAST SQUARES ANALYSES OF CYCLIC DATA

(Data from Appendix D, Figure D5-3a)

The two step data reduction/analysis methods described above all introduce unknown amounts of analytical error; each suffers from the following defects:

- o the derivative, da/dN, is approximated and not directly measured, thus introducing analytical error;
- o the error in the "independent" variable, log (ΔK), is ignored when the rate equations are linearized; and

- the sum of the squares of the errors in the dependent variable (crack length) is not minimized.

These difficulties would be overcome if the integrated form of the rate equations were fit directly to the empirical data. For example, the integrated form of equation (4-3) can be written as:

$$N = \alpha a^{1-m} + \beta a^{1-m}\sqrt{a} + \gamma \qquad \text{(F-7)}$$

where

$$\alpha = \frac{2(1-R)K_c}{C(2-n)(\Delta\sigma\sqrt{\pi})^n}$$

$$\beta = \frac{-2}{C(3-n)(\Delta\sigma\sqrt{\pi})^{n-1}}$$

$$m = n/2 = [1.5\beta(1-R)K_c + \alpha\Delta\sigma\sqrt{\pi}]/[\beta(1-R)K_c + \alpha\Delta\sigma\sqrt{\pi}] \qquad \text{(F-8)}$$

$$\Delta\sigma = \sigma_{max} - \sigma_{min}$$

γ = constant of integration

Once α, β, γ and m are determined, we can calculate:

$$n = 2m \qquad \text{(F-9)}$$

$$C = -2/[3-n)\beta(\Delta\sigma\sqrt{\pi})^{n-1}] \qquad \text{(F-10)}$$

$$da/dN = a^m/[(1-m)\alpha + (1.5-m)\beta\sqrt{a}] \qquad \text{(F-11)}$$

However, calculating α, β, γ, and m directly from the data (N_i, a_i) is a nontrivial problem. The quantity to be minimized is:

$$g = \Sigma\,[a_i - h(N_i;\ \alpha,\ \beta,\ \gamma,\ m)]^2 \qquad \text{(F-12)}$$

where h is the implicit function a = h(N) defined by equation (F-8). Unfortunately this means that all coefficients α, β, γ, and m appear nonlinearly. Finding the values of the coefficients which minimize g requires solving the following system of nonlinear equations:

$$\begin{aligned} \partial g/\partial \alpha &= 2\Sigma a_i F_i &&= 0 \\ \partial g/\partial \beta &= 2\Sigma a_i \sqrt{a_i} F_i &&= 0 \\ \partial g/\partial \gamma &= 2\Sigma\, a_i^m F_i &&= 0 \\ \partial g/\partial m &= -2\Sigma[\alpha+\beta\sqrt{a_i}][a_i \log a_i]F_i &&= 0 \end{aligned} \qquad \text{(F-13)}$$

where

$$F_i = (a_i - h(N_i;\ \alpha,\beta,\gamma,m)]/[\alpha(1-m) + \beta(1.5-m)\sqrt{a_i}]$$

From equation (F-9) it is seen that m can be expressed explicitly in terms of α and β so that one equation of system (F-13) is redundant. Nevertheless, solution of the "reduced" system still is a formidable problem. An attempt to numerically solve it for some hypothetical data values showed that unless the starting estimate for the solution was very good, convergence could not be achieved.

The effort required to find a practical method for solving system (F-13) was beyond the scope of this study.

References:

(F-1) C. E. Feddersen, W. S. Hyler, "Fracture and Fatigue-Crack Propagation Characteristics of 7075-T7351 Aluminum Alloy Sheet and Plate," Battelle Memorial Institute Report No. G8902 (March, 1970).

(F-2) T. W. Orange, "Some Effects of Experimental Error in Fracture Testing," NASA-TM-X-68285 (August, 1973).

Appendix G

CONVERSION FACTORS *

TO CONVERT FROM	TO	MULTIPLY BY
Fahrenheit	kelvin	$T_K = (5/9)(T_F + 459.67)$
inch	centimeter	2.54
inch	millimeter	$2.54 \times 10^{+1}$
kip	kilonewton	4.448221
kip	meganewton	4.448221×10^{3}
kip/inch^2 (ksi)	megapascal	6.894757
ksi $\sqrt{in}$	MPa $\sqrt{m}$	1.099003
lbf	newton	4.448221
lbf/inch^2 (psi)	pascal	6.895757×10^{3}
psi $\sqrt{in}$	Pa $\sqrt{m}$	1.099003×10^{3}

* From: E. A. Mechtly, "The International System of Units", NASA SP-7012, 1973.