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UC-25 - Metallurgy and Ceramics

METALLURGY OF ZIRCALOY-2

PART II. THE EFFECTS OF FABRICATION VARIABLES ON THE PREFERRED ORIENTATION AND ANISOTROPY OF STRAIN BEHAVIOR

P. L. Rittenhouse
M. L. Picklesimer

OAK RIDGE NATIONAL LABORATORY
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U.S. ATOMIC ENERGY COMMISSION

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METALLURGY OF ZIRCALOY-2 PART II THE EFFECTS OF FABRICATION VARIABLES ON THE PREFERRED ORIENTATION AND ANISOTROPY OF STRAIN BEHAVIOR

P. L. Rittenhouse and M. L. Picklesimer

SUMMARY

The preferred orientation and anisotropy of strain behavior of Zircaloy-2 were studied as functions of fabrication variables. An inverse-pole-figure technique was used for the preferred orientation determinations. Evaluation of the effects of the fabrication variables on the anisotropy of strain behavior was accomplished by a contractile strain-axial strain analysis. An analysis of strain behavior in the normal direction was developed on the basis of theory of plastic flow of anisotropic metals. It was also found that a simple intuitively derivable relationship existed between the strain-strain analysis and the preferred orientation data. Correlations of the strain-strain data with true stress-true strain diagrams and mechanical properties were also attempted.

The preferred orientation of Zircaloy-2 produced by the Oak Ridge National Laboratory-Homogeneous Reactor Project (ORNL-HRP) Metallurgy fabrication schedule (ingot breakdown at 1800–1900°F, major reduction at 1800–1900°F or 1350–1450°F, a heat treatment of 30 min at 1800–1850°F followed by a water quench or rapid air cool to below 1200°F, a final reduction of 25–40% at 1000°F, and a 30-min anneal at 1400–1425°F) was weak compared to that of most of the other schedules investigated. Elimination of the β heat treatment (1800–1850°F for 30 min) between the major reduction and final reduction steps resulted in a material with a high degree of preferred orientation and with a state of pseudoisotropy in the rolling plane. A unique and quite high degree of preferred orientation was also developed when the ORNL-HRP Metallurgy fabrication procedure was used, but the ingot axis was in the transverse rather than the rolling direction of the finished plate permitting more contractile strain to occur in the normal direction than in either the rolling or transverse directions. The strain-strain analyses of these materials were consistent with the conclusions reached by the preferred orientation analyses.

The effects of cross rolling on the anisotropy of strain behavior of Zircaloy-2 were found to depend on the type of cross rolling (unidirectional or rotational), the temperature of cross rolling, and the stage of fabrication at which the cross rolling was done. Unidirectional cross rolling at 1000°F after β heat treatment caused only a slight increase in anisotropy of strain behavior over that for straight-rolled material, but rotational cross rolling at 1000°F after β heat treatment resulted in a material with a state of isotropy of strain behavior only in the rolling plane. Rotational cross rolling before β heat treatment, for one material at 1450°F and for another from 1900°F, produced different states or degrees of anisotropy of strain behavior.

Because of flow constraints which exist in sheet-type tensile specimens with width-to-thickness ratios > 1.0, it is imperative that round tensile specimens be used in the contractile strain-axial strain analysis. Also, since the principal axes of anisotropy are generally not the major sheet directions, they must be found by the preferred orientation analysis.

A number of problems for further investigation were suggested from the results of this study. Among these are the study of the anisotropy and preferred orientation of tube and rod products of Zircaloy-2 and an investigation of the effects of multiaxial loading on anisotropic behavior.

INTRODUCTION

When a polycrystalline metal is plastically deformed, the orientation of each individual grain proceeds toward a preferred orientation such that certain crystallographic planes and axes are aligned in a direction related to the direction of plastic flow in the metal. The nature of the preferred orientation or texture which results from the deformation is a function of both the characteristics of flow of the material and the degree of deformation. Textures which are generated during deformation are not eliminated by annealing, but are changed to other textures which are related to the deformation texture.

Although little work has been published on the preferred orientation of Zircaloy-2, considerable information on zirconium is available. The cold-rolled sheet texture of zirconium has been reported by a number of investigators.[1–4] The poles of the basal planes have been found to be inclined 36–40° from the normal direction toward the transverse direction and the $\langle 10\bar{1}0 \rangle$ directions have been found to be parallel to the rolling direction. The annealing texture reported for material annealed in the temperature range 925–1550°F shows the same tilt of the basal plane poles but with $\langle 11\bar{2}0 \rangle$ directions about 10° from the rolling direction and out of the rolling plane.[3] Cross rolling at room temperature (rotating the material 90° after each pass) produces a texture in which the poles of the basal planes are perpendicular to the rolling plane, the $\langle 10\bar{1}0 \rangle$ directions are parallel to one rolling direction, and the $\langle 11\bar{2}0 \rangle$ directions are parallel to the other rolling direction. Annealing at 1200°F produces a new orientation related to the as-rolled texture by a 30° rotation about the c-axis, thereby exchanging the positions of the $\langle 10\bar{1}0 \rangle$ and $\langle 11\bar{2}0 \rangle$ directions.[1]

No studies of the deformation systems in Zircaloy-2 have been made, but the deformation systems for relatively high-purity zirconium have been reported.[5] Slip has been observed only on the system $\{10\bar{1}0\} \langle \bar{1}2\bar{1}0 \rangle$. Deformation twins having composition planes of $\{10\bar{1}2\}$, $\{11\bar{2}1\}$, $\{11\bar{2}2\}$, and $\{11\bar{2}3\}$ were also found. The effect of the oxygen, tin, iron, nickel, and chromium present in Zircaloy-2 on the activity of these systems is not known. It is probable that the same systems are operative.

The practical importance of preferred orientation is that it causes a variation of properties with direction in the worked material. This is obvious when one considers that plastic deformation in metals occurs by slip and twinning on specific crystallographic planes and in specific directions. Therefore, when a preferred orientation exists in a material, deformation will be favored in some directions and restricted in others, even in cubic metals which have a multiplicity of slip and twin systems.

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[1] R. K. McGreary and B. Lustman, Trans. Met. Soc. AIME **191**, 994 (1951).

[2] R. K. McGreary and B. Lustman, Trans. Met. Soc. AIME **197**, 284 (1953).

[3] J. H. Keeler et al., Trans. Met. Soc. AIME **197**, 932 (1953).

[4] J. H. Keeler and A. H. Geisler, Trans. Met. Soc. AIME **206**, 80 (1955).

[5] E. J. Rapperport, Room Temperature Deformation Process in Zirconium, NMI-1199 (Feb. 24, 1958).

Noncubic materials have only a limited number of deformation systems available, and the importance of the degree of preferred orientation of these systems with respect to the applied stress system becomes even greater.

The results of an investigation of the effect of fabrication variables on the anisotropy of mechanical properties of Zircaloy-2 have been published previously.[6] In the study, the variation of mechanical properties (tensile and yield strength, elongation, and reduction in area) in the rolling plane of the plate was investigated as a function of fabrication variables (annealing and working temperatures, cross rolling, etc.). Details of the fabrication procedure for each of the experimentally fabricated schedules of Zircaloy-2 may be seen in Appendix I.

Although the mechanical property data obtained in the study could, in most cases, be correlated qualitatively with the fabrication variables, a more characteristic and distinctive quantity is needed to describe the state of anisotropy resulting from each of these variables. During the mechanical property testing of irradiated and control specimens of Zircaloy-2 at ORNL, it was noticed that tensile specimens of circular cross section did not neck uniformly on testing. The fracture cross sections, in fact, seemed to be elliptical with the ellipticity varying from material to material and with the orientation of the specimen axis in the plate. The degree of ellipticity as measured by the ratio of the major to the minor axis of the cross section, however, appeared constant for duplicate specimens. It was believed, then, that the shape of the cross section was characteristic of the degree and type of preferred orientation in the lot of material, and could be used as a measure of the anisotropy of the material. In order to determine whether or not the cross sections of the fractured specimens were truly elliptical, measurements of the specimen diameters were made from fracture to the shoulder at rotation intervals of 5° from the normal direction through 180°. All measurements were made using an optical comparator which was equipped with a specimen jig to allow 5° rotations through 360° and accurate measurement of the lateral displacement of the specimen. The major and minor axes of the specimen can be measured directly by such a technique, but calculations are

[6] P. L. Rittenhouse and M. L. Picklesimer, Metallurgy of Zircaloy-2 Part I The Effects of Fabrication Variables on the Anisotropy of Mechanical Properties, ORNL-2944 (Oct., 1960).

involved in the determination of the true dimensions when the specimen is rotated to angles intermediate to 0° (major axis) and 90° (minor axis). Although the parallel light beam from the comparator strikes the specimen at the angle of rotation, θ, this is not the angle of the tangent to the point at which the measurement is desired (see Fig. 1). Therefore, the real angle of rotation, β, and the dimension of the specimen at the tangent point, r_β, must be calculated. It is necessary first, to assume that the cross sections are elliptical and then to compare the calculated values with those for a true ellipse with identical major and minor axes. Methods of calculation of β and r_β are presented in Appendix II.

Proof of the ellipticity of the cross sections of the fractured tensile specimens may be seen in Figs. 2 and 3. The two inner solid curves are the ellipses calculated using the major and minor axes of the cross sections at the fracture and 0.0625 in. back from the fracture. The data points are those determined by calculation from the experimental measurements. Metallographic examination of the cross sections of specimens also showed that they were truly elliptical (Fig. 4).

The first attempts at characterization of the anisotropy of each material by ellipticity involved only the ratio of the major axis to the minor axis at the fracture. This ratio, at best, yields a small spread of values, so that appreciable differences in ratio occur only when the differences in anisotropy are large. Various methods of analyzing the data based on plots of strain (both contractile and axial) reduction in area, and combinations of the two versus distance from the fracture were of only limited value because of variations in total strain, especially when the fracture did not occur at the exact center of the gage section.

To facilitate further strain analyses, coordinate systems were adopted using each of the major fabrication directions of the sheet as coordinate directions. The strain relationships were evaluated by using the rolling, transverse, and normal directions as reference axes x, y, and z and subscript notation for the strains, as shown in Fig. 5. In each case the axial natural tensile strain was defined[7] as $\bar{\epsilon}_{ii}$, and the contractile natural strains as $\bar{\epsilon}_{ij}$ and $\bar{\epsilon}_{ik}$. It was found experimentally that the contractile strains, over

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[7] In this report all strains are natural (true) strains: $\bar{\epsilon}_{ii} = \ln \frac{A_o}{A}$

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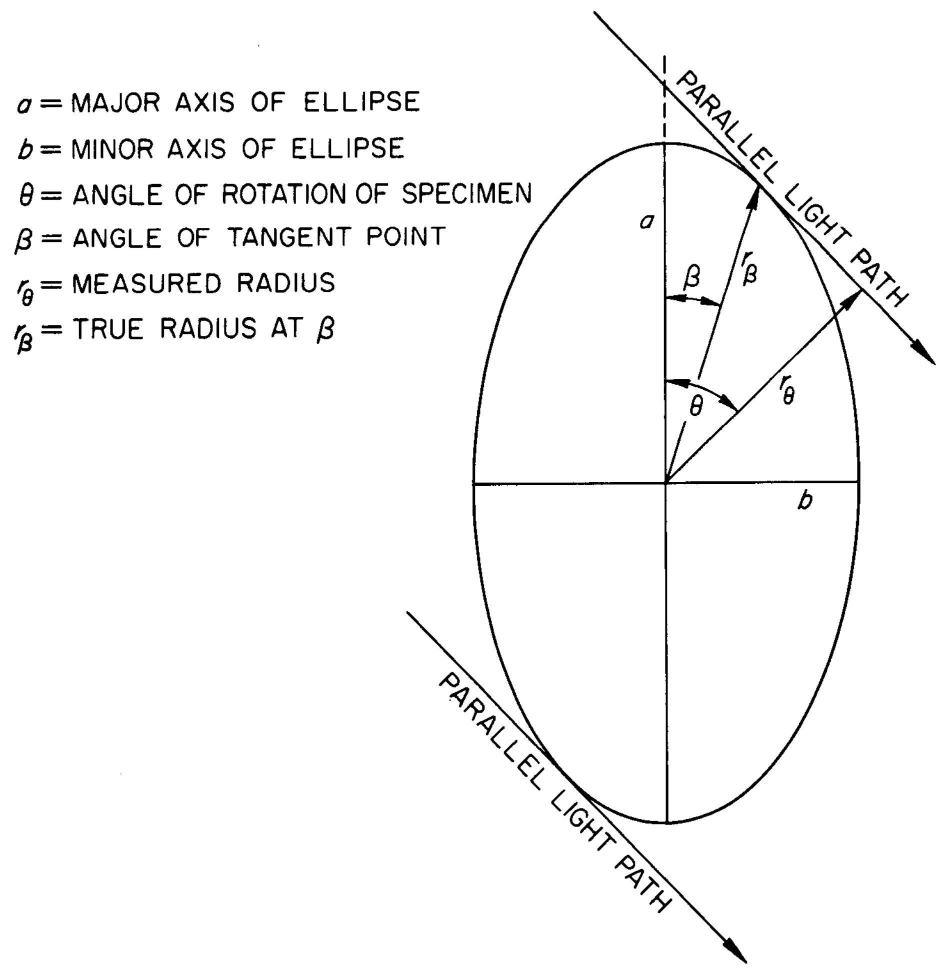

Fig. 1. Dimensions Involved in the Ellipticity Calculations.

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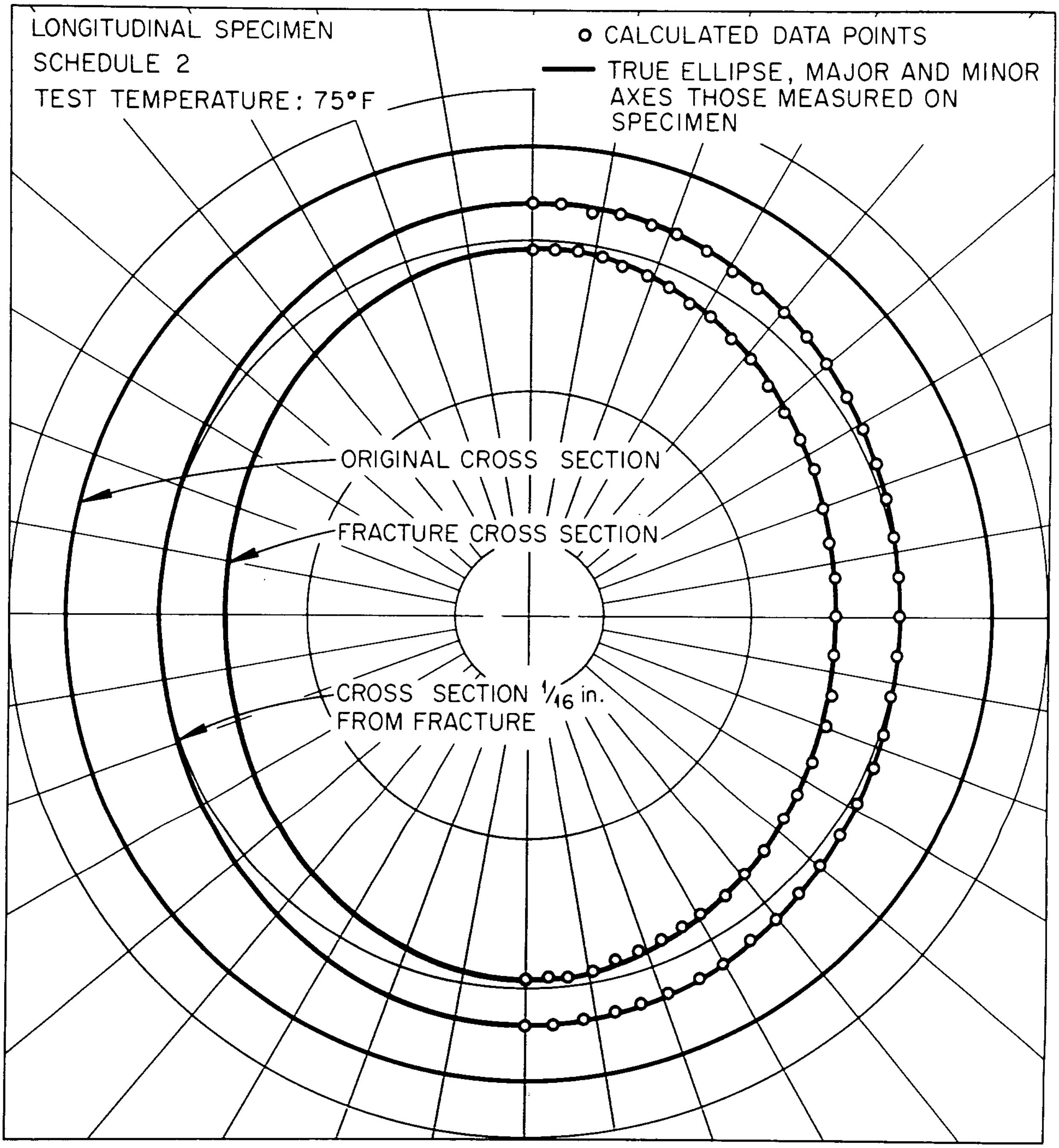

Fig. 2. Polar Plot of the Cross Sections of a Zircaloy-2 Longitudinal Tensile Specimen Tested at Room Temperature. Schedule 2.

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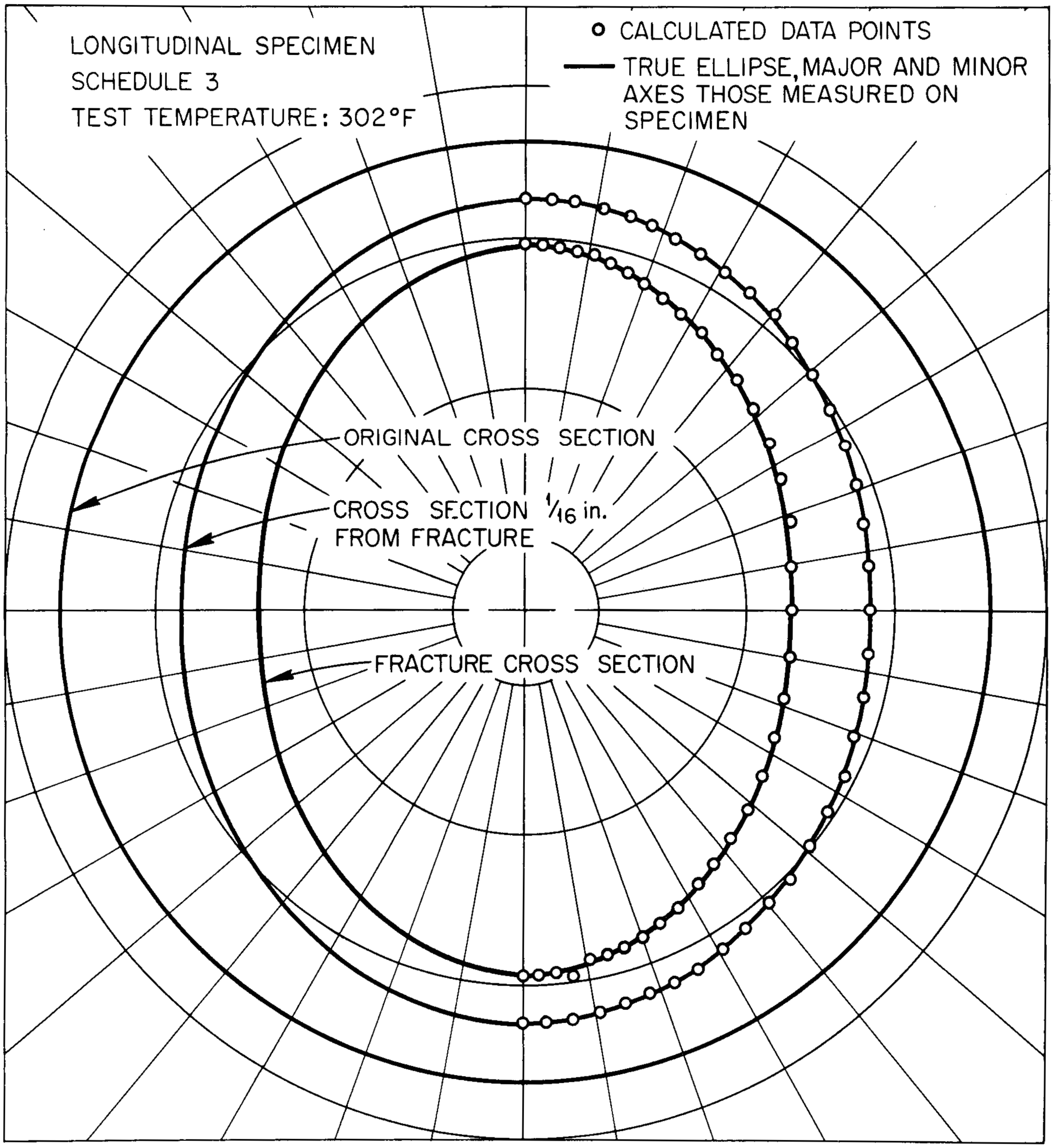

Fig. 3. Polar Plot of the Cross Sections of a Zircaloy-2 Longitudinal Tensile Specimen Tested at 302°F. Schedule 3.

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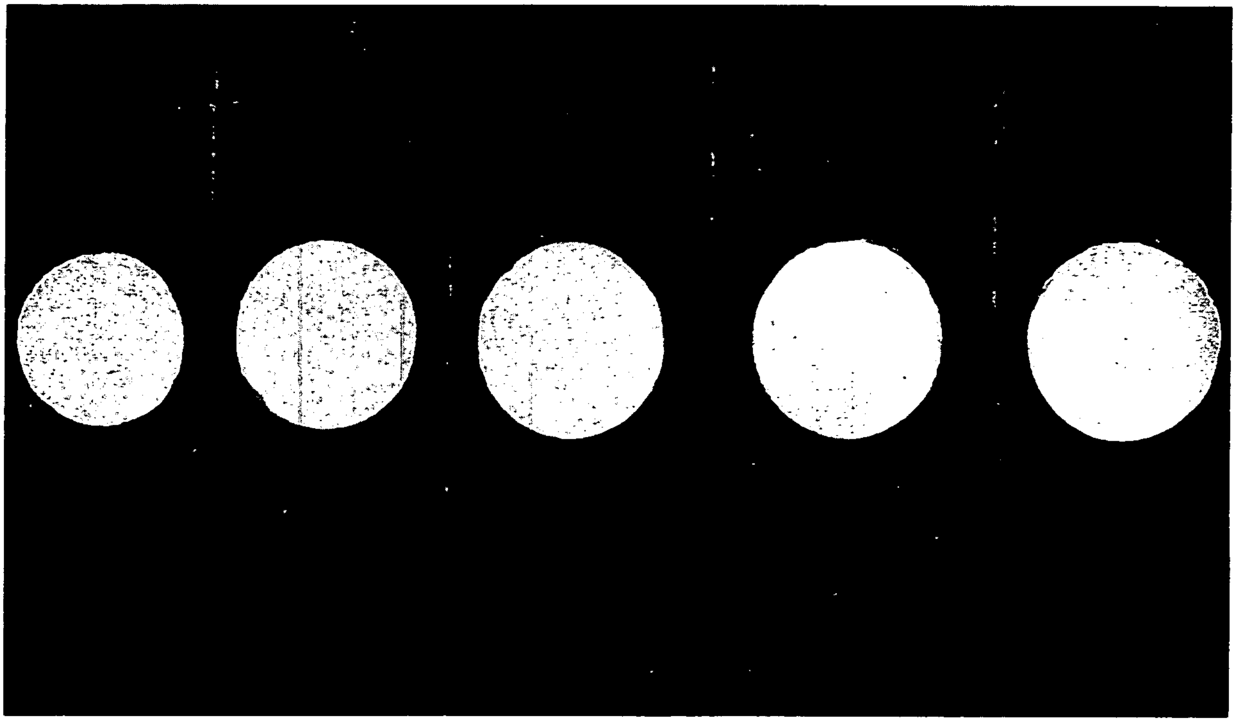
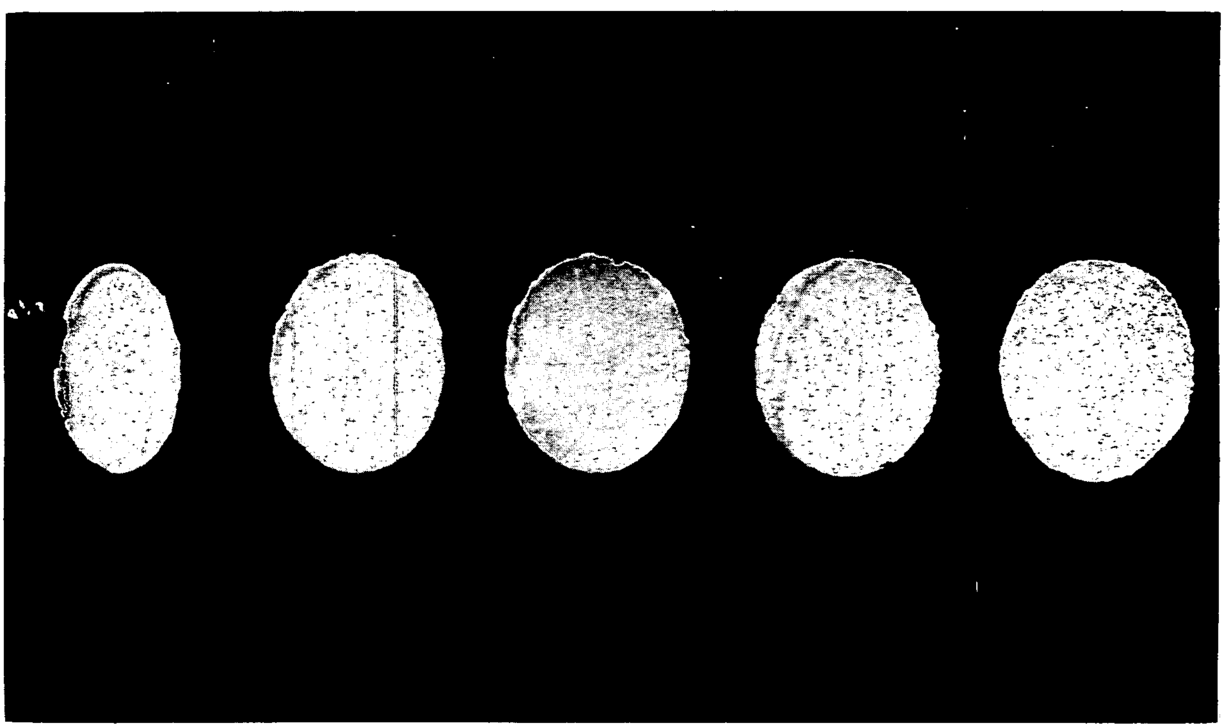


(a) SCHEDULE 62 - 0, 1/8, 1/4, 3/8 AND 1/2 in. FROM FRACTURE.



(b) SCHEDULE 9 - 0, 1/8, 1/4, 3/8 AND 1/2 in. FROM FRACTURE.

Fig. 4 Photographs of Zircaloy-2 Tensile Specimen Cross-Sections After Testing at Room Temperature.

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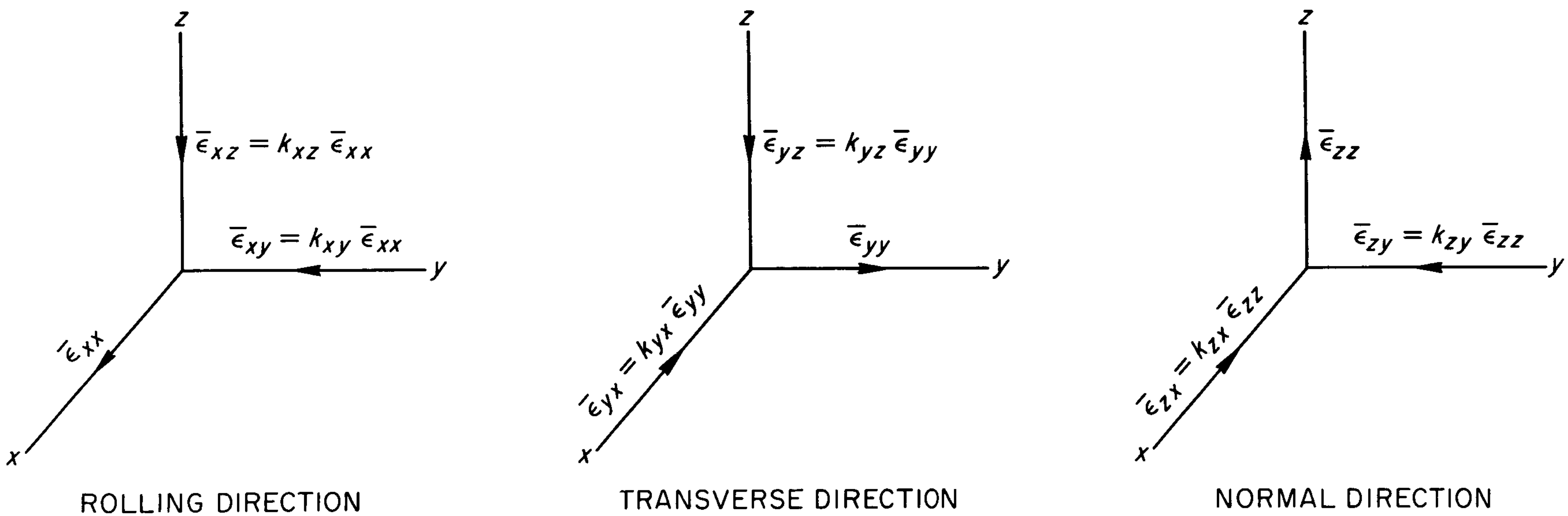

Fig. 5. Reference Axes Notation.

large ranges of axial tensile strain, could be expressed as linear functions of the axial strain,

$$\bar{\epsilon}_{ij} = k_{ij}\bar{\epsilon}_{ii} \tag{1}$$

and

$$\bar{\epsilon}_{ik} = k_{ik}\bar{\epsilon}_{ii} \tag{2}$$

where k_{ij} and k_{ik} are the slopes of axial strain-contractile strain plots and are constant for a given lot of material. Since the volume of the specimen remains constant during plastic flow,

$$\bar{\epsilon}_{ii} + \bar{\epsilon}_{ij} + \bar{\epsilon}_{ik} = 0 \tag{3}$$

Substituting from Eqs. 1 and 2 for $\bar{\epsilon}_{ij}$ and $\bar{\epsilon}_{ik}$

$$\bar{\epsilon}_{ii} = -k_{ij}\bar{\epsilon}_{ii} - k_{ik}\bar{\epsilon}_{ii} \tag{4}$$

so that

$$k_{ij} + k_{ik} = -1. \tag{5}$$

It has been shown experimentally (Appendix III) that after an axial tensile strain of $\bar{\epsilon}_{ii} \simeq 0.03$ is reached, the values of k_{ij} and k_{ik} remain constant to fracture. But, because of the fact that the values of the k's do change during the first small increments of plastic strain, the straight line plots of $|\bar{\epsilon}_{ij}|$ and $|\bar{\epsilon}_{ik}|$ versus $\bar{\epsilon}_{ii}$ do not always pass through the origin. The intercepts of the curves on the axes are, however, generally less than ± 0.005 and always less than ± 0.01 in value.

Values for k_{xy}, k_{xz}, k_{yx}, and k_{yz} can be determined experimentally from fractured tensile specimens in the rolling and transverse directions. It was impossible to test a specimen from the normal direction, but it has been shown previously[6] that the state of anisotropy is not fully described without consideration of the tensile strain properties in the normal direction. Therefore, it is not only desirable but necessary to obtain values of k_{zx} and k_{zy}. For calculation of these values, it is necessary to establish at least two relationships between the k values. The first of these relationships is given by Eq. 5. Starting with the theory of anisotropic strain behavior developed by Hill[8] and converting to the coordinate system used in

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[8] R. Hill, "A Theory of the Yielding and Plastic Flow of Anisotropic Metals," Proc. Roy. Soc., (London) 193, Series A, pp. 281–297 (1948).

this report, it is possible to show that (Appendix IV)

$$\frac{k_{xy}\, k_{yz}\, k_{zx}}{k_{xz}\, k_{yx}\, k_{zy}} = 1 \qquad (6)$$

A simultaneous solution of Eqs. 5 and 6 yields the desired equation for k_{zx},

$$k_{zx} = - \frac{k_{xz}\, k_{yx}}{k_{xy}\, k_{yz} + k_{xz}\, k_{yx}} \qquad (7)$$

and, from Eq. 5, for k_{zy}

$$k_{zy} = -(k_{zx} + 1). \qquad (8)$$

For an isotropic material,

$$\bar{\epsilon}_{ij} = \bar{\epsilon}_{ik} = - \frac{\bar{\epsilon}_{ii}}{2} \qquad (9)$$

and $$k_{ij} = k_{ik} = -0.5 \qquad (10)$$

Such a relationship would be the limiting case for Zircaloy-2, and, as it became more nearly isotropic, the values of the k's would approach -0.5.

Although, at the time of development of this type of analysis, it was believed to be unique, it was later found that investigations along similar lines had been performed at the University of California[9] and at Case Institute of Technology.[10] The work was done on sheet-type specimens of aluminum and magnesium alloys and the maximum axial tensile strains were in all cases less than 0.1. The anisotropic effects seen in these studies were not nearly so large as those observed for Zircaloy-2. No normal direction analyses were presented. It is believed that the present analysis is the first conducted on round tensile specimens and the first presenting an analysis of the properties in the normal direction.

In a study of the effects of dimensional factors on the yielding and fracture of medium carbon steel,[11] it was shown that the ratio of the contractile strain in the thickness direction to the contractile strain in the width direction at fracture was a function of the width-to-thickness ratio (W/T). The ratio of the strains was approximately unity for specimens

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[9] T. H. Hazlett, A. T. Robinson, and J. E. Dorn, Trans. Am. Soc. Metals 42, 1326 (1950).

[10] L. J. Klingler and G. Sachs, J. Aeronaut. Sci., p. 599 (Oct., 1938).

[11] J. Miklowitz, J. Appl. Mech., p. 274 (Sept., 1948).

with square (W/T = 1) cross sections. At a ratio of W/T = 3, the strain ratio was greater than 1.5 and increased to about 2.0 for a ratio of W/T = 10. The contractile strain in the thickness directions remained essentially constant (random variation) for all W/T ratios, while the contractile strain in the width direction decreased as the ratio of W/T increased. Since a constraint is imposed on the contractile strain in the width direction for a ratio of W/T > 1, care must be exercised in any strain analysis of sheet-type specimens.

EXPERIMENTAL DETAILS AND PROCEDURES

Preferred Orientation Determination

The preferred orientation of material from twelve of the Zircaloy-2 experimental fabrication schedules was obtained by utilizing the inverse pole figure technique first described by Jetter and Borie.[12] The technique is unique in that complete quantitative pole figure data are obtained using a single spherical x-ray diffraction specimen. A description of the specimen, equipment, and experimental procedures may be found in the paper by Jetter and Borie.[12]

The preferred orientation data are presented on axis distribution charts termed "inverse pole figures." In the conventional method, the orientation distribution of the pole of a diffracting plane is plotted with respect to a reference axis; in the inverse pole figure method, the orientation distribution of a reference axis is plotted with respect to standard crystallographic axes.[13,14]

The intensity data for all of the inverse pole figures were determined by the X-Ray Diffraction Service Group of the Metallurgy Division.

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[12] L. K. Jetter and B. S. Borie, Jr., J. Appl. Phys. 24(5), 532 (May, 1953).

[13] L. K. Jetter, C. J. McHargue, and R. O. Williams, J. Appl. Phys. 27(4), 368 (April, 1956).

[14] C. J. McHargue and L. K. Jetter, Met. Div. Ann. Prog. Rep., Sept. 1, 1959, ORNL-2839, p. 3.

Strain-Strain Analysis

The measurement of the ellipticity and contractile strains for all of the tensile specimens was accomplished using a Jones and Lamson optical comparator at a magnification of 50X. A specimen jig was constructed to allow rotation of the specimen through 360° in 5° increments and to permit accurate measurement (± 0.0005 in.) of the lateral movement of the cross section being examined from shoulder to fracture. The jig also provided for the alignment of the reference notch, always cut before machining on the end of the grip section of the specimen, in the direction normal to the plane of the plate.

Measurement of the dimensions of the fractured specimens at the fracture point is complicated by the distortion which exists in that portion of the necked region. The selection of the point of measurement at fracture, the point just behind the fracture flare, is subject to errors in the judgment of the operator and may be, in some case, as much as 0.002 in. in error along the tensile axis. For the most part, it is believed that the measurements of cross-section position between shoulder and fracture were accurate to better than 0.001 in. Because of the large number of specimens on which measurements were desired, the majority of the specimens were measured only at 0, 45, 90, 135, and 180° rotations from the normal direction at each cross-section position. In every case measurements were taken at the fracture, 0.0625 in. from the fracture, and at 0.125-in. increments from the fracture-plus-0.0625 in. to the shoulder.

The contractile and axial natural strains at any axial point of measurement are calculated as follows:

$$\bar{\epsilon}_{ij} = \ln \frac{D_{ij}}{D_o} \qquad (11)$$

$$\bar{\epsilon}_{ik} = \ln \frac{D_{ik}}{D_o} \qquad (12)$$

$$\bar{\epsilon}_{ii} = |\bar{\epsilon}_{ij}| + |\bar{\epsilon}_{ik}| \qquad (13)$$

or

$$\bar{\epsilon}_{ii} = \ln \frac{A_o}{A} \qquad (14)$$

where D_{ij} = "diameter" in 'j' direction of specimen cross section after testing

D_{ik} = "diameter" in 'k' direction of specimen cross section after testing

D_o = original diameter of specimen

A_o = original cross-sectional area of specimen

A = cross-sectional area after testing

$$A = \pi ab \qquad (15)$$

where 'a' = major axis of the ellipse of cross section

'b' = minor axis of the ellipse of cross section

The majority of the calculations, both for the proof of ellipticity and for computing the natural strains, were performed by the ORNL computing machine, the ORACLE.

RESULTS

The inverse pole figures determined for twelve of the schedules of Zircaloy-2 are presented in Figs. 7–18. The principal sheet directions – rolling, transverse, and normal – were taken as the reference axes, and their distributions are plotted with respect to crystallographic axes. The orientations of a number of crystallographic planes with respect to the close-packed hexagonal unit cell are presented in Fig. 6. The planes shown were those generally used in the determination of the preferred orientation.

Strain-strain plots for all of the Zircaloy-2 fabrication schedules (room temperature tests) are shown. Natural (true) axial tensile strains are plotted on the abscissa, and the absolute values of the natural contractile strains are plotted on the ordinate. The slopes of the axial versus the contractile strain curves are the absolute values of the associated k's. Plots of the values of the k's versus orientation of the specimen axis for twelve of the experimental schedules of Zircaloy-2 are also presented. Data from a few of the elevated-temperature tests are presented in the text; the remainder are presented in Appendix VI.

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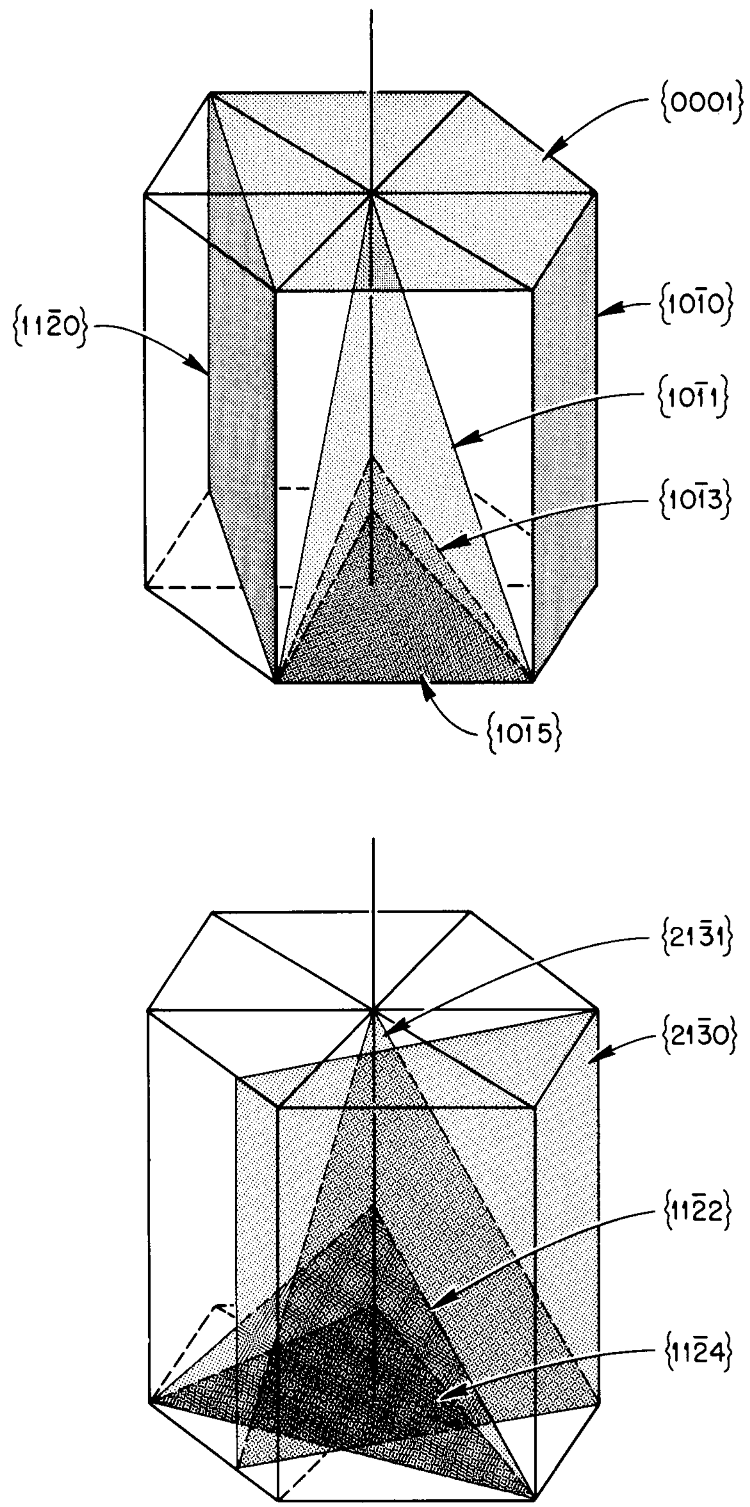

Fig. 6. The Orientation of a Number of Crystallographic Planes with Respect to the Close-Packed-Hexagonal Unit Cell.

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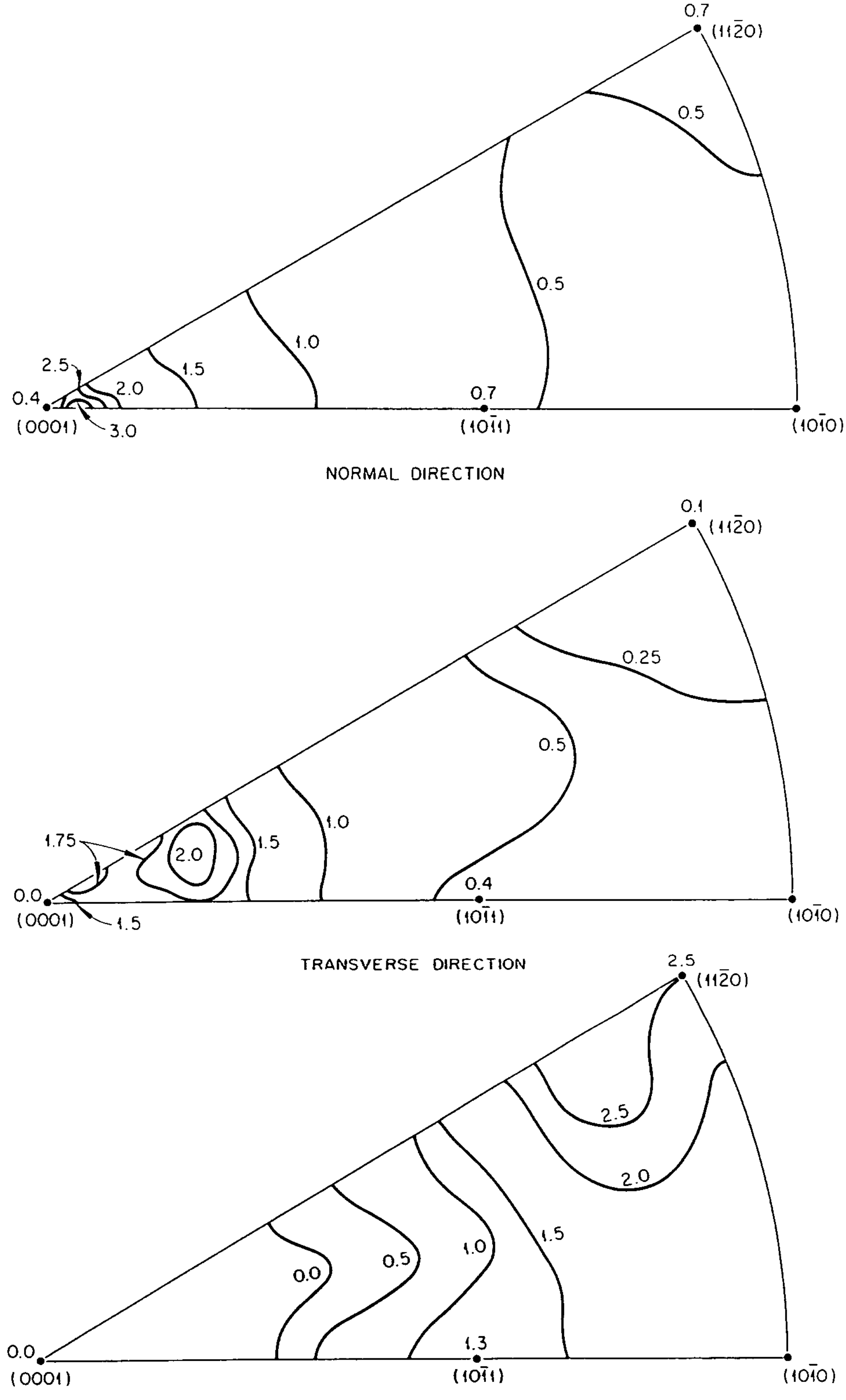

Fig. 7. Inverse Pole Figures for Schedule 62 Zircaloy-2.
Schedule 62: HRP Commercial Fabrication Procedure.

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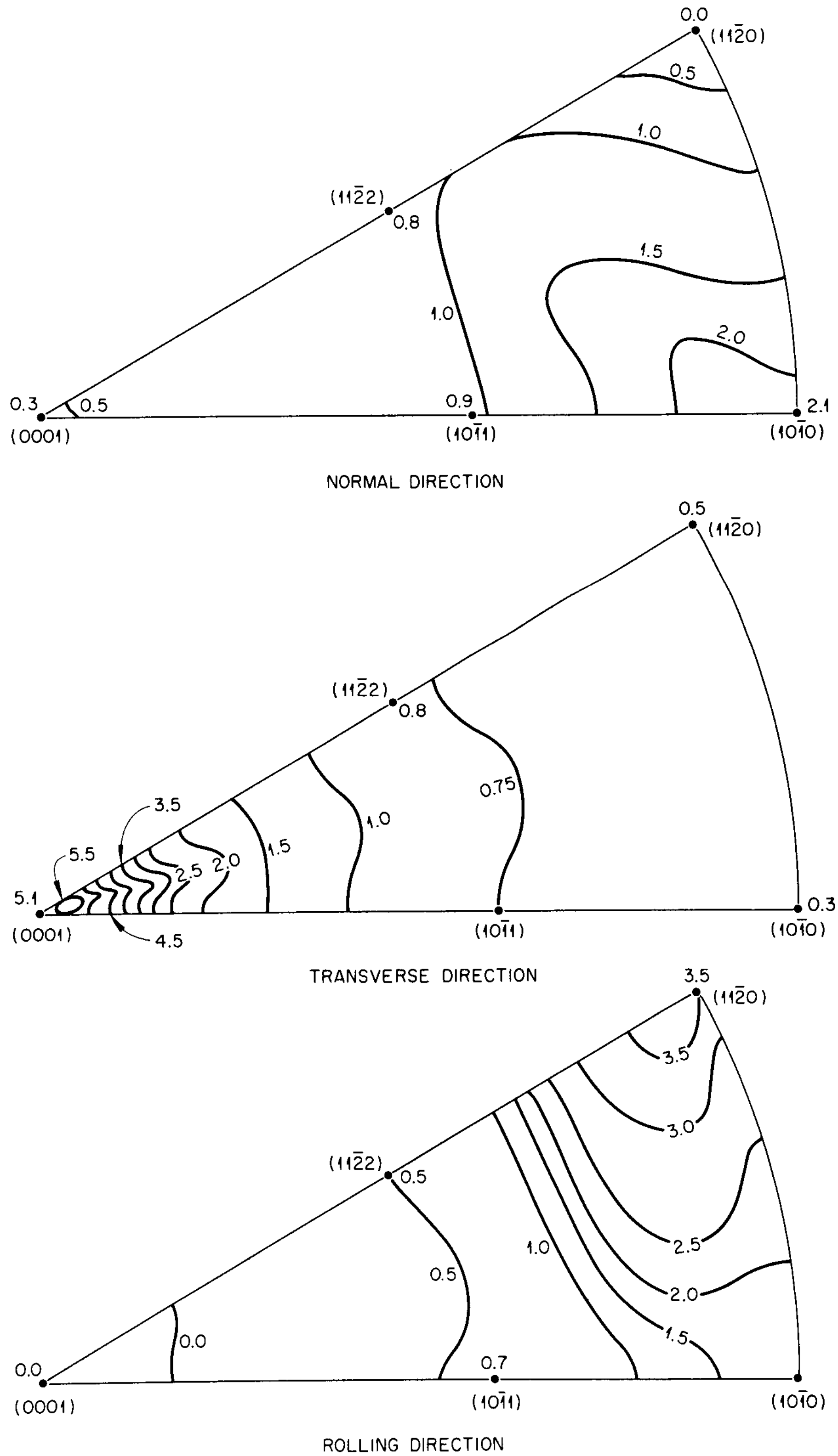

Fig. 8. Inverse Pole Figures for Schedule J Zircaloy-2.
Schedule J: HRP Commercial Fabrication Procedure for Wide Plate.

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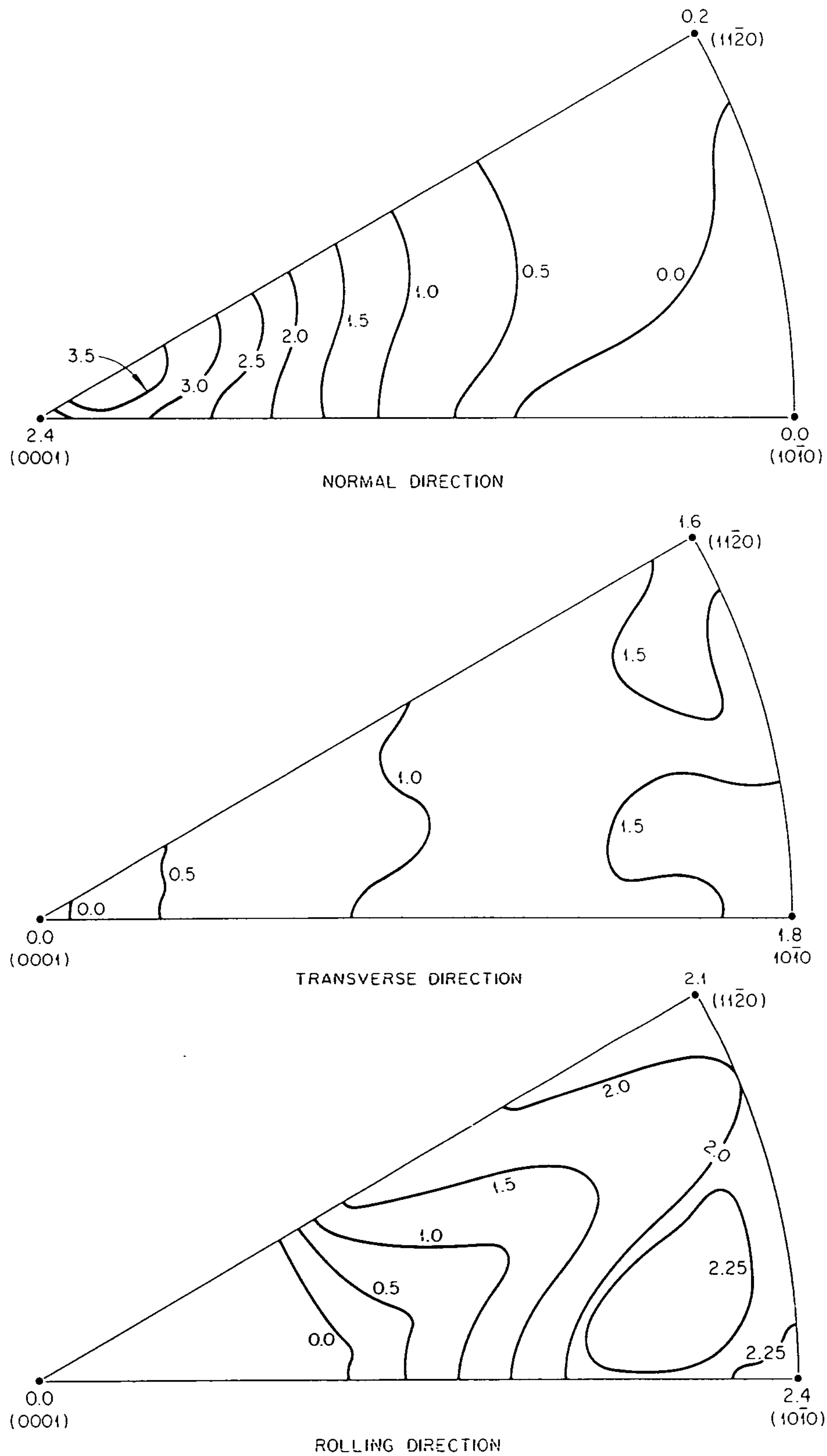

Fig. 9. Inverse Pole Figures for Schedule 10 Zircaloy-2.
Schedule 10: Cross-Rolled after β Heat-Treatment.

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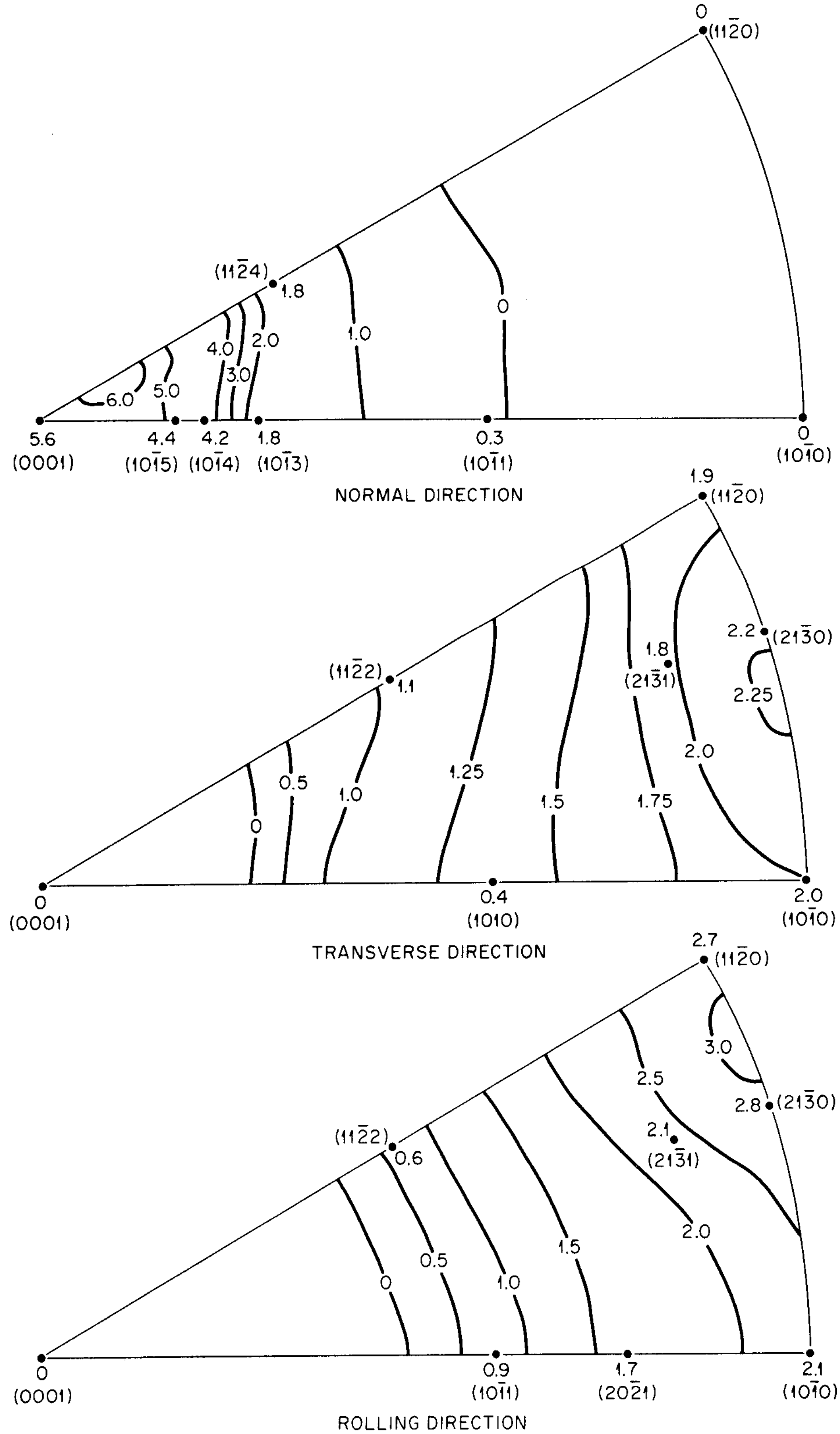

Fig. 10. Inverse Pole Figures for Schedule 8 Zircaloy-2.
Schedule 8: α Worked, 70 Percent Low α.

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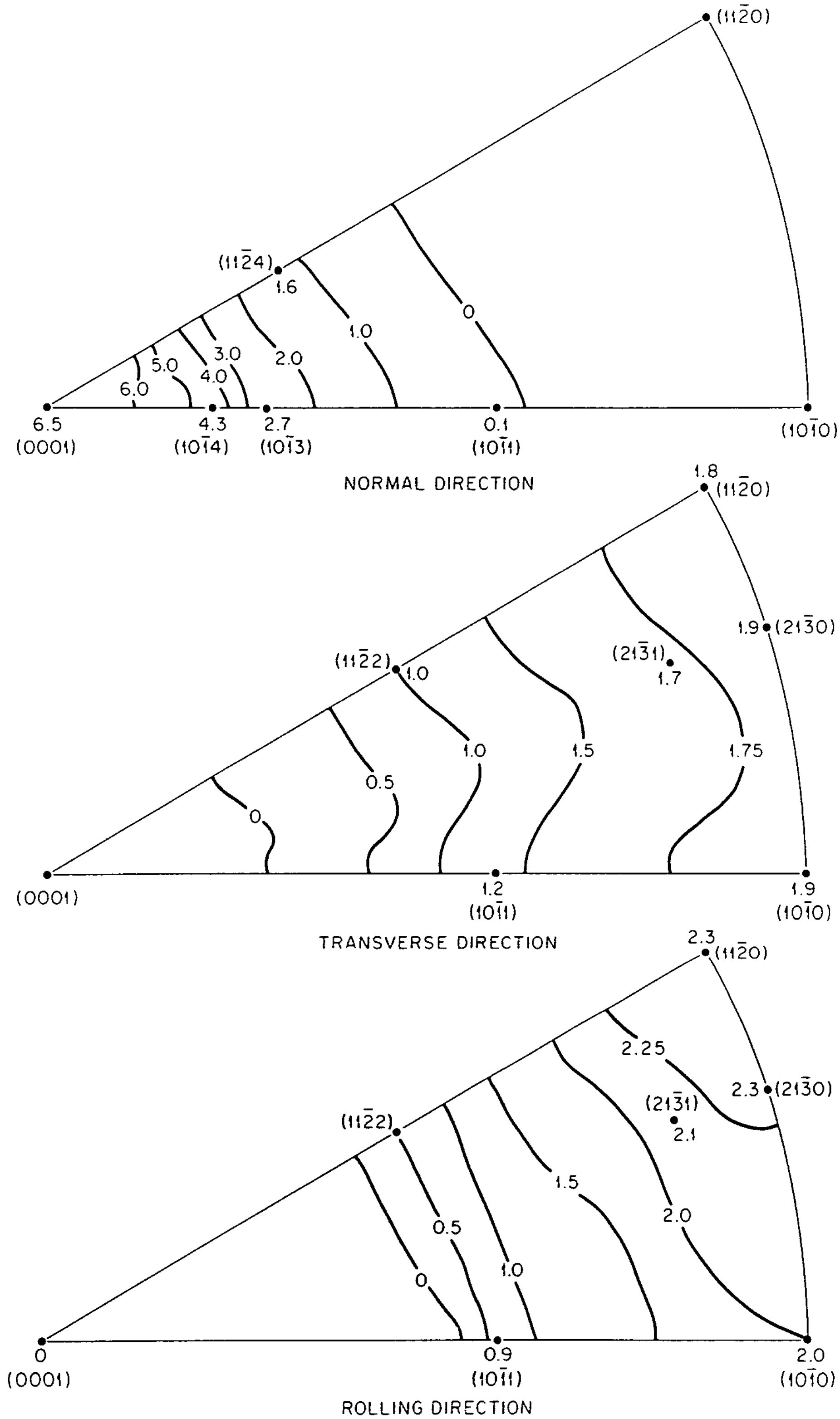

Fig. 11. Inverse Pole Figures for Schedule 9 Zircaloy 2.
Schedule 9: α Worked, 50 Percent Low α.

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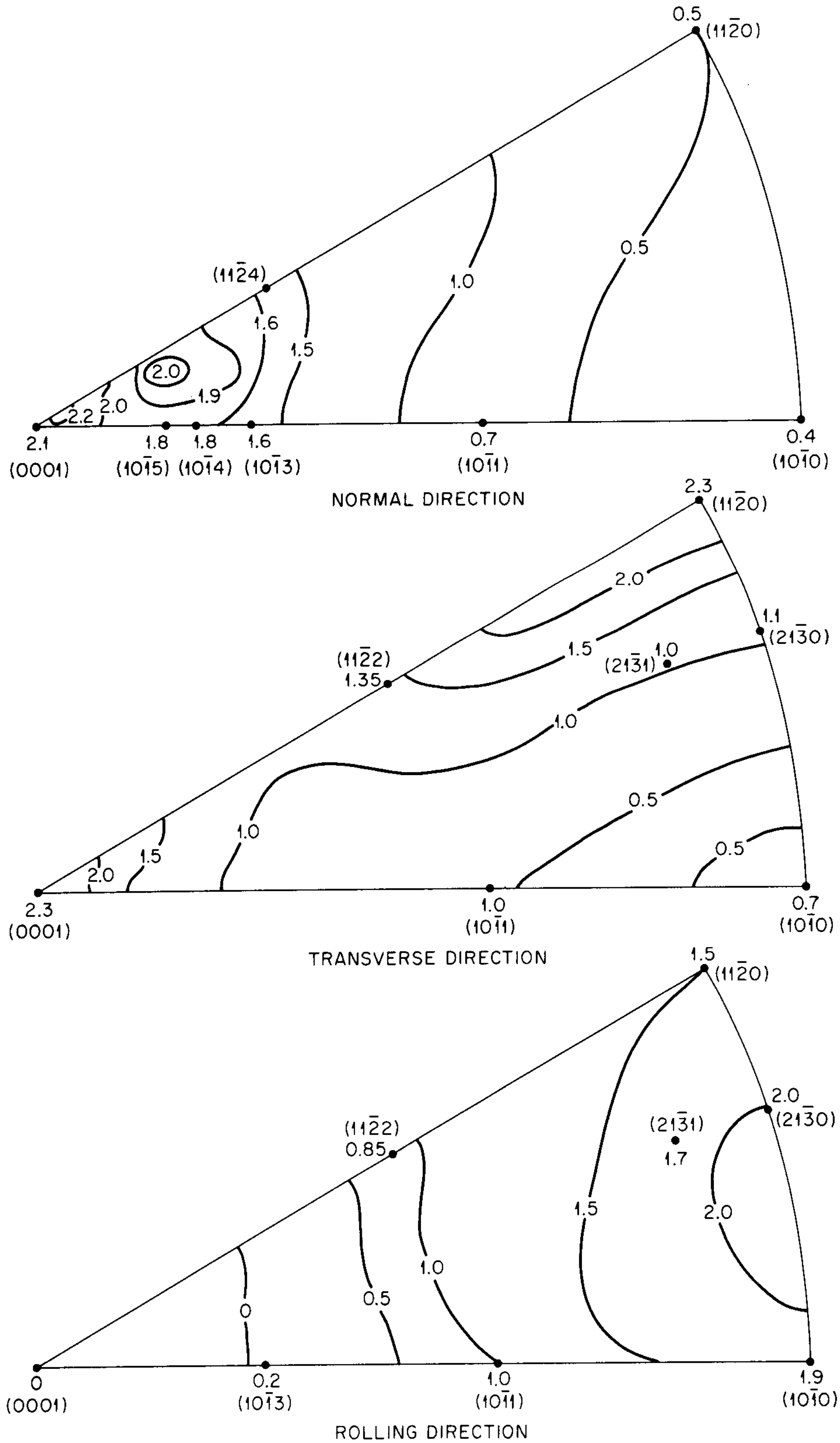

Fig. 12. Inverse Pole Figures for Schedule 1 Zircaloy-2.
Schedule 1: Two Intermediate β Heat-Treatments, Air Cooled.

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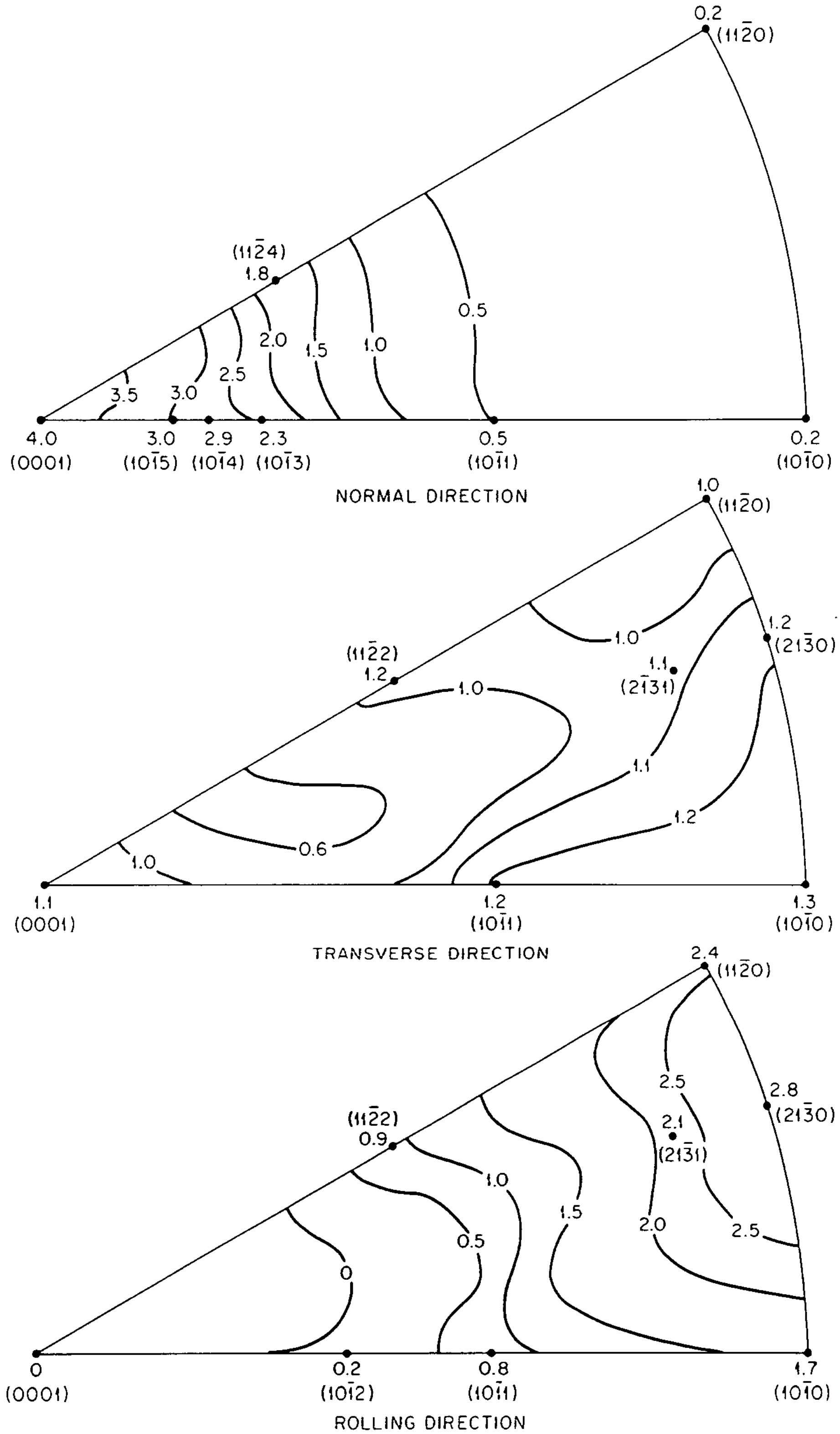

Fig. 13. Inverse Pole Figures for Schedule 3 Zircaloy-2.
Schedule 3: One Intermediate β Heat-Treatment.

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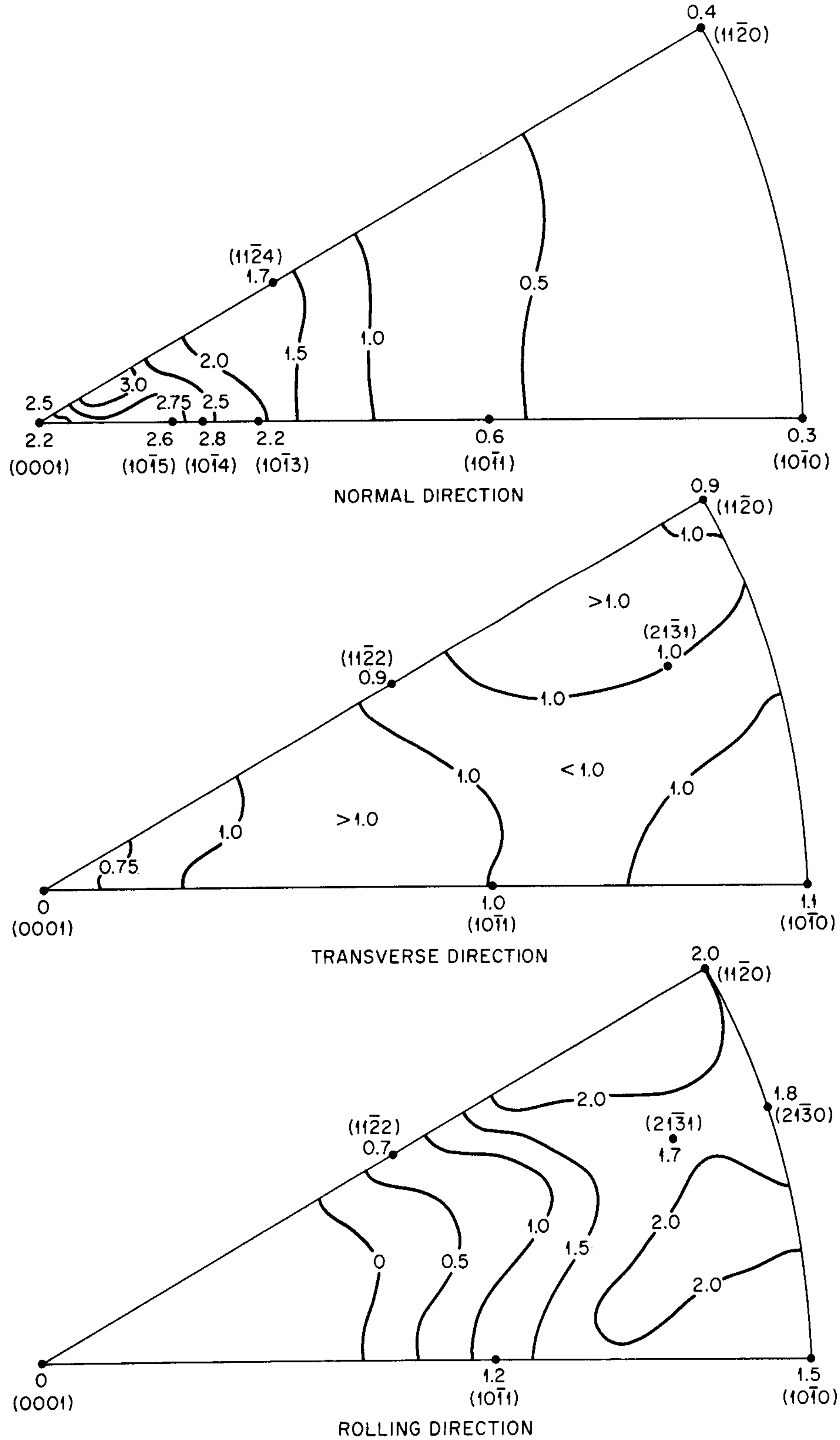

Fig. 14. Inverse Pole Figures for Schedule 2 Zircaloy-2
Schedule 2: Two Intermediate β Heat-Treatments, Water Quenched.

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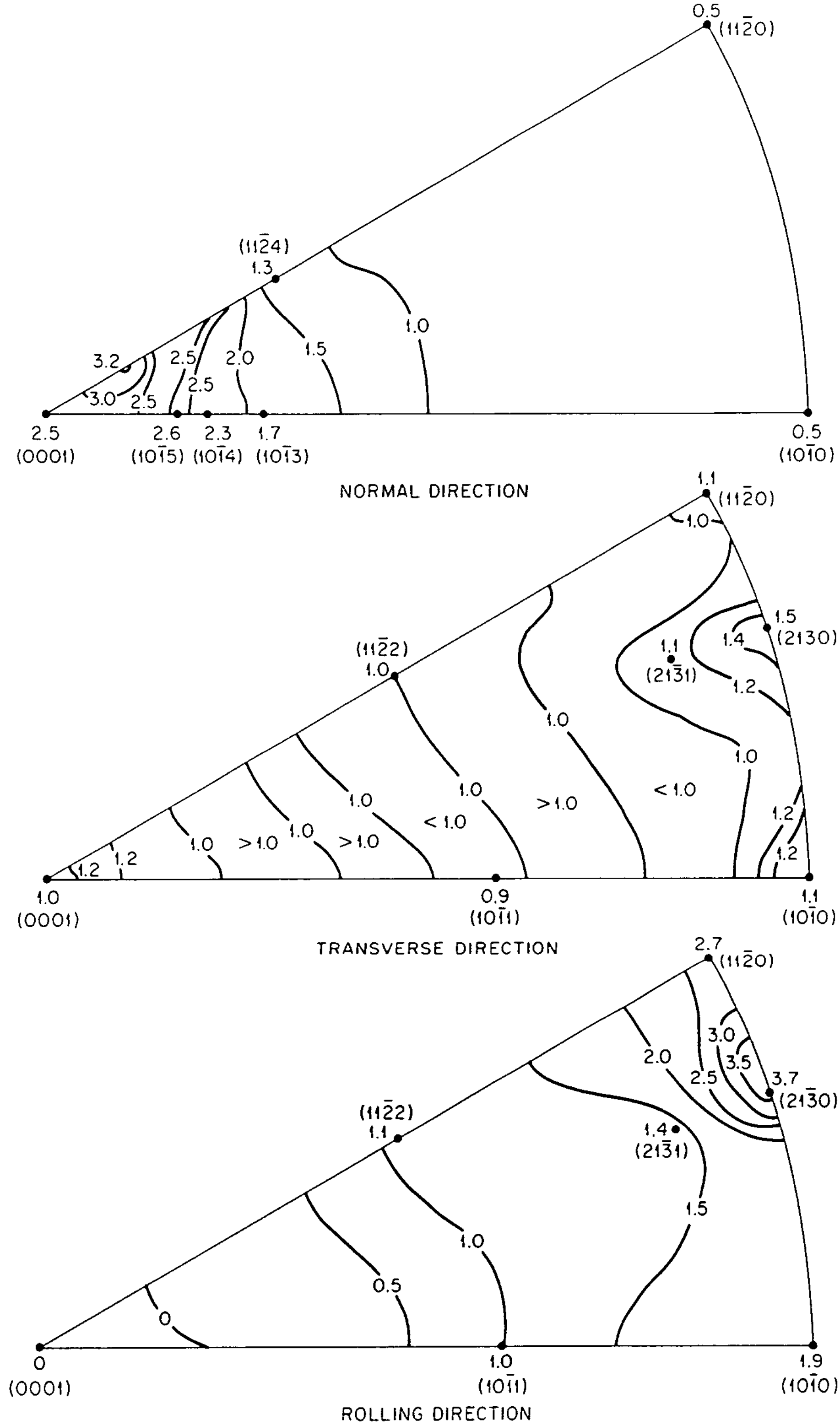

Fig. 15. Inverse Pole Figures for Schedule 4 Zircaloy-2.
Schedule 4: β Reduction Plus 25 Percent Low α Reduction.

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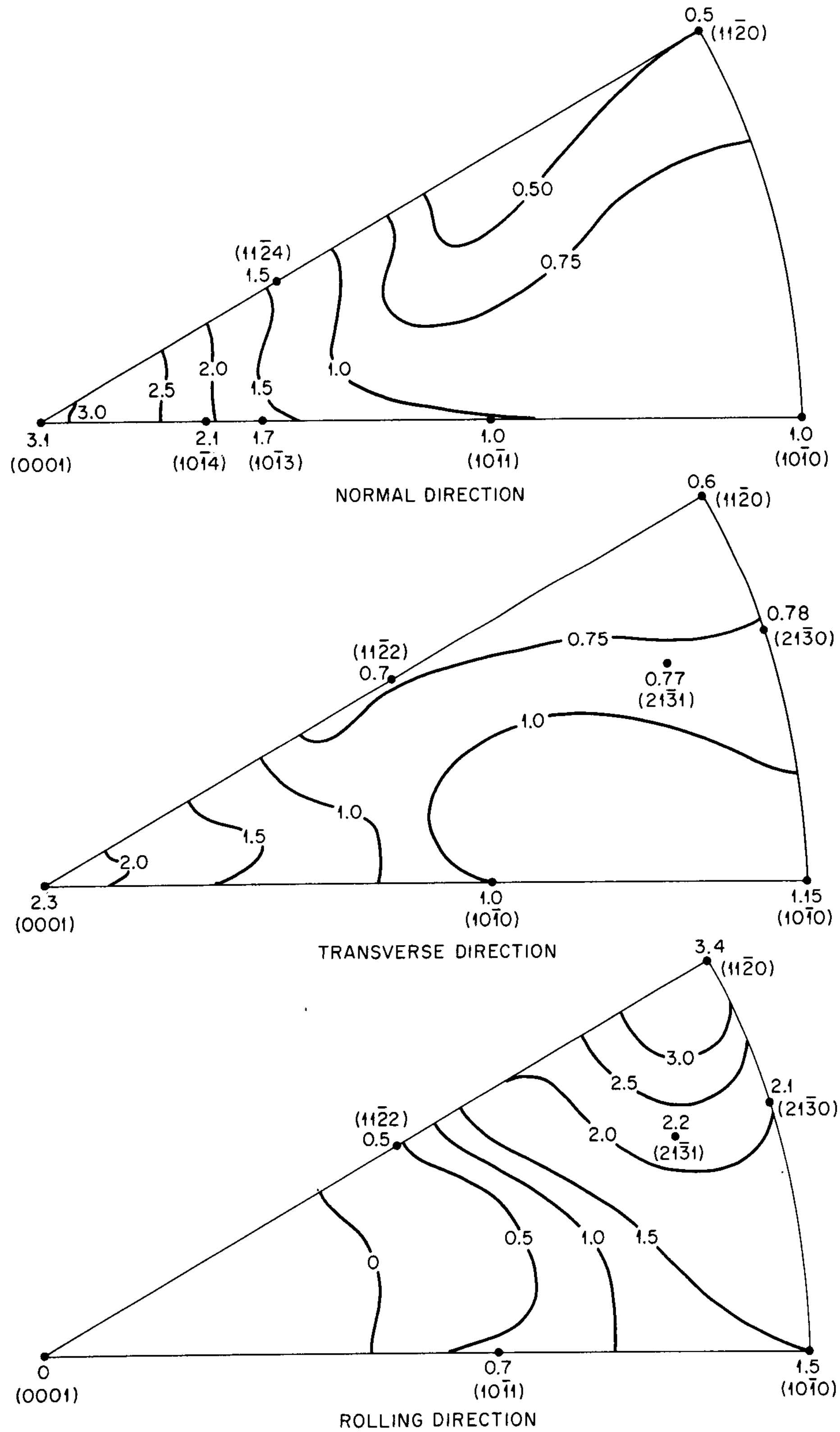

Fig. 16. Inverse Pole Figures for Schedule 5 Zircaloy-2.
Schedule 5: β Reduction Plus 50 Percent Low α Reduction.

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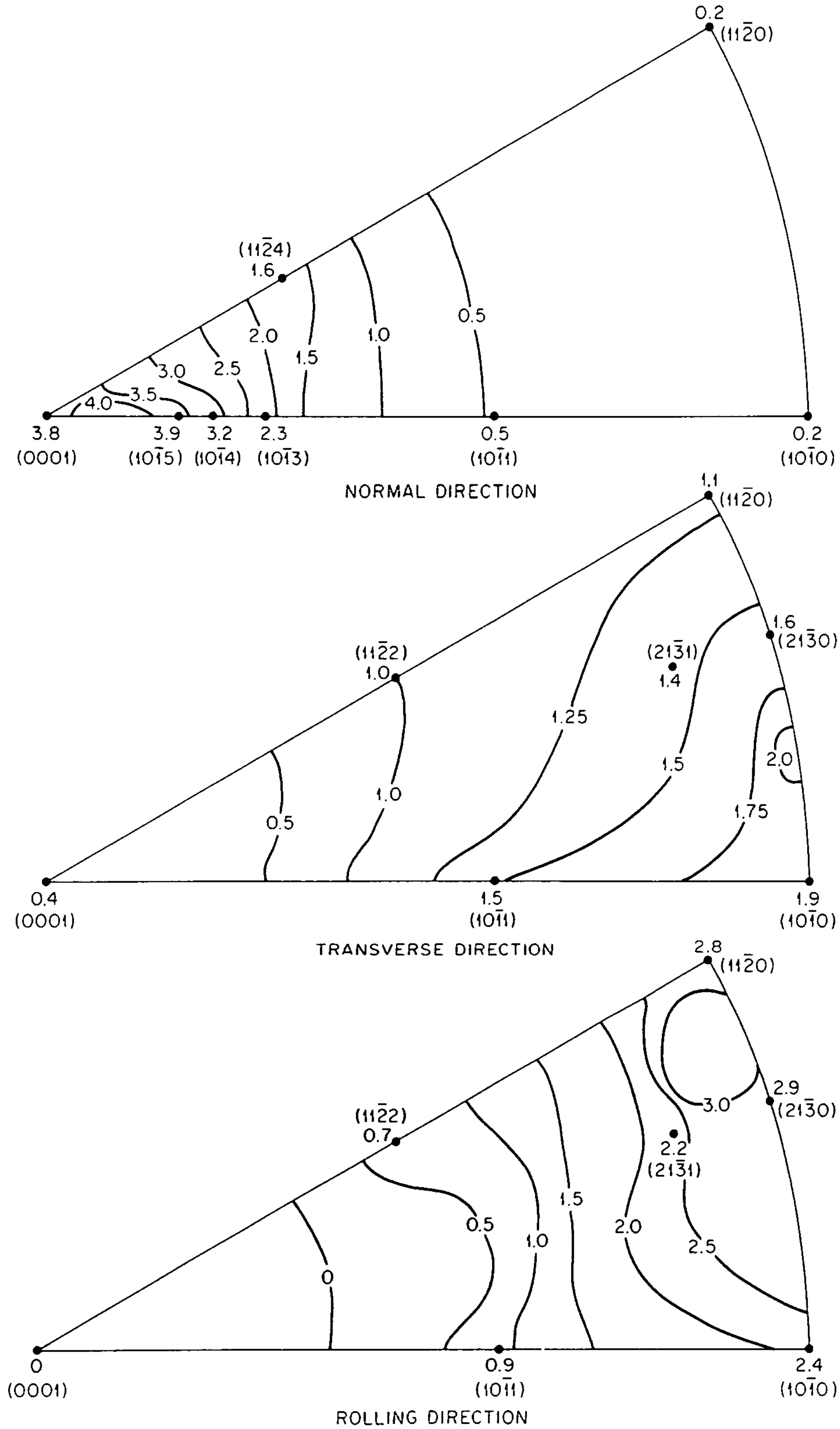

Fig. 17. Inverse Pole Figures for Schedule 6 Zircaloy-2.
Schedule 6: β Reduction Plus 70 Percent Low α Reduction.

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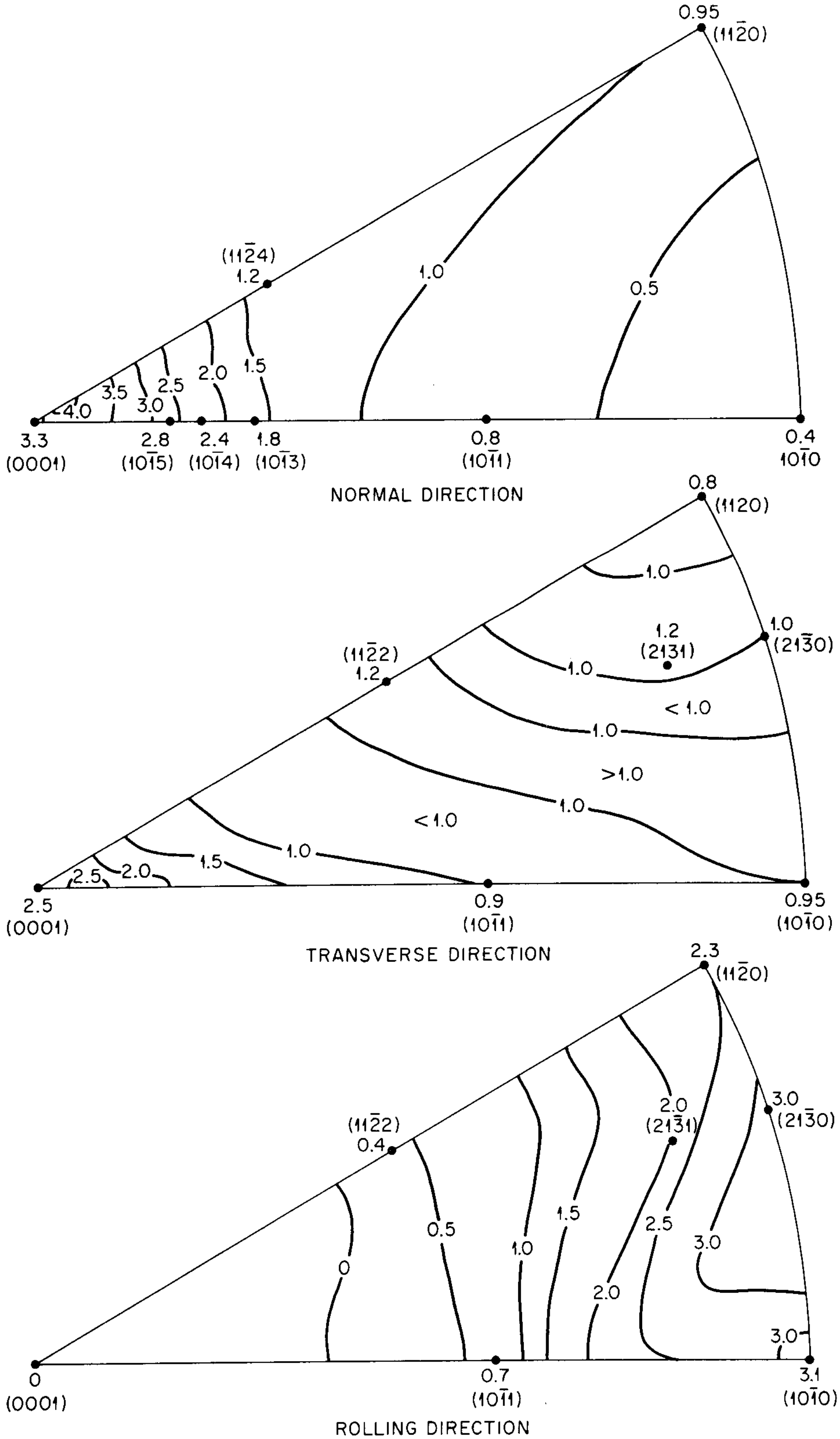

Fig. 18. Inverse Pole Figures for Schedule 7 Zircaloy-2. Schedule 7: β Reduction Plus High α Reduction.

DISCUSSION OF RESULTS

Preferred Orientation

General Features of the Inverse Pole Figures. Examination of the inverse pole figures presented in Figs. 7–18 showed that the distributions of the reference axes – the rolling, transverse, and normal directions – with respect to the crystallographic axes, although not without exception, followed a rather consistent pattern through all fabrication schedules. The densities of the rolling direction reference axes were generally a maximum at the poles of the $\{hki0\}$ planes, and in every case zero at the poles of the (0001) planes, so that the basal planes (0001) tended, in all cases, to contain the rolling direction. The basal planes, depending on the fabrication procedure, were found perpendicular to the normal direction, perpendicular to the transverse direction, or distributed between both. Although there is a similarity in form of the inverse pole figures for all of the schedules of Zircaloy-2, considerable differences in axis density and exact position exist. The axis density is represented as R, where R is equal to 'Intensity'/'Random Intensity'. For a randomly oriented material the axis density has a uniform intensity of $R = 1.0$. Values of $R > 1.0$ show a concentration of axes at that point; values of $R < 1.0$ show avoidance or below random density of reference axes.

Effect of Cross Rolling on the Preferred Orientation of Zircaloy-2. Schedules 10, J, and 62 serve to show the effects of cross rolling on the preferred orientations which were developed. The inverse pole figures for Schedule 62 Zircaloy-2 (1832°F β breakdown, 1450°F α reduction, 1832°F β anneal, 1000°F 25% final α reduction, 1425°F α anneal, commercially fabricated), Fig. 7, showed low density – but greater than random – concentrations of basal poles which lie at 5° from the normal direction and in a spread of from 5 to 30° about the transverse direction. The basal pole peak near the normal direction was fairly sharp and of moderately high density (three times random, $R = 3.0$), while that near the transverse direction was broad and only about twice random. For the rolling direction, the maximum density occurred within a few degrees of the poles of the $\{11\bar{2}0\}$ planes so that the major concentration of planes of the $\{hki0\}$ zone were at an angle slightly greater or less than 90° to the rolling direction.

For Schedule J Zircaloy-2, the poles of the basal planes were concentrated almost entirely in the transverse direction (see Fig. 8). Schedule J material was fabricated in a manner identical to Schedule 62 material except that, after an initial lengthening, the ingot was turned and rolled with the ingot axis in the transverse direction. The poles most prevalent (but still only approximately two times that of random intensity, $R \simeq 2$) in the normal direction were those of the prism planes, $\{10\bar{1}0\}$. The most preferred position of the rolling direction reference axis for Schedule J Zircaloy-2 was, as for Schedule 62, a few degrees from the poles of the $\{11\bar{2}0\}$ planes. Thus, the effect of rolling with the ingot axis in the transverse direction after partial breakdown along the ingot axis and before β heat treatment (1825–1850°F β anneal) was to move the poles of the basal planes from an almost equal distribution in both the normal and transverse directions to a high density in only the transverse direction.

Schedule 10 material (as Schedule 62 except that the final 30% reduction was unidirectional rolling perpendicular to the major rolling direction) showed the effect of cross rolling after the β heat treatment. The greatest percentage of the normal direction reference axes were concentrated within 30° of the pole of the basal plane, with a maximum density at about 10°. The inverse pole figures for the transverse and rolling directions, Fig. 9, are quite similar. A greater degree of preferred orientation is, however, indicated for the rolling direction. The preferred positions of both the rolling and transverse direction reference axis may be considered as the entire spectrum of the poles of planes of the $\{hki0\}$ zone. Therefore, the major effect of the cross rolling after the β heat treatment was to move the pole of the basal plane out of the transverse direction.

Effect of All α Phase Reduction on the Preferred Orientation of Zircaloy-2. The effect of all α working may be seen in the inverse pole figures for Schedules 8 and 9 (β breakdown, 1475°F major reduction, 1475°F anneal, 1000°F final reduction – 70 and 50%, respectively, for Schedules 8 and 9, 1425°F anneal), Figs. 10 and 11. The inverse pole figures for both materials are quite similar. In both cases, there was a very high concentration of the normal direction reference axes close to the pole of the basal plane. Oddly, Schedule 9, with 50% final reduction, had a slightly more perfected texture than did Schedule 8 with 70% final reduction. This discrepancy could, however, have resulted from a slight misalignment of the reference axes of the specimen or from local variations in texture in the plate. For both materials, the most preferred positions of the rolling and transverse direction reference axes were evenly distributed among the poles of the {hki0} planes. From the inverse pole figures of these materials, it can be seen that a state of pseudoisotropy existed in the rolling plane. Therefore, the properties in all directions in the plane of the plate should be approximately the same. This was found to be true.[15] Hence, if only the ordinary mechanical testing procedures and data were taken as a measure of anisotropy, it would probably be concluded that these materials were completely isotropic. The value, then, of the preferred orientation determination and the strain-strain analysis for the interpretation of the state of anisotropy is easily demonstrated.

Effect of the Number of β Heat Treatments on the Preferred Orientation of Zircaloy-2. An illustration of the effects of the number of β heat treatments on the preferred orientation of Zircaloy-2 may be seen by a comparison of the inverse pole figures of Schedules 1 and 3, Figs. 12 and 13. For Schedule 1 material, α (1000°F) working was done at three different times during fabrication. Each working period was preceded by a β heat treatment, and the effect sought was that produced by the two intermediate β heat treatments in comparison to the single intermediate β heat treatment received by Schedule 3 Zircaloy-2. Both of the materials were reduced 25% after the final β heat treatment. The degree of preferred orientation was not large for the material of Schedule 1, the maximum value of the R's for all of the reference axes being less than 2.5. The transverse direction texture was not far from random except for two positions, one at the pole of the basal plane and the other at the poles of the $\{11\bar{2}0\}$ planes. There was also a small concentration of normal direction reference axes about the pole of the basal plane with R = 2.1. The maximum for the rolling direction reference axis was in the zone of the {hki0} family, about 10° from the prism plane. By reducing the number of intermediate β heat treatments to one (Schedule 3), the normal direction axis was shifted to the pole of the basal plane with a maximum value of R = 4.0 and the transverse direction reference axes became even more randomly oriented. The degree of

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[15] P. L. Rittenhouse and M. L. Picklesimer, Metallurgy of Zircaloy-2 Part I The Effects of Fabrication Variables on the Anisotropy of Mechanical Properties, ORNL-2944 (Oct., 1960).

preferred orientation in the rolling direction was increased, the maximum concentration of the rolling direction reference axes occurring at the poles of the $\{21\bar{3}0\}$ planes. Thus, the effect of two versus one intermediate β heat treatment was to decrease the degree of preferred orientation, as would be expected, and to cause a spread of the poles of the basal planes from the normal direction toward the transverse direction.

Effect of Cooling Rate from β Heat Treatment on the Preferred Orientation of Zircaloy-2. The inverse pole figures for Schedule 2 Zircaloy-2 (as Schedule 1 except that the material was water quenched from the β heat treatment temperature rather than air cooled), Fig. 14, show a texture which is similar to that for Schedule 3 except that there is a complete absence of poles of the basal plane in the transverse direction and a lower degree of preferred orientation over-all. Although the differences in texture between Schedules 1 and 2 cannot be explained, they do account for the differences found in the mechanical properties[15] and in the strain values.

Effect of Final Percent Reduction on the Preferred Orientation of Zircaloy-2. The effect of final percent reduction at 1000°F on the preferred orientation texture is shown by the inverse pole figures for Schedules 4, 5, and 6 (Figs. 15, 16, and 17), which had 25, 50, and 70% final reduction, respectively, after a β heat treatment. The transverse direction for Schedule 4 was almost isotropic. One peak of R = 1.5 did occur at the poles of the $\{21\bar{3}0\}$ planes. With 50% final reduction, the transverse direction peak occurred at the pole of the basal plane, and for 70% final reduction the peak moved back into the zone of the {hki0} family, about equidistant between the prism plane and the $\{21\bar{3}0\}$. This progression does not seem logical, the anomaly being the position of the transverse direction maximum. All of the inverse pole figures are internally consistent, so that inverse pole figures for Schedule 5 must be considered suspect. Lesser inconsistencies between the inverse pole figures for the rolling and transverse directions also exist. Also, worthy of note is the striking similarity between the inverse pole figures for Schedules 5 and 7 (Figs. 16 and 18). (The fabrication procedure for the Schedule 7 Zircaloy-2 was as for Schedule 6 except that the final 70% reduction was at 1450°F rather than at 1000°F.) The inverse pole figures for Schedule 7, not those for Schedule 6, are those which might be expected to be produced upon further working of Schedule 5 material. Thus, the pole figures for Schedule 5 material are inconsistent with the progression of percent reduction.

Effect of α Phase Working Temperature on the Preferred Orientation of Zircaloy-2. Comparison of the inverse pole figures for Schedules 6 and 7, Figs. 17 and 18, shows the effect on the preferred orientation of the temperature of α reduction after β heat treatment. A splitting of the preferred positions of the transverse and normal directions about the poles of the basal plane was effected by the higher working temperature (1450 vs 1000°F). Similarly, as it should have been, the intensity of the transverse direction axis was higher in the zone of the {hkil} planes for Schedule 6 than for Schedule 7. The densities and positions of the rolling direction reference axes are similar for the two schedules: a value of R = 3.5 about 5° from the pole of the $\{11\bar{2}0\}$ plane and 6° from the pole of the $\{21\bar{3}0\}$ plane for Schedule 6, and a value of R = 3.5 about 10° from the pole of the $\{10\bar{1}0\}$ plane and 9° from the pole of the $\{21\bar{3}0\}$ plane for Schedule 7.

Inverse pole figures for the other eight schedules were not determined because of time and manpower limitations. It is possible (as will be shown later), however, to predict the major features of their preferred orientation by a correlation of the strain-strain analyses with the inverse pole figures determined for the twelve schedules.

Strain-Strain Analysis

Interpretation. The strain-strain analysis, a method devised to allow useful interpretation of the effects of fabrication variables on anisotropy, is probably of more intrinsic value than the preferred orientation analysis. The methods are, however, complimentary and of more value when used conjunctively to evaluate the factors affecting anisotropy. A discussion of the strain-strain (k) analysis has been presented earlier in this report. Briefly, it has been found that, for Zircaloy-2, the natural contractile strains occurring at any point along the gage length of any particular round tensile specimen may be expressed as a constant fraction of the axial natural tensile strain. The deviation of the values of the fractions or k values from the case for isotropic materials ($k_{ij} = k_{ik} = -0.5$) may, then, be used as a measure of anisotropy.

Strain-Strain Analysis of Zircaloy-2 Produced by Standard ORNL-HRP Metallurgy Fabrication Schedule. Strain-strain plots for Zircaloy-2 fabricated by the standard ORNL-HRP Metallurgy fabrication procedure (Schedules 11, 12, and 62) are presented in Figs. 19, 20, and 21. (The absolute values of the contractile strains were plotted so that negative numbers could be eliminated from the discussion.) The fabrication procedure for the three schedules mentioned above consisted of ingot breakdown in the β field (1900°F), high α (1450°F) major reduction, a one-half-hour β heat treatment followed by an air quench, 25–40% final reduction at 1000°F, and a one-half-hour anneal at 1425°F. Schedule 62 material was fabricated from a 1000-lb ingot (ingot axis in the rolling direction), and Schedules 11 and 12 from slices of a 1000-lb ingot (ingot axis in the normal direction). When a longitudinal specimen of Schedule 62 material was tested at room temperature, the natural contractile strain in the y or transverse direction, $\bar{\epsilon}_{xy}$, was 0.586 times the natural axial tensile strain, $\bar{\epsilon}_{xx}$, ($k_{xy} = 0.586$); while that in the z or normal direction, $\bar{\epsilon}_{xz}$, was 0.414 $\bar{\epsilon}_{xx}$, ($k_{xz} = 0.414$). The measured value of k_{yx} was 0.689 and the value of k_{zx} calculated from Eq. 7 (p. 12) was 0.611. Thus, for longitudinal specimens, the strain behavior approached that for an isotropic material, but the deviation from isotropy became larger for specimens whose tensile axes would have been in the normal or transverse directions. The k values for Schedule 12 Zircaloy-2 (40% final reduction) were found to be essentially the same as those for Schedule 62, while those for Schedule 11 material (25% final reduction) were slightly closer to those for an isotropic material. This is consistent with an increase in anisotropy or perfection of texture with an increase in the percentage final reduction. In order to facilitate the discussion, the k values for all of the schedules are presented in Table I.

Effect of Cross Rolling During Final Reduction on the Anisotropy of Strain Behavior of Zircaloy-2. The effect of cross rolling, both unidirectional and 90° rotation (work piece turned 90° after each pass), after β heat treatment, may be seen by comparison of the k's for Schedules 62 and 10 and Schedules 11 and 13. Unidirectional cross rolling versus straight rolling, Schedule 10, Fig. 22, versus 62, Fig. 21, (both materials with ingot axis in the major rolling direction), caused an increase in the deviation of

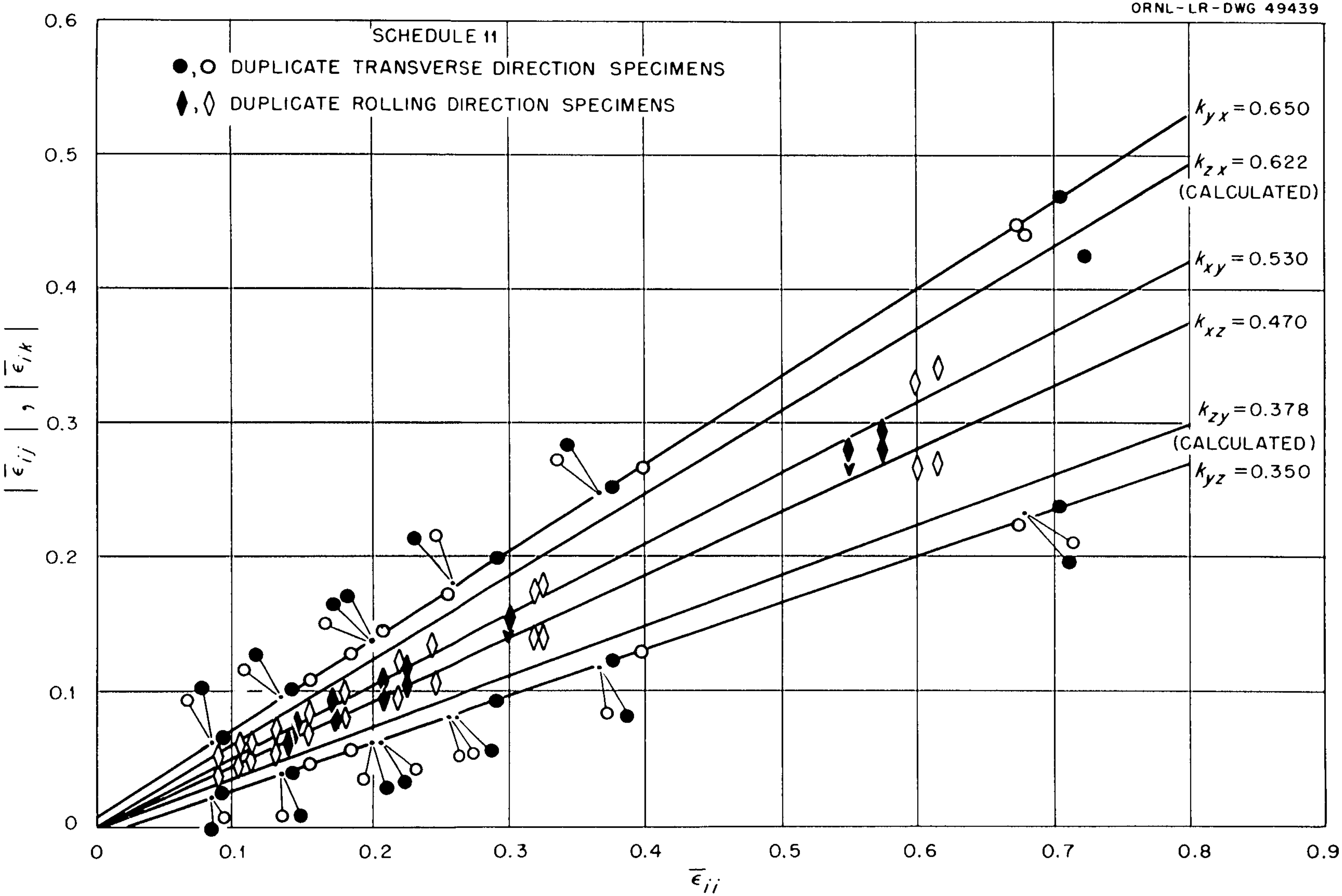

Fig. 19. Strain–Strain Plots for Schedule 11 Zircaloy–2. Schedule 11: HRP Commercial Fabrication Procedure, 25% Final Reduction.

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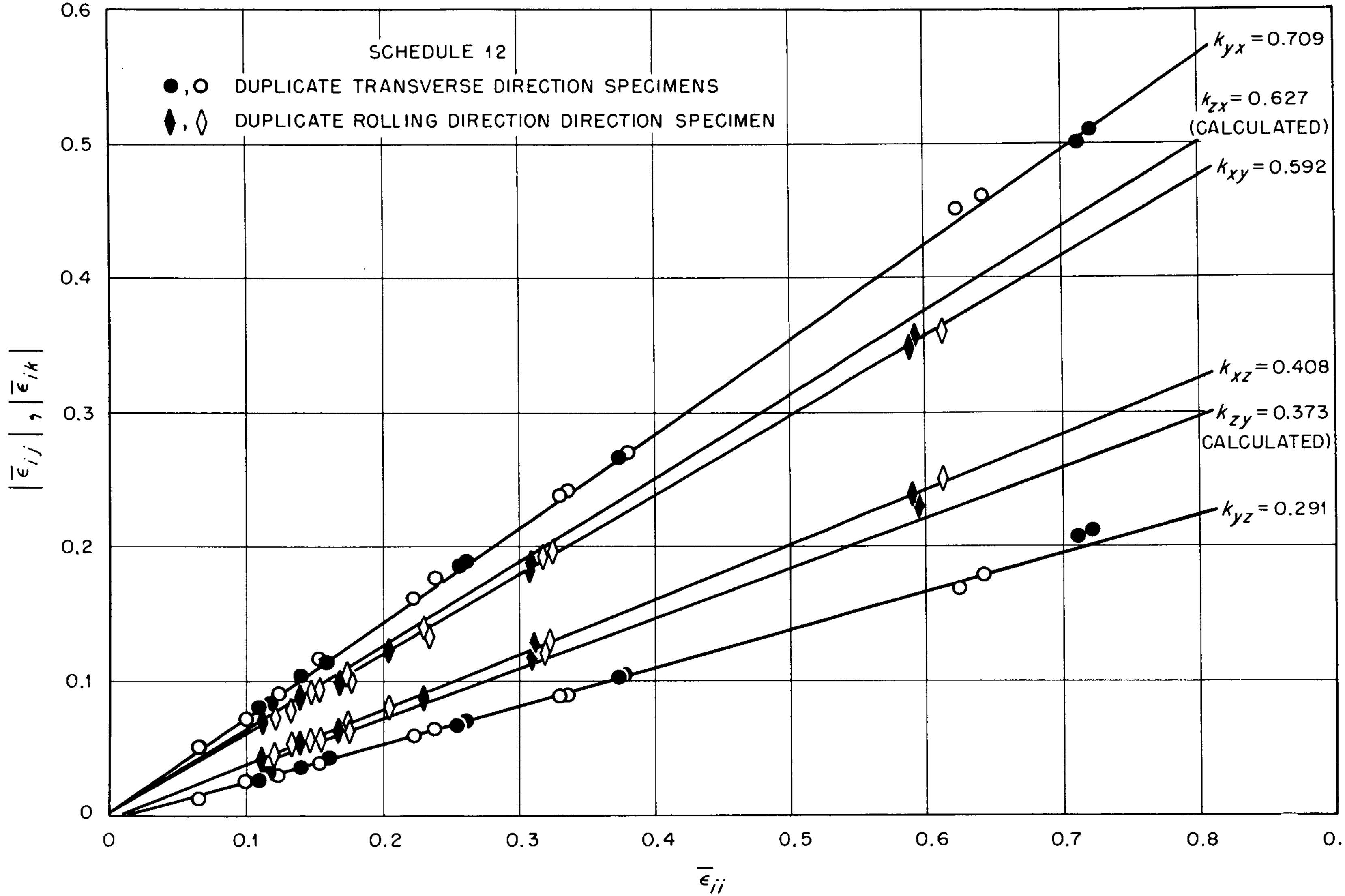

Fig. 20. Strain-Strain Plots for Schedule 12 Zircaloy-2. Schedule 12: Modified HRP Commercial Fabrication Procedure, 40 % Final Reduction.

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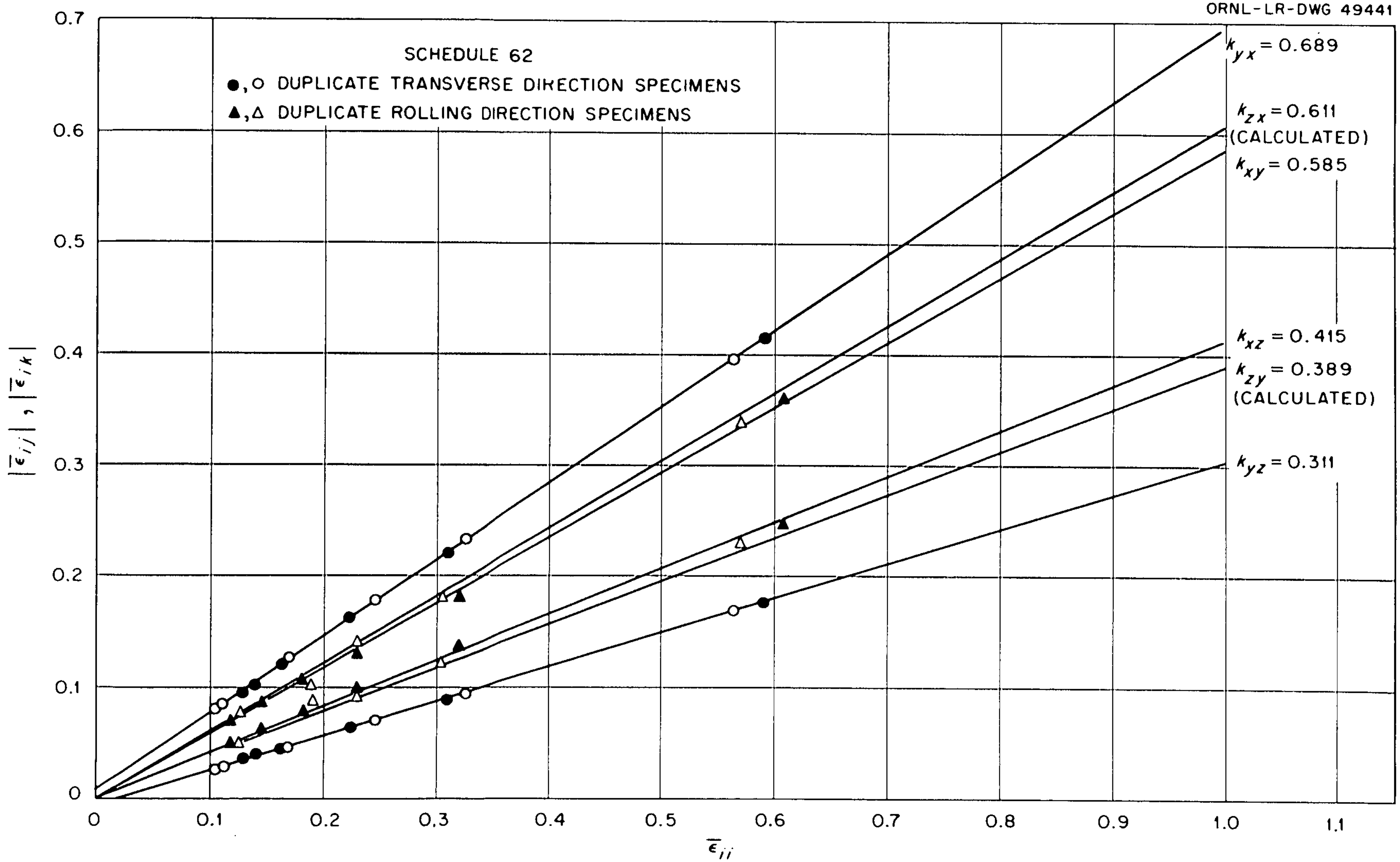

Fig. 21. Strain–Strain Plots for Schedule 62 Zircaloy–2. Schedule 62: HRP Commercial Fabrication Procedure.

TABLE I

k VALUES FOR ZIRCALOY-2 OF TWENTY FABRICATION SCHEDULES[a]

	Specimen Axis[b]					
	RD	22-1/2°	45°	67-1/2°	TD	ND
Schedule	k_{xy}/k_{xz}	k_{cp}/k_{cz}	k_{bp}/k_{bz}	k_{ap}/k_{az}	k_{yx}/k_{yz}	k_{zx}/k_{zy}
1	0.520/0.480	0.676/0.324	0.688/0.312	0.680/0.320	0.773/0.227	0.759/0.241
2	0.619/0.381	0.611/0.389	0.649/0.351	0.691/0.309	0.692/0.308	0.580/0.420
3	0.700/0.300	0.669/0.331	0.679/0.321	0.741/0.259	0.715/0.285	0.518/0.482
4	0.665/0.335	0.709/0.291	0.743/0.257	0.764/0.236	0.700/0.300	0.540/0.460
5	0.700/0.300	-	-	-	0.756/0.244	0.570/9.430
6	0.739/0.261	0.789/0.211	0.810/0.190	0.812/0.188	0.812/0.188	0.604/0.396
7	Data Poor					
8	0.885/0.115	0.885/0.115	0.884/0.116	0.884/0.116	0.884/0.116	0.498/0.502
9	0.855/0.145	-	-	-	0.888/0.112	0.573/0.427
10	0.678/0.322	-	-	-	0.784/0.216	0.633/0.367
11	0.530/0.470	-	0.610/0.390	-	0.650/0.350	0.622/0.378
12	0.592/0.408	-	0.702/0.298	-	0.709/0.291	0.627/0.373
13	0.735/0.265	-	0.733/0.267	-	0.741/0.259	0.508/0.492
14	0.544/0.456	-	0.610/0.390	-	0.780/0.220	0.748/0.252
15	0.570/0.430	-	0.614/0.386	-	0.662/0.338	0.596/0.404
16	0.634/0.366	-	0.680/0.320	-	0.695/0.305	0.568/0.432
17	0.620/0.380	-	-	-	0.733/0.267	0.627/0.373
18	0.531/0.469	-	-	-	0.693/0.307	0.666/0.334
62	0.585/0.415	-	-	-	0.689/0.311	0.611/0.389
J	0.304/0.696	0.625/0.375	0.554/0.446	0.625/0.375	0.600/0.400	0.774/0.226

[a] Determined at room temperature.

[b] RD - rolling direction, TD - transverse direction, ND - normal direction.
k_{jp} - j = a, b, or c (tensile axis at 67-1/2, 45, or 22-1/2° from RD) and p is contractile strain axis in rolling plane.

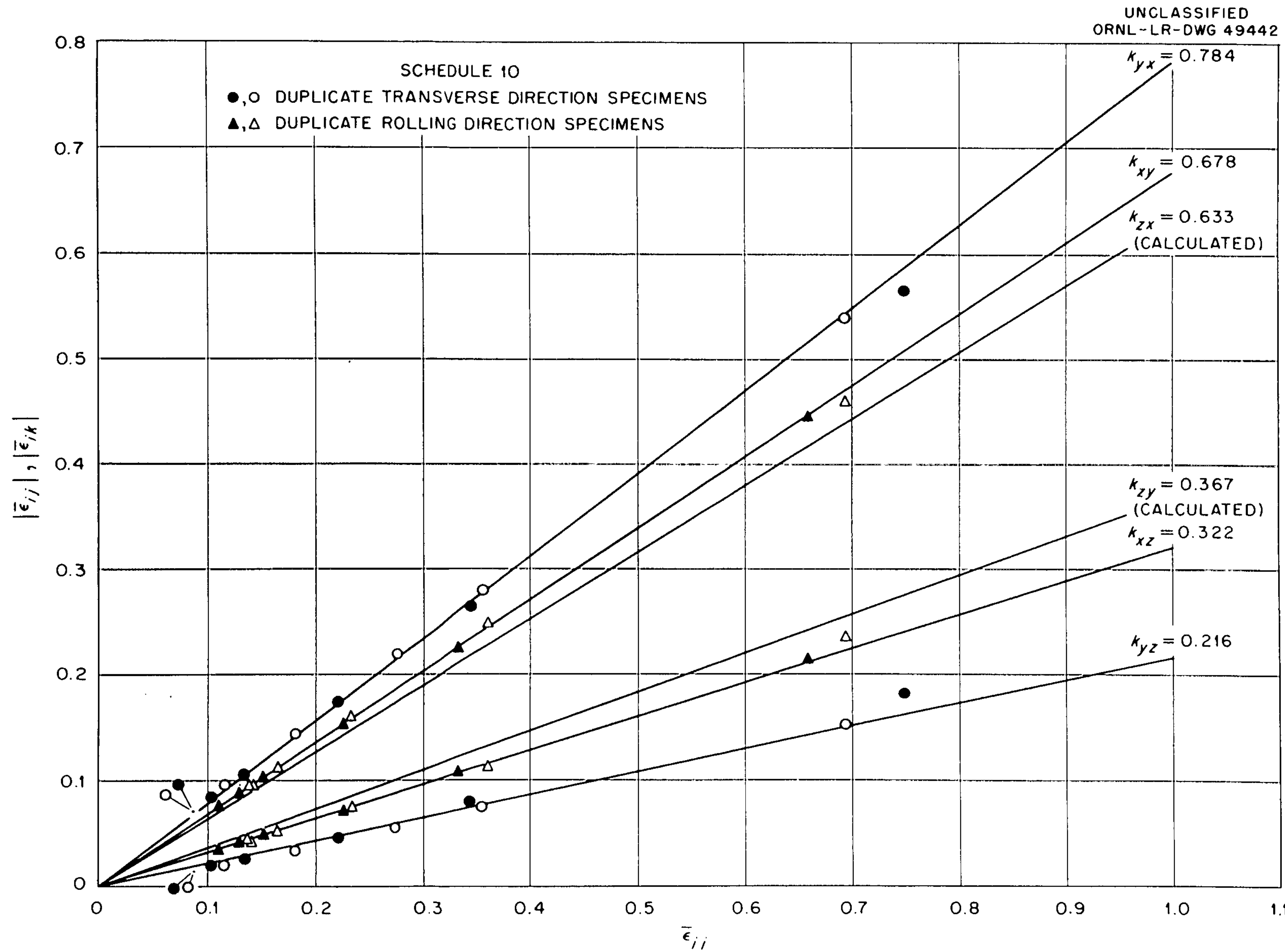

Fig. 22. Strain–Strain Plots for Schedule 10 Zircaloy-2. Schedule 10: Cross-Rolled After β Heat–Treatment.

the values of the k's, longitudinal and transverse, from the isotropic case, while k_{zx} and k_{zy} remained approximately constant. Although the differences in anisotropy between the major sheet directions for each material were of the same order, the anisotropy as a whole was increased by unidirectional cross rolling. Rotational cross rolling versus straight rolling, Schedule 13, Fig. 23, versus Schedule 11, Fig. 19 (both with ingot axis in the normal direction), had a more significant effect than did unidirectional cross rolling. The material produced by the 90° rotation cross rolling (Schedule 13) had equal values of k's in the plane of the plate ($k_{xy} = 0.735$, $k_{yx} = 0.741$); and, therefore, the calculated values of the k's for the normal direction were approximately equal to 0.5 ($k_{zx} = 0.508$, $k_{zy} = 0.492$). The fact that both k_{zx} and k_{zy} were equal to 0.5 indicated only that the anisotropy was identical in the longitudinal and transverse directions, and not that a true state of isotropy existed. A state of pseudoisotropy existed in this material, the strain properties for all directions in the plane of the plate being identical. The strain behavior in a direction in the rolling plane was, however, quite dissimilar to the strain behavior in the normal direction.

Effect of Cross Rolling During the Intermediate α Reduction Step on the Anisotropy of Strain Behavior of Zircaloy-2. Rotational cross rolling (90° rotation after each pass) during the intermediate reduction step at 1450°F (Schedule 14, Fig. 24) caused an increase in anisotropy over that for straight-rolled material. Comparison of the values of the k's for Schedule 14 with those for Schedule 11 (produced by identical procedure except that no cross rolling was done) showed that, although there had been little change in strain behavior in the longitudinal direction, $k_{xy}(14) = 0.544$ and $k_{xy}(11) = 0.530$, there had been a considerable change in the transverse direction. Cross rolling caused an increase in the value of k_{yx} from 0.650(11) to 0.780(14).

Effect of Cross Rolling in the β Field on the Anisotropy of Strain Behavior of Zircaloy-2. The effect of rotational cross rolling at a temperature in the β field is seen by comparison of Schedules 15 and 16, Figs. 25 and 26. Both materials were rolled at a temperature in the β field (cross rolling for Schedule 16), β heat treated, rolled 25% at 1000°F, and annealed at 1425°F. The effect of the cross rolling in the β field was both to increase slightly the k values in the plane of the

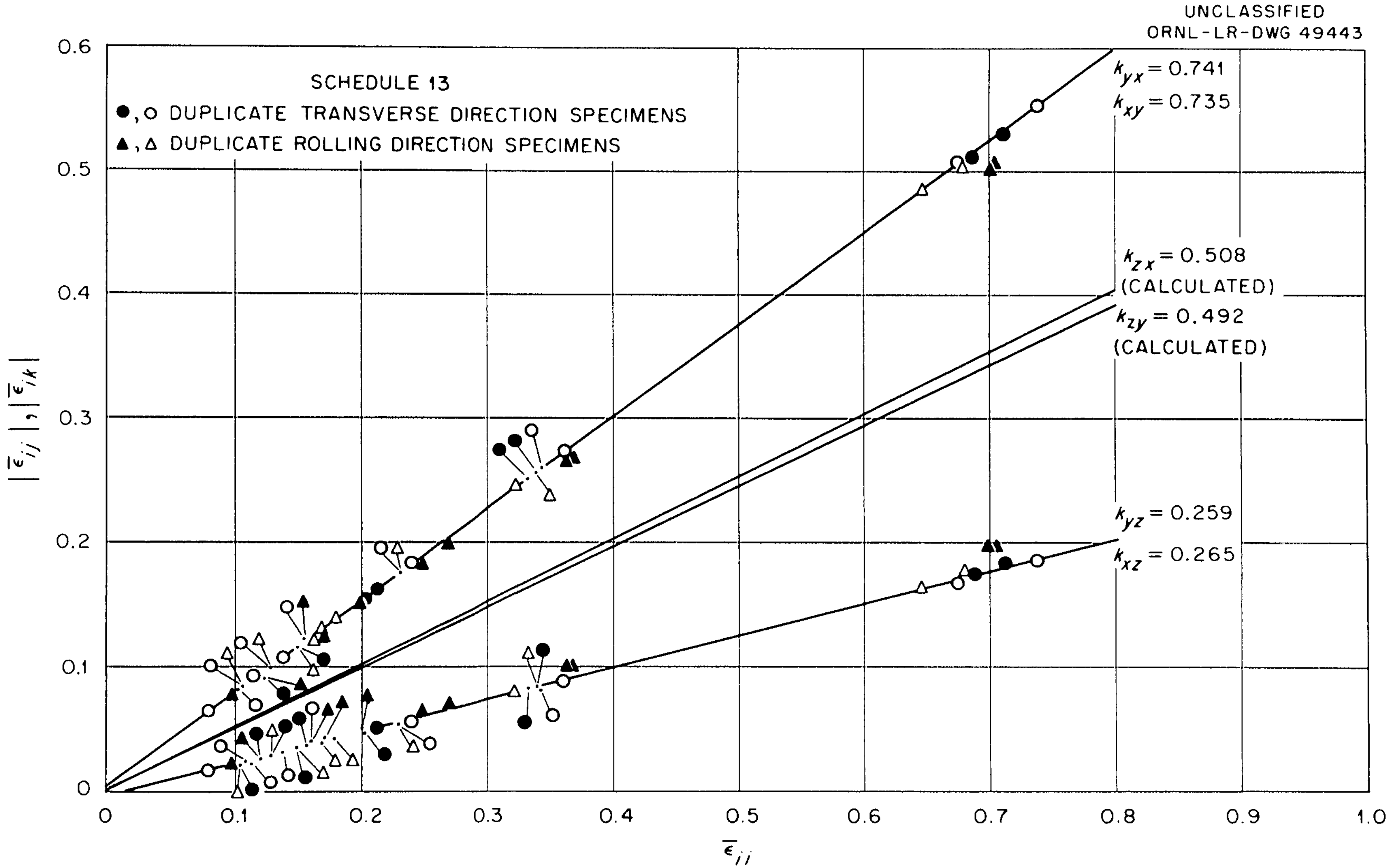

Fig. 23. Strain–Strain Plots for Schedule 13 Zircaloy-2. Schedule 13: Cross-Rolled After β Heat-Treatment.

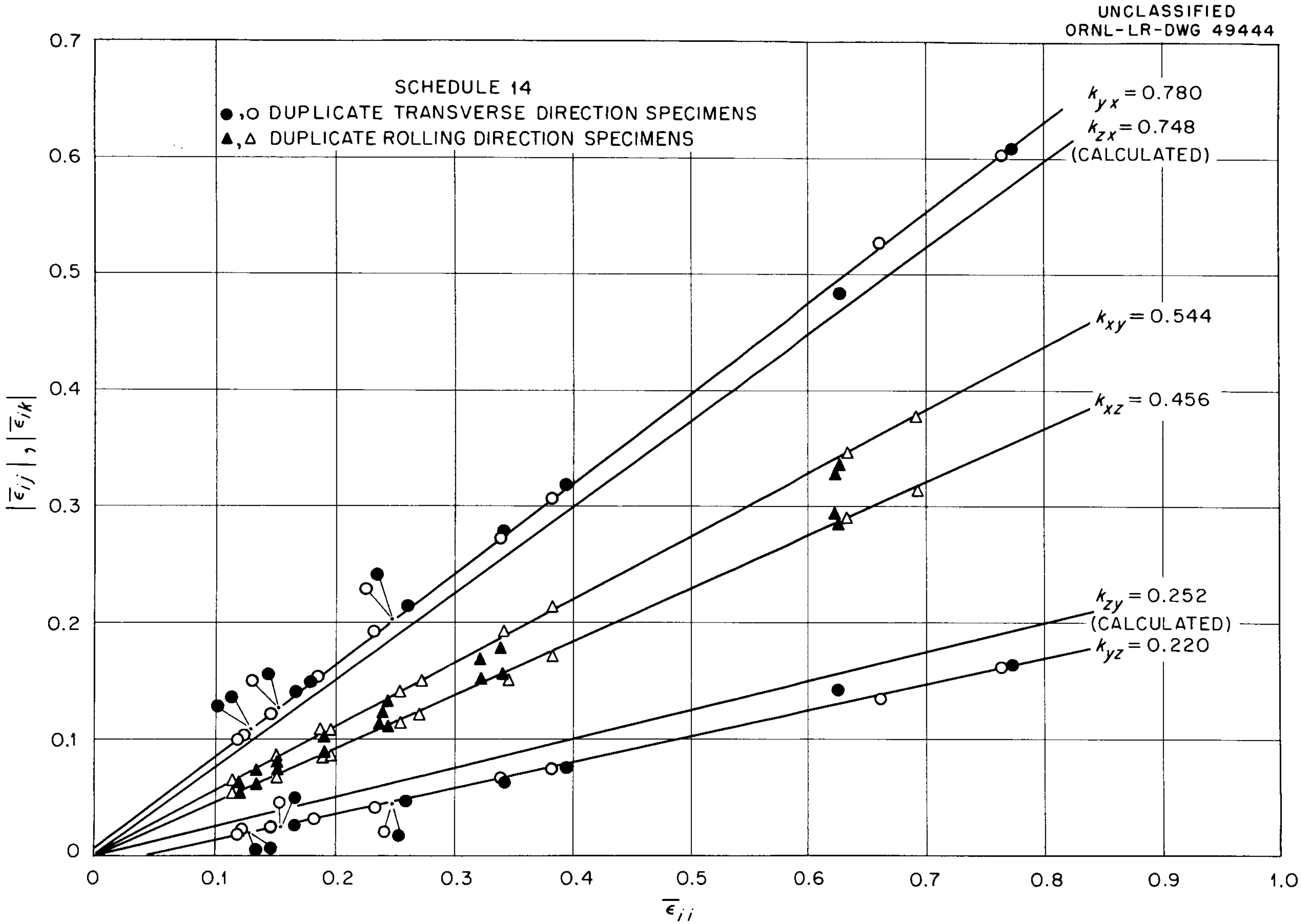

Fig. 24. Strain–Strain Plots for Schedule 14 Zircaloy-2. Schedule 14: Cross-Rolled During High α Reduction.

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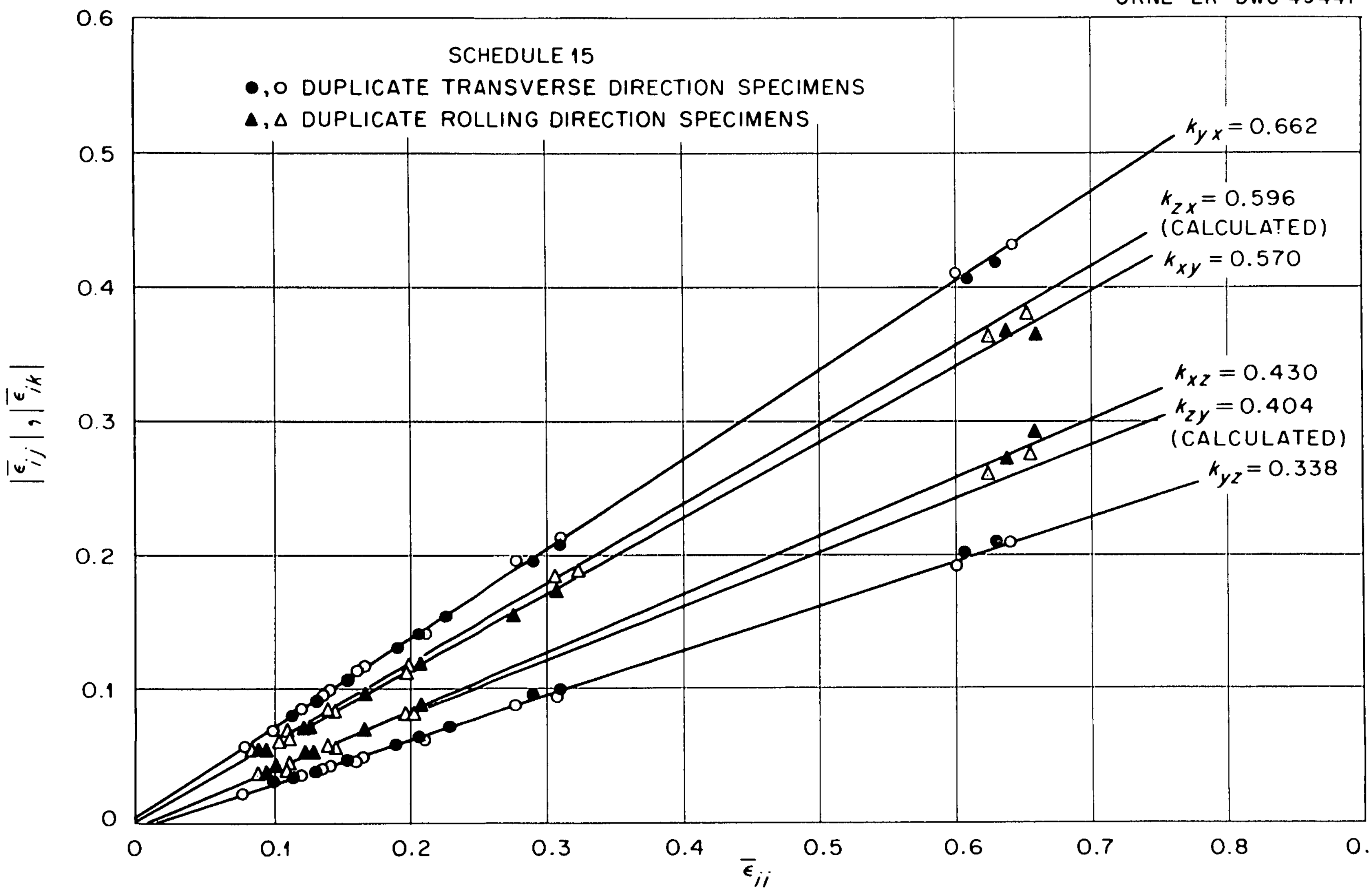

Fig. 25. Strain–Strain Plots for Schedule 15 Zircaloy–2. Schedule 15: Straight–Rolled β Reduction.

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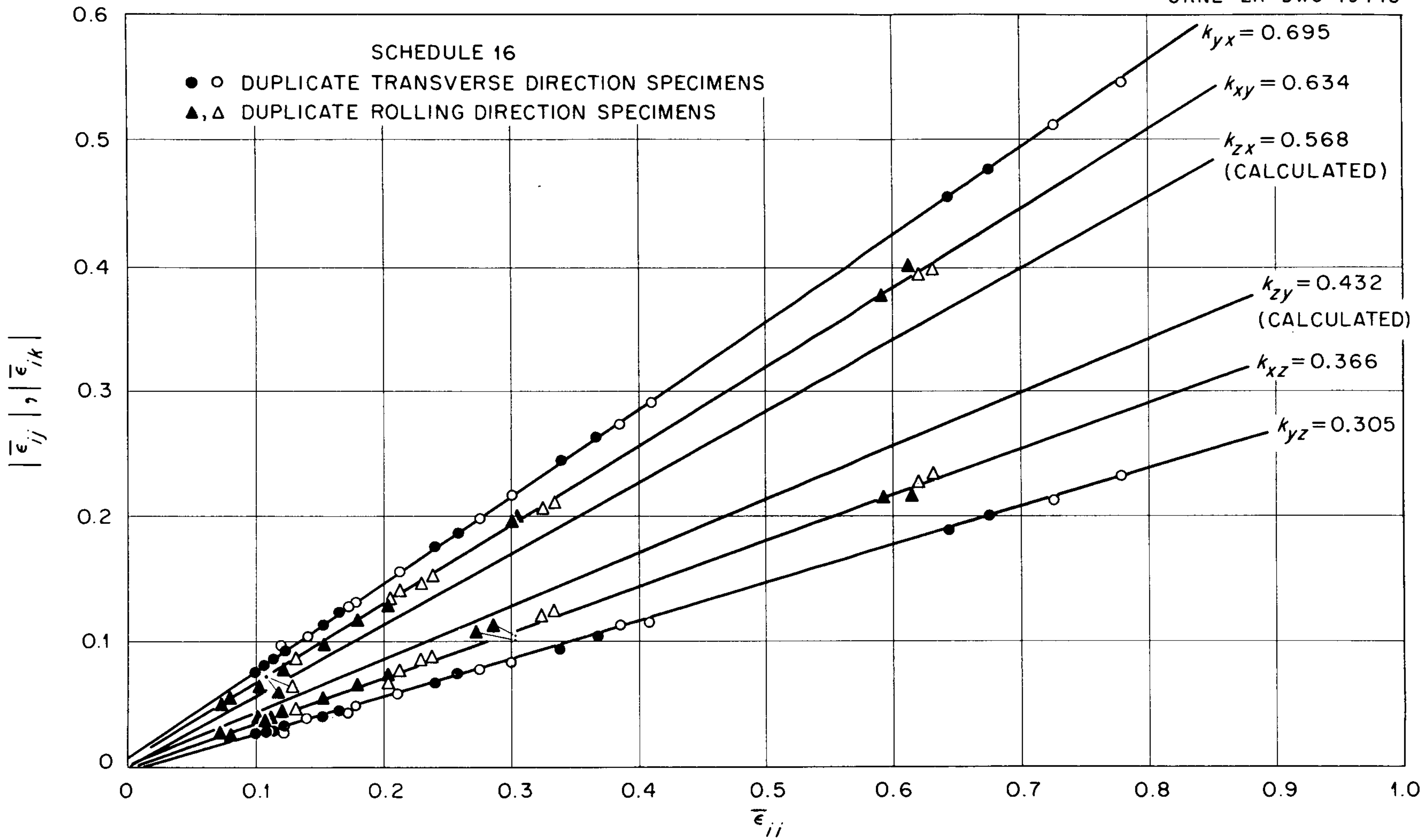

Fig. 26. Strain–Strain Plots for Schedule 16 Zircaloy-2. Schedule 16: Cross-Rolled β Reduction.

plate (Schedule 16, k_{xy} = 0.634, k_{yx} = 0.695, and k_{zx} = 0.568 and for Schedule 15, k_{xy} = 0.570, k_{yx} = 0.662, and k_{zx} = 0.596) and to increase the degree of pseudoisotropy.

Schedule J Zircaloy-2, rolled from a 1000-lb ingot, was fabricated essentially in the same way as was Schedule 62, except that, after enough rolling to spread, lengthen, and flatten the ingot somewhat, the ingot was turned so that the ingot axis was in the transverse direction. In this case, and only in this case, the contractile strain in the normal direction for a longitudinal specimen was greater than the transverse direction contractile strain, (k_{xz} = 0.696). The values of the k's for the transverse direction specimen are reasonably close to those for the isotropic case: k_{yx} = 0.600 and k_{yz} = 0.400. Calculated values for the normal direction k's show that the anisotropy of strain behavior for Schedule J Zircaloy-2 would be the most pronounced for a specimen whose tensile axis was normal to the rolling plane (see Fig. 27). When, however, considerable reduction (from 12-in.-diam ingot to 4-in. slab) was done before ingot axis rotation (Schedule 18, Fig. 28), the strain behavior was modified from that of Schedule J. The major difference was that the strain behavior for Schedule 18 in the longitudinal direction approached isotropic behavior ($k_{xy} \approx k_{xz} \approx 0.5$).

<u>Effect of All β vs Partial α Major Reduction on the Anisotropy of Strain Behavior of Zircaloy-2</u>. Only a slight change in the strain behavior of Zircaloy-2 (Schedule 11 versus Schedule 15) was effected by differences in the temperatures for major reduction. Schedule 11 Zircaloy-2 was rolled first at a temperature in the β field and then at 1450°F before β heat treatment, final reduction, and annealing, while all of the reduction before the final β heat treatment for Schedule 15 was performed in the β field. The values of the k's for Schedule 11 are, k_{xy} = 0.530, k_{yx} = 0.650, and k_{zx} = 0.622; and for Schedule 15, k_{xy} = 0.570, k_{yx} = 0.662, and k_{zx} = 0.596.

<u>Effect of All α Phase Treatment on the Anisotropy of Strain Behavior of Zircaloy-2</u>. When the final α-reduction step was not preceded by a β heat treatment (Schedules 8 and 9), the result was the production of a pseudoisotropic material. The strain-strain plots for Schedule 8, Fig. 29, showed that the data for specimens of all orientations tested in the plane of the plate gave identical curves. The calculated root-mean-square values for k_{xy} and k_{yx} were 0.885 and 0.884, respectively, there being no

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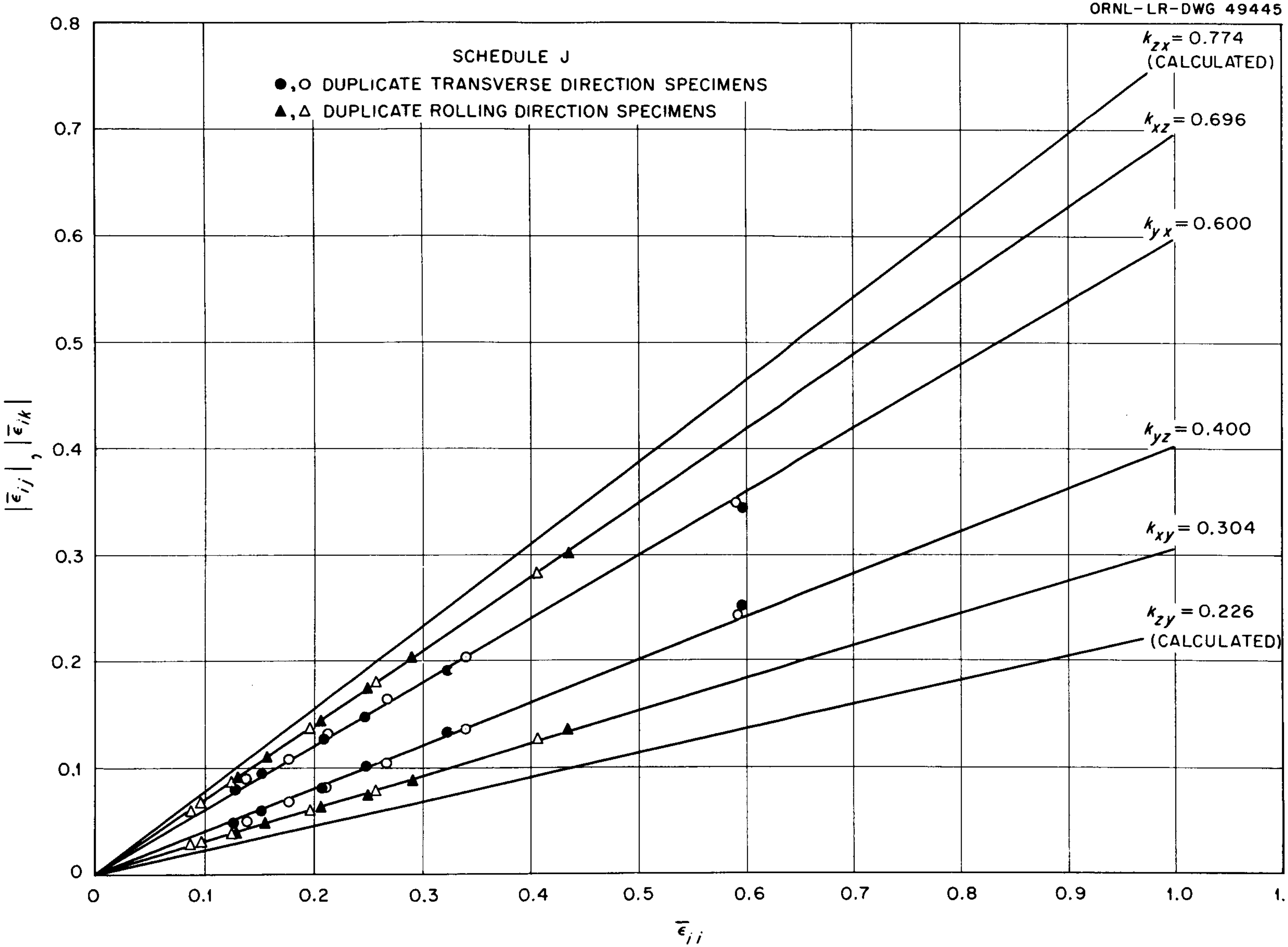

Fig. 27. Strain–Strain Plots for Schedule J Zircaloy–2. Schedule J: HRP Commercial Fabrication Procedure for Wide Plate.

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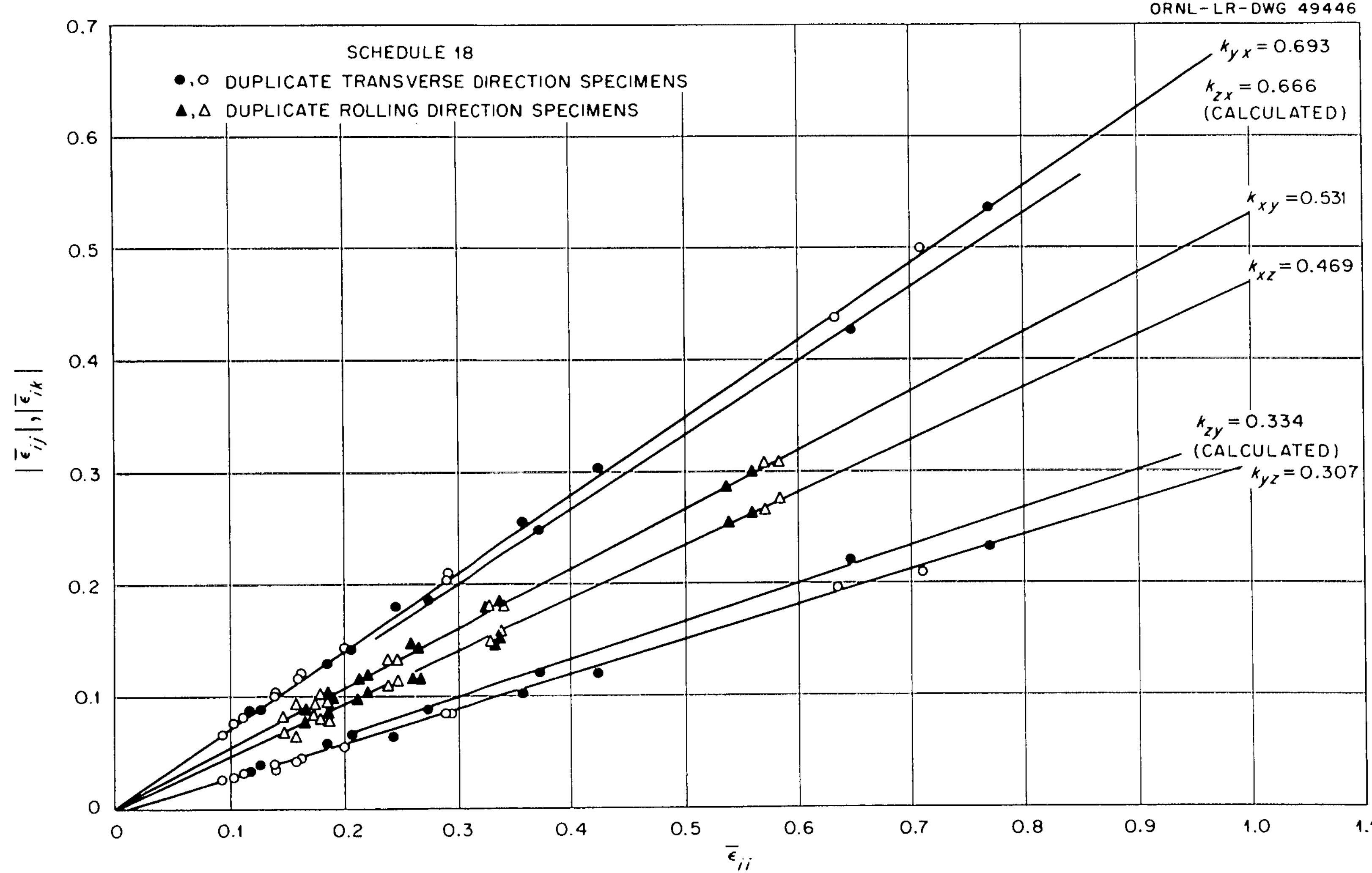

Fig. 28. Strain-Strain Plots for Schedule 18 Zircaloy-2. Schedule 18: HRP Commercial Fabrication Procedure for Wide Plate.

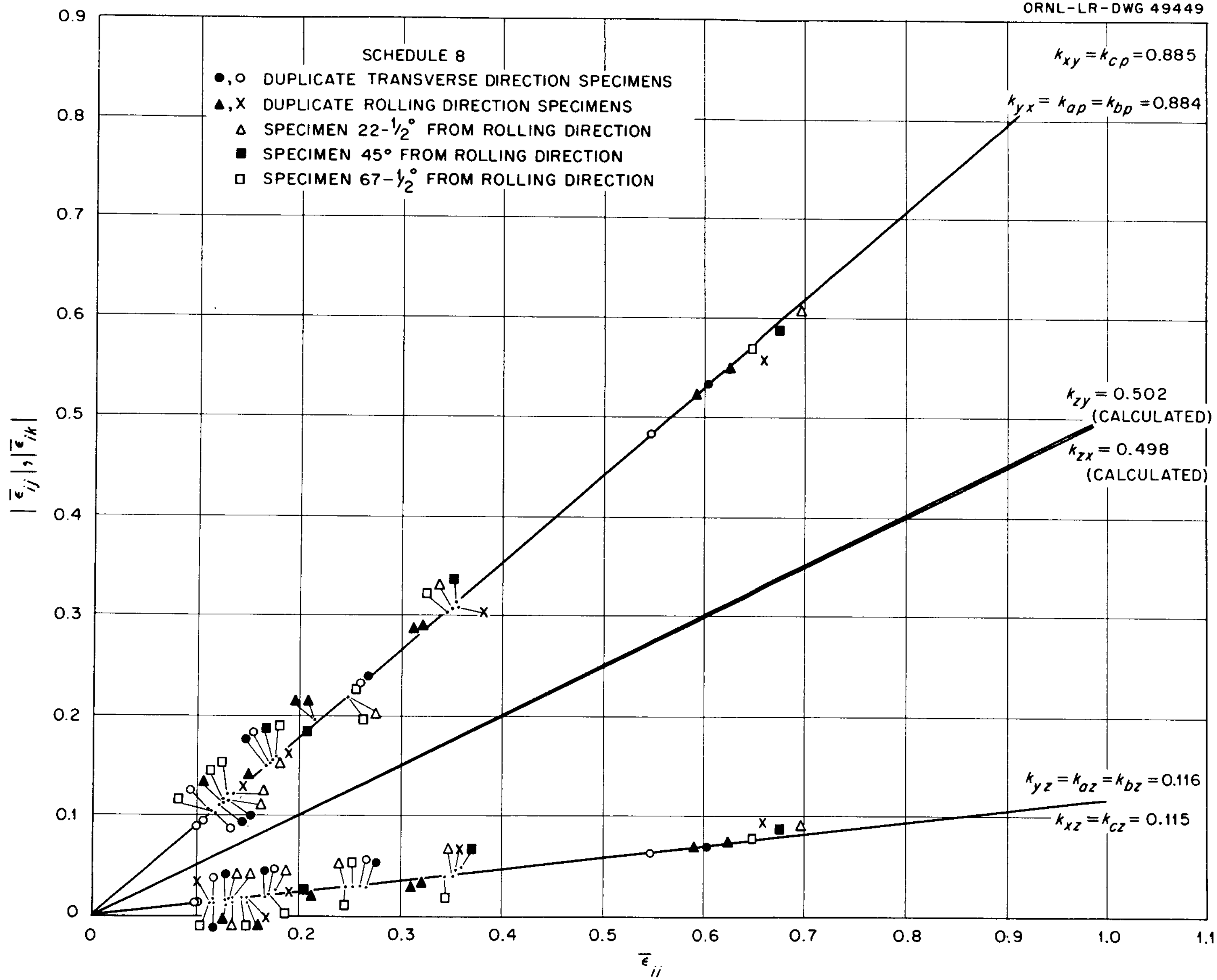

Fig. 29. Strain–Strain Plots for Schedule 8 Zircaloy-2. Schedule 8: α Worked, 70% Low α.

real difference in the values. The values of the k's for the normal direction were essentially equal to 0.5. The values of the k's for Schedule 9, Fig. 30, approached the same degree of pseudoisotropy (k_{xy} = 0.855 and k_{yx} = 0.888) as did those for Schedule 8. The differences seen in the degree of perfection of preferred orientation for these two materials were consistent with the values of the k's. (Although Schedule 9 had 70% final reduction while Schedule 8 had only 50%, the texture determined for Schedule 8 was more perfected than that for Schedule 9.)

Effect of the Number of β Heat Treatments and the Final Percentage Reduction on the Anisotropy of Strain Behavior of Zircaloy-2. Analysis and evaluation of the effect of the β heat treatments and the final percentage reductions, even with the aid of the inverse pole figures, has been quite difficult. Examination of the strain-strain data for these schedules, while it does not explain the causes of the anomalies which are believed to exist, does give a cross-check on the reliability of the data. The differences in the pole figures of Zircaloy-2 of Schedules 1 and 2 (both materials received two intermediate β heat treatments but Schedule 2 material was water quenched, rather than air cooled, from the β heat-treatment temperature) could not be reconciled on the basis of the differences in fabrication procedure. Although the strain-strain data, Figs. 31 and 32, do not aid in understanding the differences, they do show that the pole figures are consistent with the strain behavior. The equal intensity of transverse and normal direction reference axes which are observed at the basal poles, along with the location of the intensities in the rolling direction pole figure, would indicate that the strain behavior in the rolling or longitudinal direction of Schedule 1 material should approach that for an isotropic metal and that the strain behavior in the transverse and normal directions should be similar to each other. This was found to be true, in that k_{xy} = 0.520, k_{yx} = 0.773, and k_{zx} = 0.759. Schedule 2 Zircaloy-2, from examination of the pole figures, should have shown similar, but not identical, strain behavior in the transverse and rolling directions. This prediction was shown to be accurate, even as to relative magnitudes, since k_{xy} = 0.619 and k_{yx} = 0.692.

Schedule 3, which had one less β heat treatment than Schedule 1, showed the expected trend toward pseudoisotropy or perfection of texture because of the greater percentage reduction between anneals. The anisotropy in the

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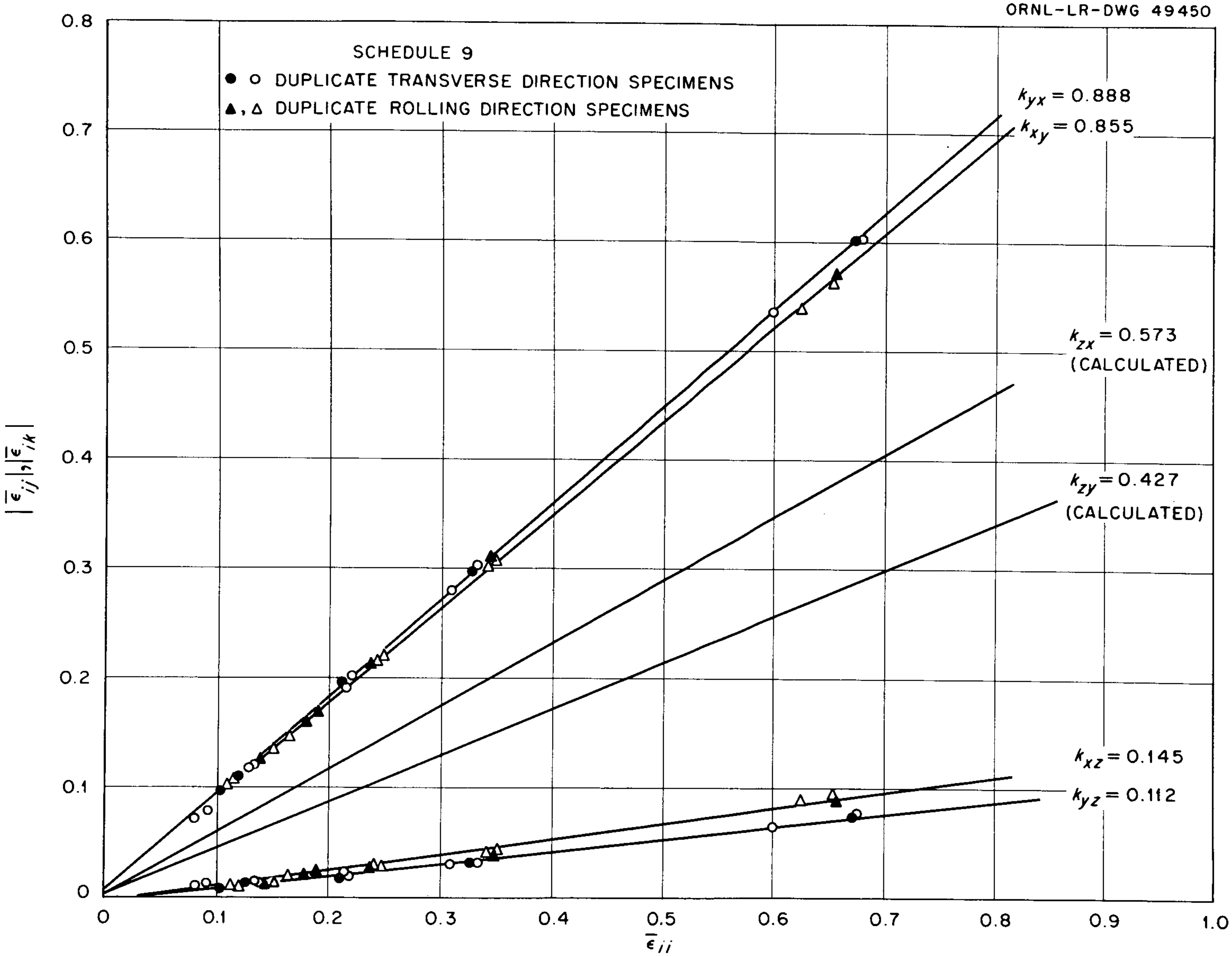

Fig. 30. Strain-Strain Plots for Schedule 9 Zircaloy-2. Schedule 9: α Worked, 50% Low α.

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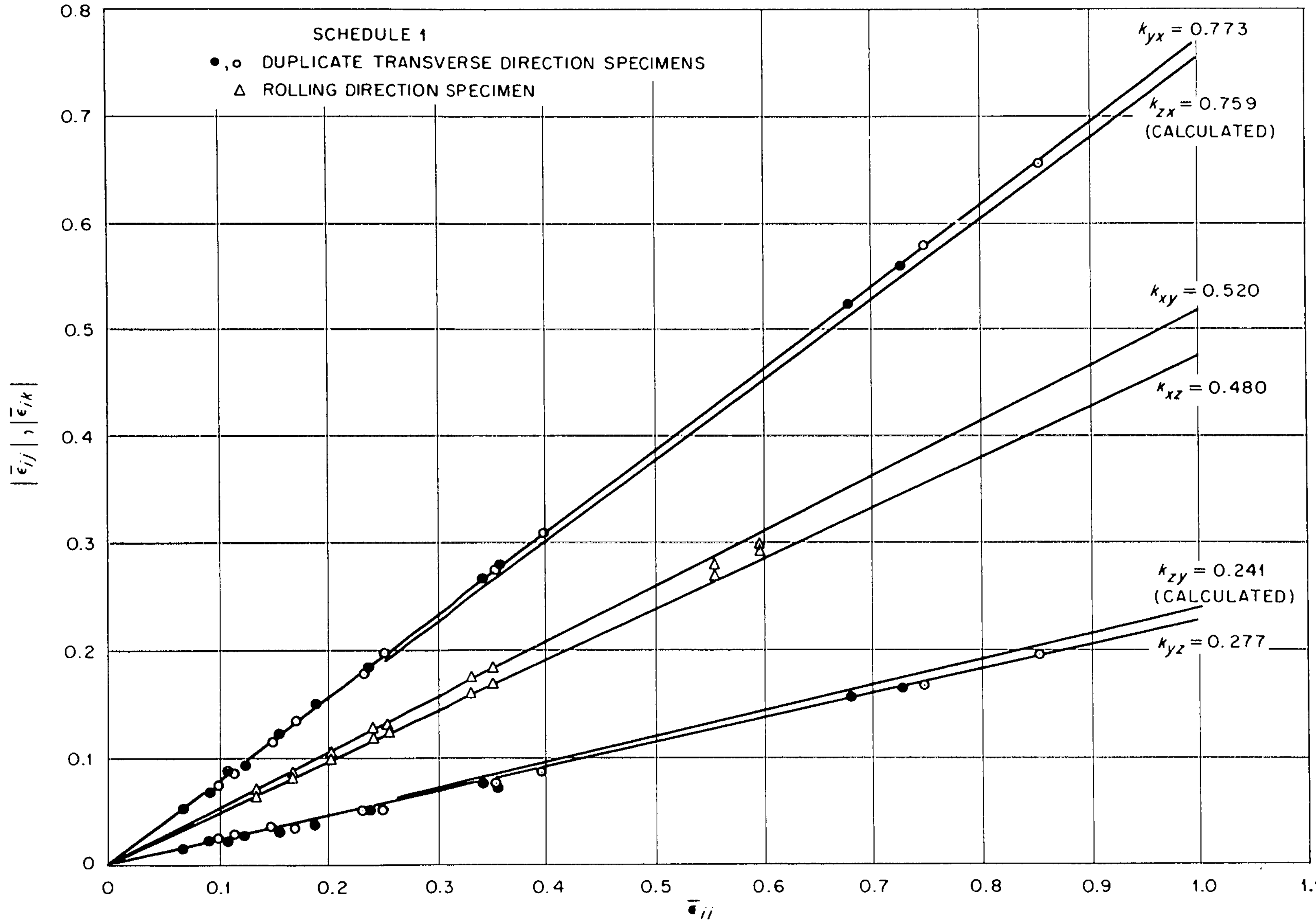

Fig. 31. Strain-Strain Plots for Schedule 1 Zircaloy-2. Schedule 1: Two Intermediate β Heat—Treatments, Air Cooled.

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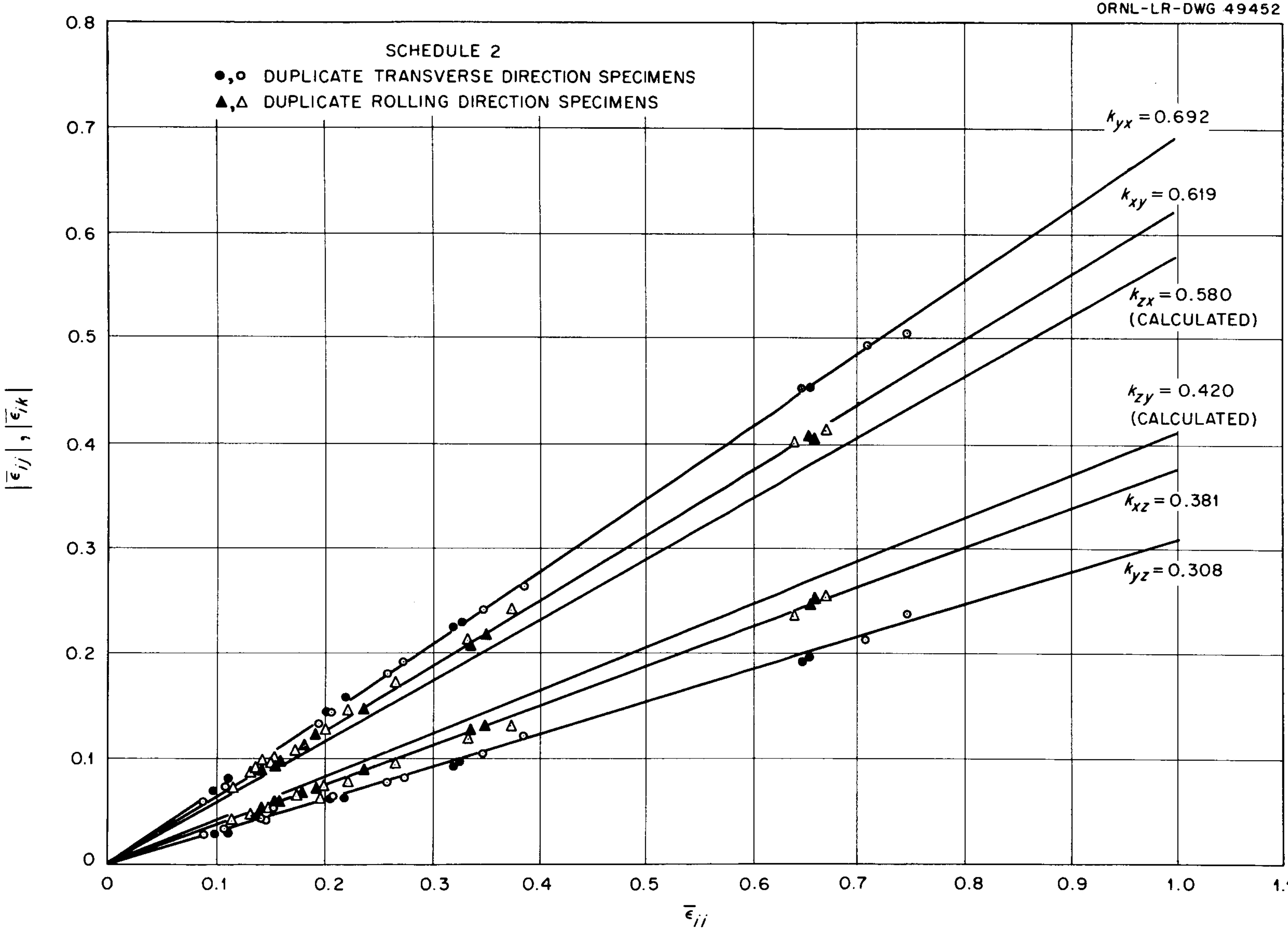

Fig. 32. Strain-Strain Plots for Schedule 2 Zircaloy-2. Schedule 2: Two Intermediate β Heat — Treatments, Water Quenched.

transverse direction, as indicated by the values of the k's, Fig. 33, was less [$k_{yx}(1) = 0.773$, $k_{yx}(3) = 0.715$], but that in the rolling direction was greater [$k_{xy}(1) = 0.520$, $k_{xy}(3) = 0.700$].

The preferred orientation of Zircaloy-2 produced by Schedules 4, 5, and 6, Figs. 34–36 (β worked, β heat treated, reduced 25, 50, and 70%, respectively, at 1000°F, and annealed at 1425°F), did not show the expected progression. It has been proposed that the pole figures for Schedule 5 might be in error. Examination of the values of the k's for this series of materials lends weight to this conjecture. The values of the k's for these three schedules of Zircaloy-2 are presented in Table II. The degree of anisotropy is seen to progress with an increase in the final percent reduction, as would be expected, and is not that which would have been predicted by examination of the inverse pole figures for Schedule 5. A re-examination of the data for the pole figures for Schedule 5 has revealed no error in the calculation or plotting of the figures. A check on the validity of these data can be made only by rerunning selected planes on a new diffraction specimen.

TABLE II

k VALUES FOR SCHEDULES 4, 5, AND 6

Schedule	% Final Reduction	k_{xy}	k_{yx}	k_{zx}
4	25	0.665	0.700	0.540
5	50	0.700	0.756	0.570
6	70	0.739	0.812	0.604

<u>k Values as a Function of Specimen Axis</u>. Strain-strain plots for specimens with tensile axes at angles to the major sheet directions in the plane of the plate were made for a number of the schedules. (The values of the k's for these specimens were presented in Table I with the values for the major sheet directions.) The significance of the absolute values of the k's found for the specimens with tensile axes at angles to the sheet directions is limited by the fact that in many cases (Schedules 1 through 10) duplicate specimens were not tested. If, however, the reproducibility of values of the k's for duplicate specimens (see Table III and Fig. 37)

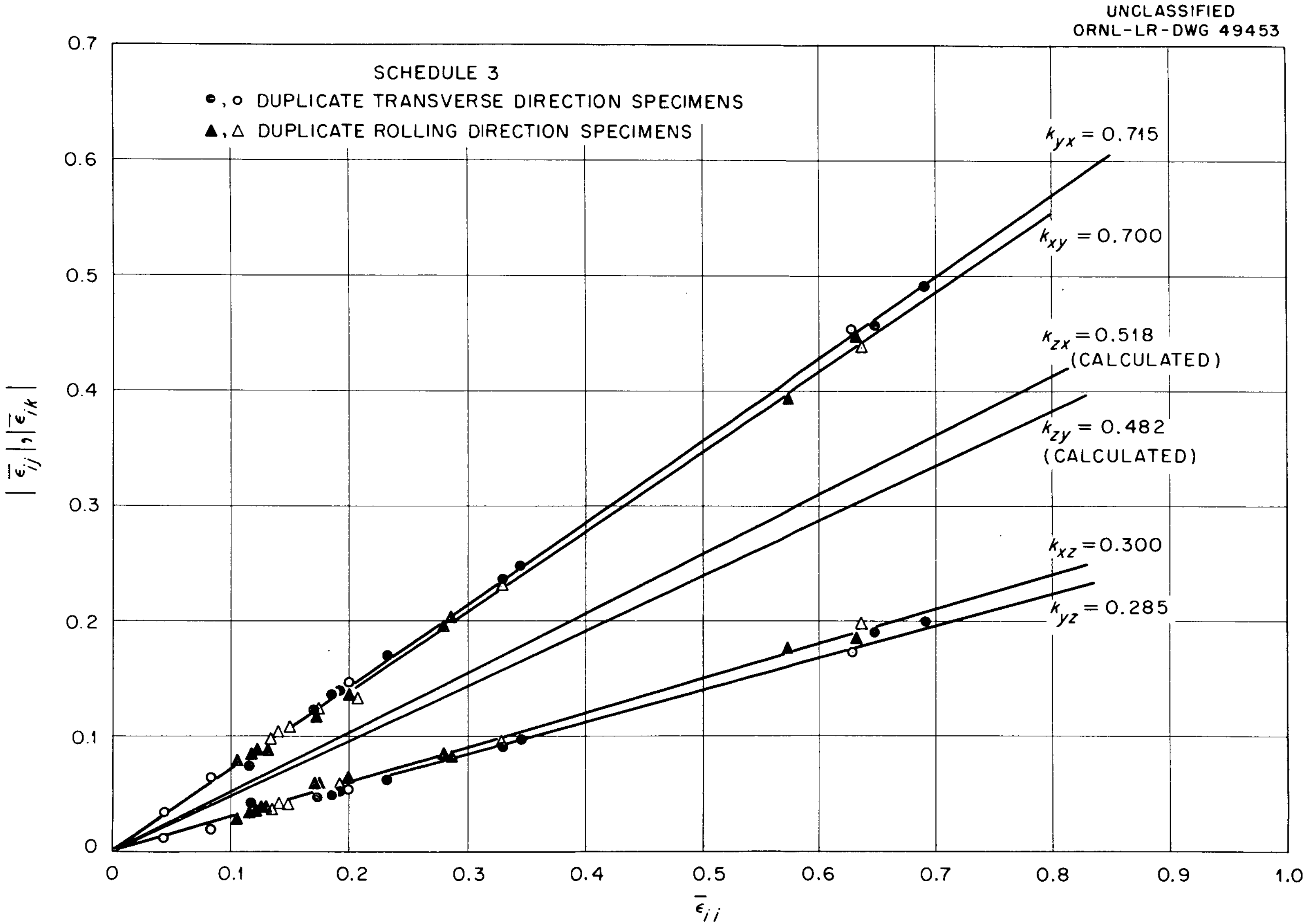

Fig. 33. Strain–Strain Plots for Schedule 3 Zircaloy-2. Schedule 3: One Intermediate β Heat Treatment.

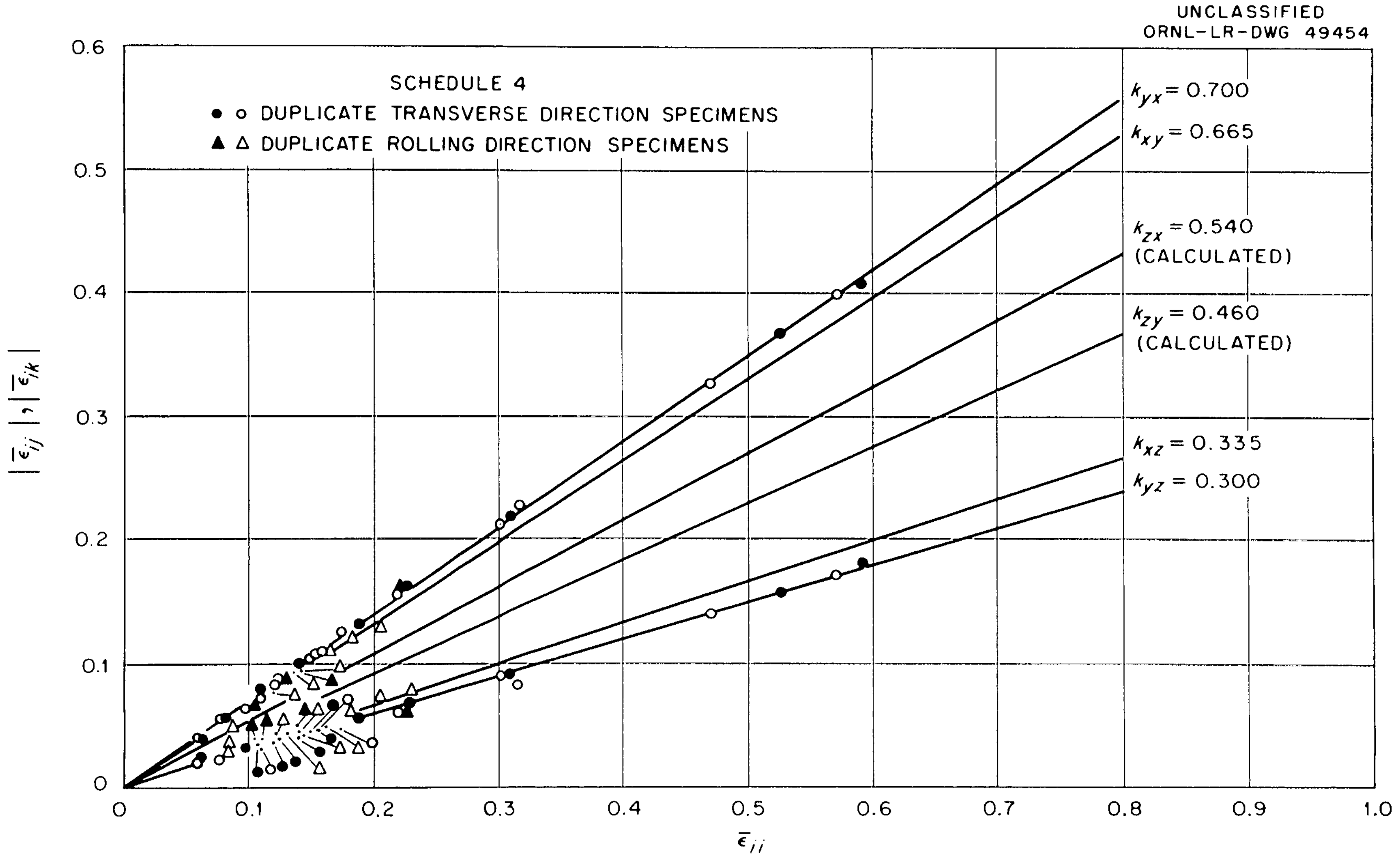

Fig. 34. Strain-Strain Plots for Schedule 4 Zircaloy-2. Schedule 4: β Reduction Plus 25% Low α Reduction.

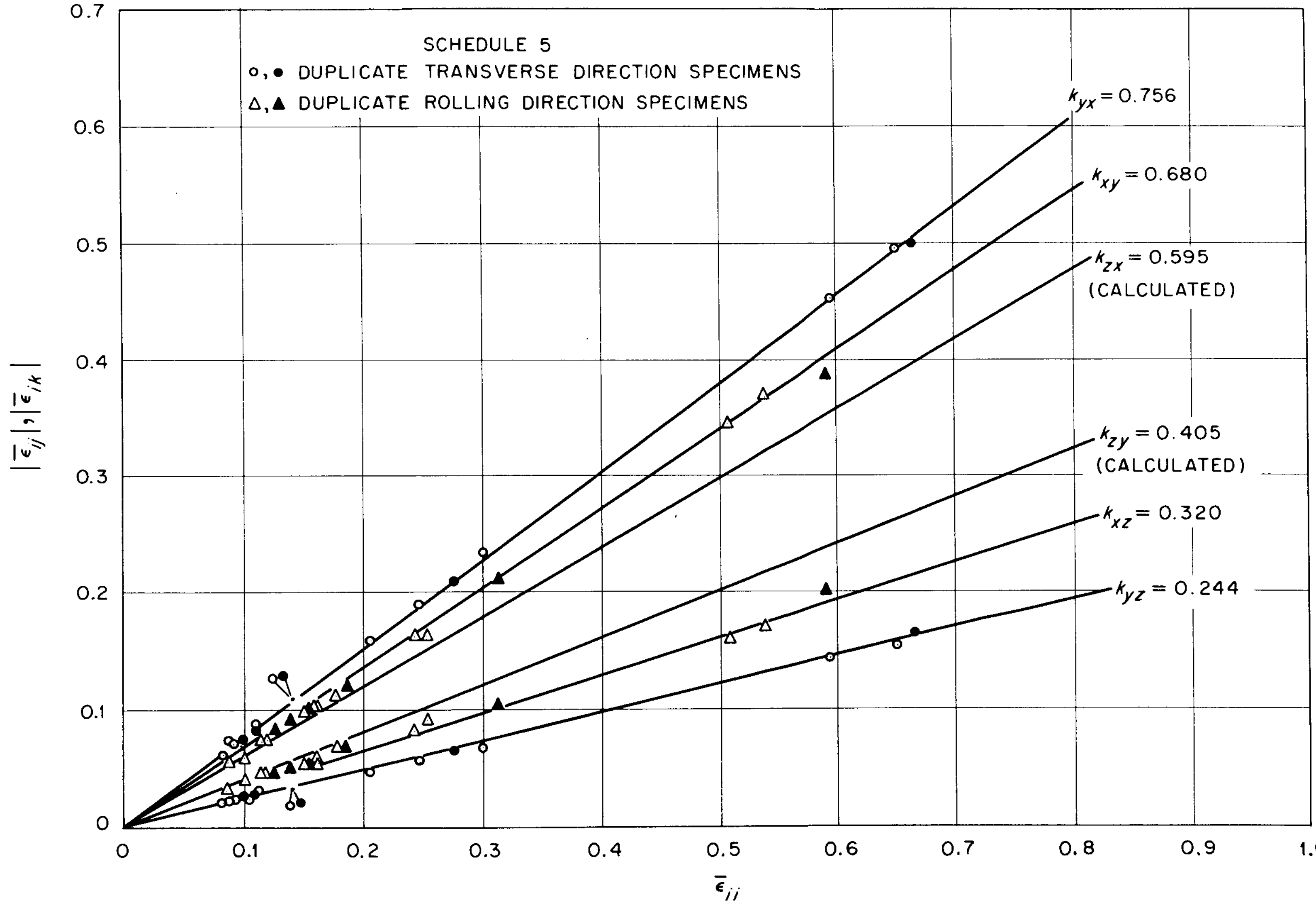

Fig. 35. Strain–Strain Plots for Schedule 5 Zircaloy–2. Schedule 5: β Reduction Plus 50 % Low α. Reduction.

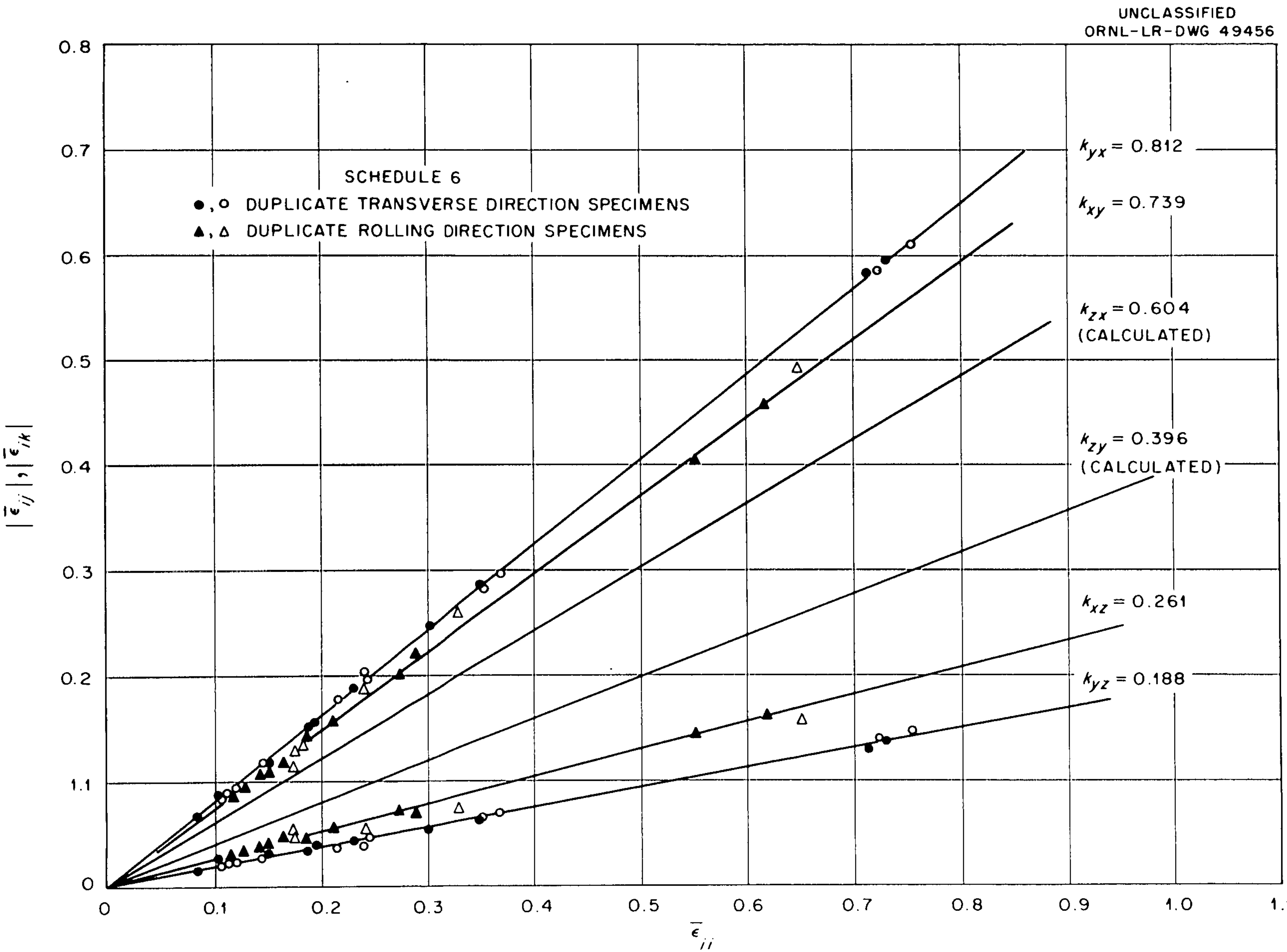

Fig. 36. Strain-Strain Plots for Schedule 6 Zircaloy-2. Schedule 6: β Reduction Plus 70 % Low α Reduction.

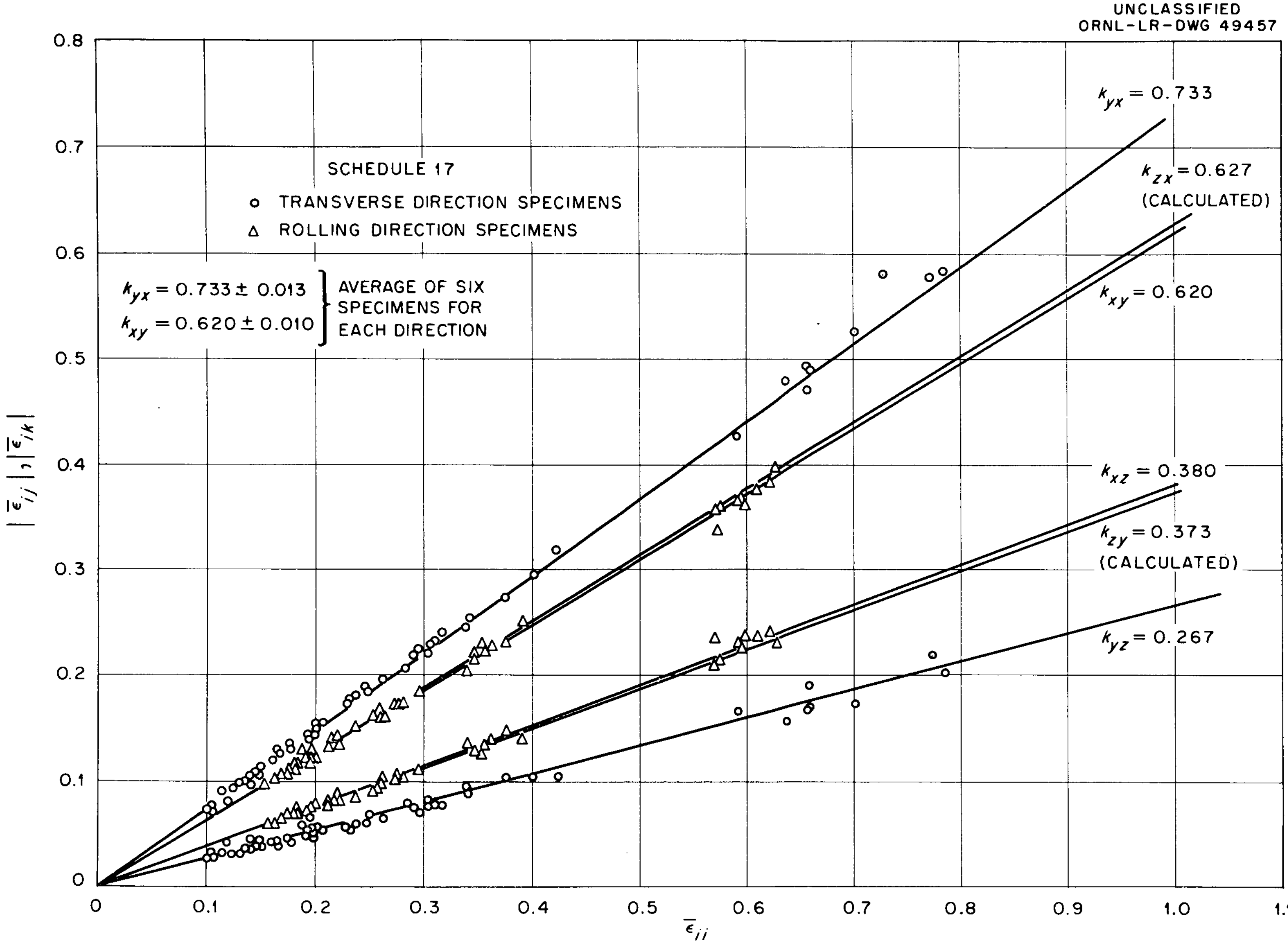

Fig. 37. Strain-Strain Plots for Schedule 17 Zircaloy-2. Schedule 17: HRP Commercial Fabrication Procedure.

TABLE III

REPRODUCIBILITY OF k VALUES - SCHEDULE 17

k_{xy}	k_{yx}
0.608	0.740
0.612	0.726
0.628	0.750
0.620	0.722
0.618	0.714
0.636	0.743
k_{xy}(Av.) 0.620	k_{yx}(Av.) 0.733
σ_{xy} = 0.010	σ_{yx} = 0.013

$$\sigma \text{ - Standard Deviation } = \sqrt{\Sigma \frac{fd^2}{r}}$$

is to be believed, it is permissible to accept the values with some confidence. Strain-strain plots of the spectrum of specimen orientations tested are important in that they point to the fact that the major sheet fabrication directions are not always the 'anisotropic axes.' (The relationship of the anisotropic axes to preferred orientation and the major sheet directions will be discussed later.) This same effect may be seen, however, in a clearer fashion by plots of values of k_{ij} versus the angle of the specimen axis from one of the reference axes. These plots also serve to show the effect of fabrication variables on the values of the k's for all of the specimen orientations tested. In these plots, Figs. 38–41, the slopes of the strain-strain curves (the values of the k's) for specimens with tensile axes at angles to the rolling direction are given as k_{jp} where j = a, b, or c (tensile axis at 67-1/2, 45, 22-1/2° from the rolling direction) and p is the contractile strain axis in the rolling plane.

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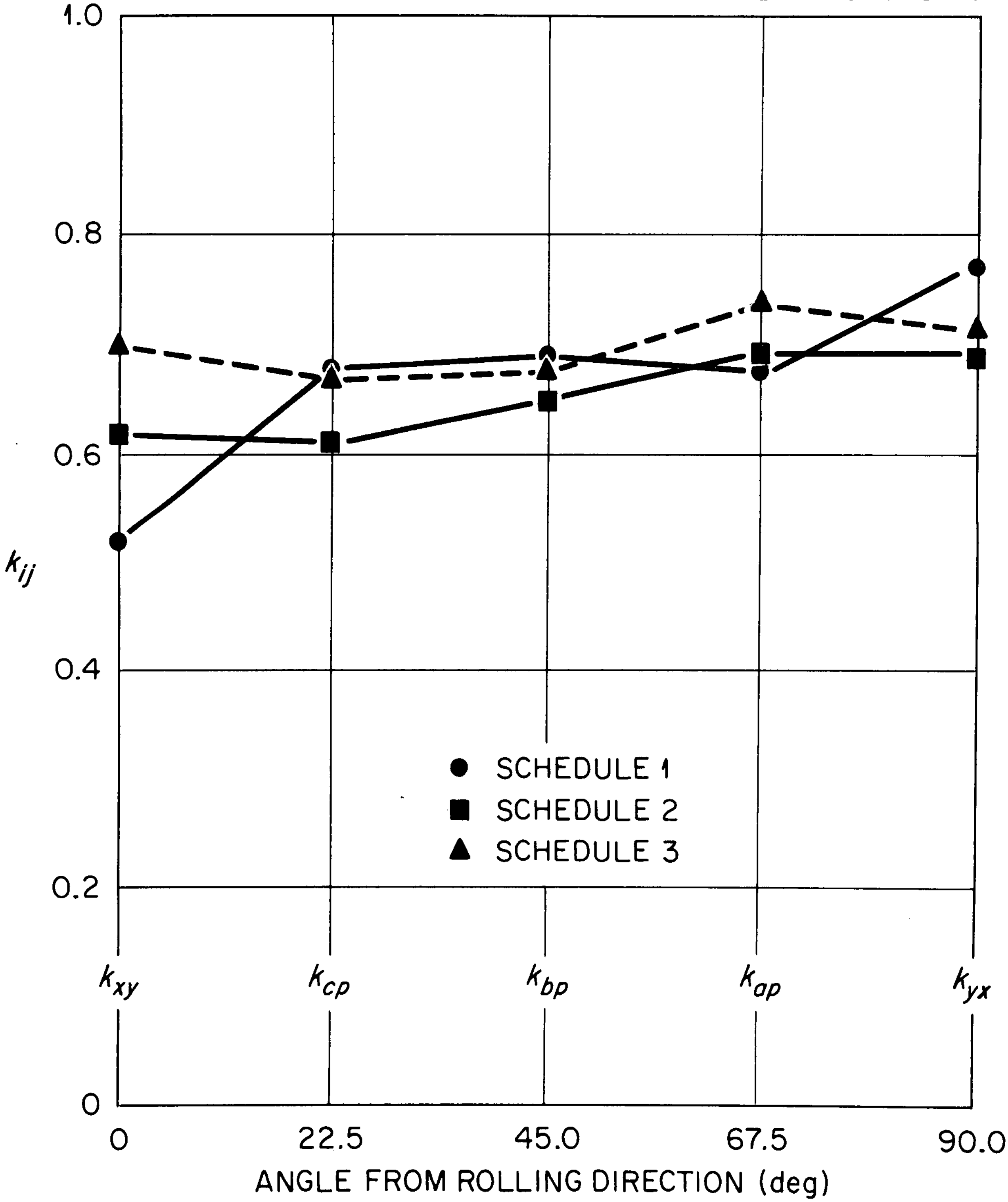

Fig. 38. k vs Angle Between Tensile Axis and Rolling Direction. Schedules 1, 2 and 3.

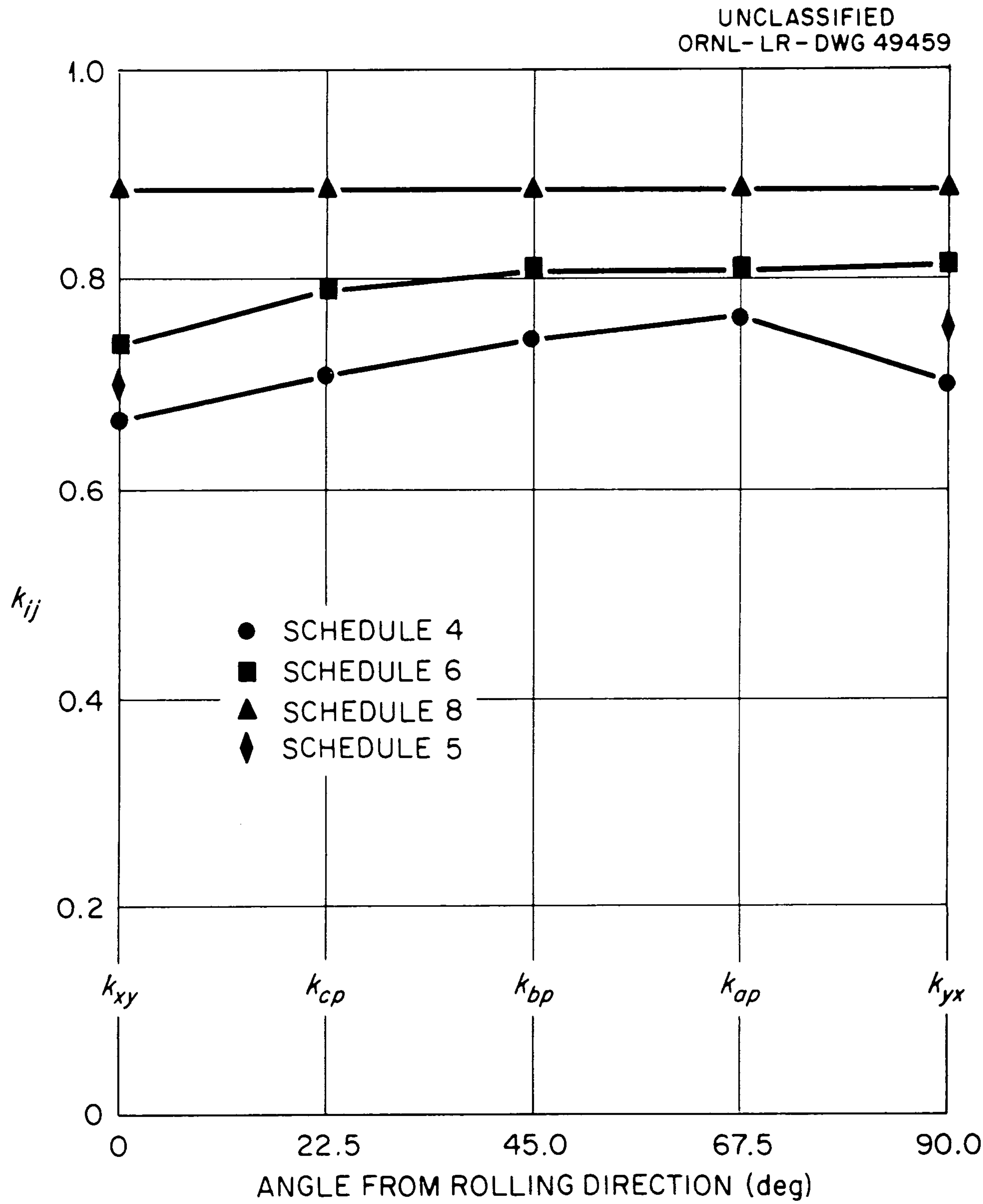

Fig. 39. k vs Angle Between Tensile Axis and Rolling Direction. Schedules 4,5,6 and 8.

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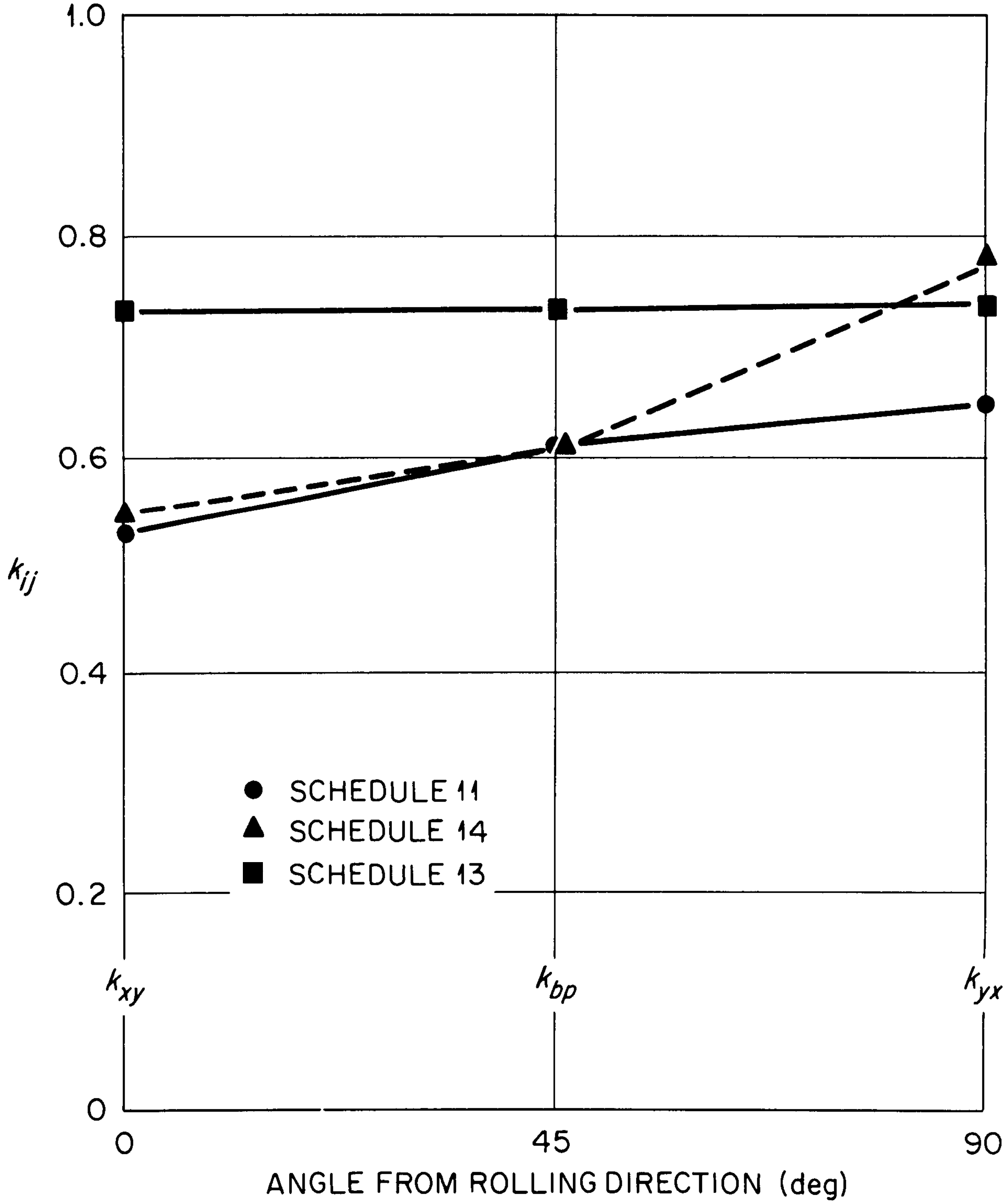

Fig. 40. k vs Angle Between Tensile Axis and Rolling Direction. Schedules 11,13 and 14.

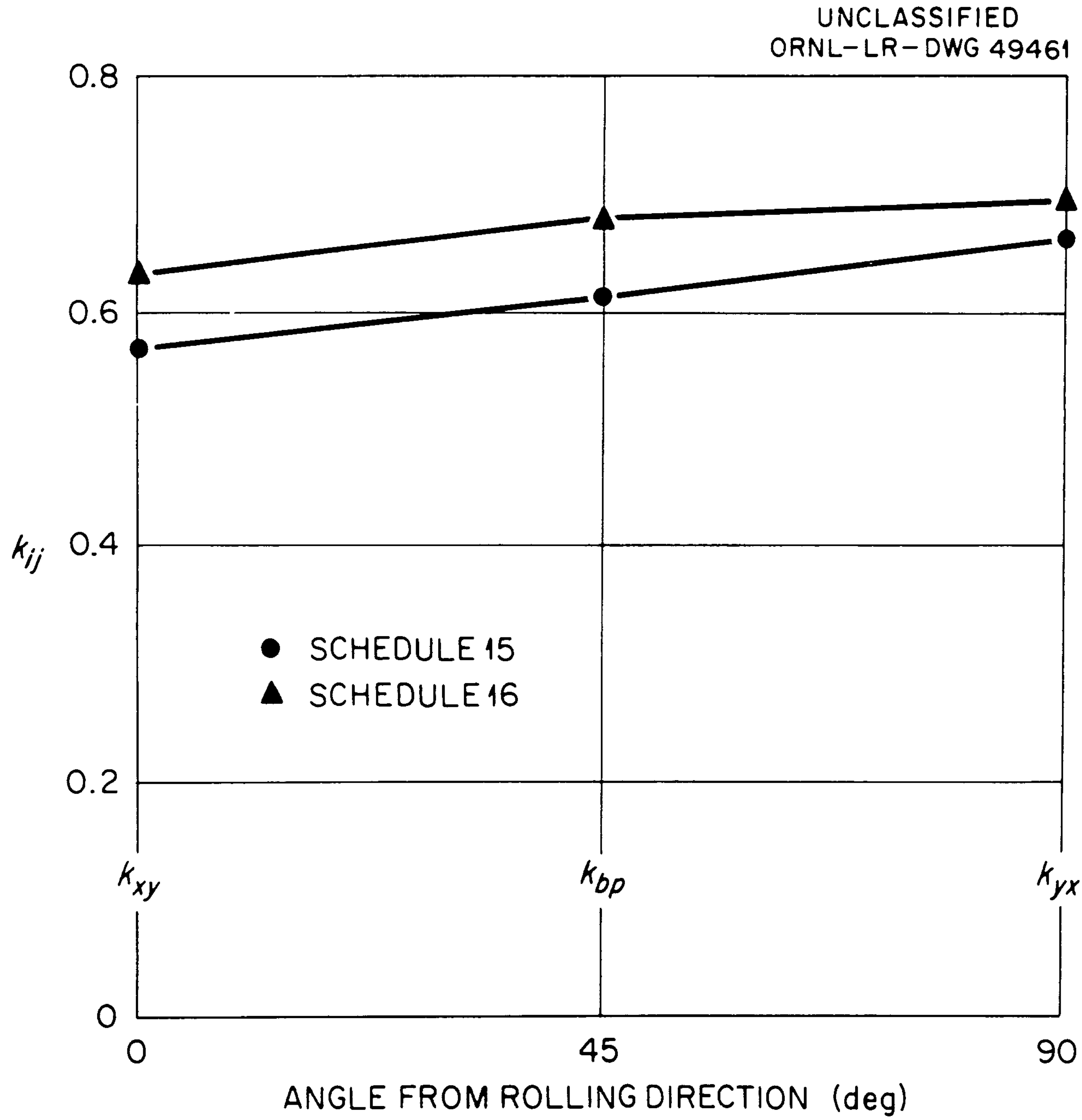

Fig. 41. k vs Angle Between Tensile Axis and Rolling Direction. Schedules 15 and 16.

The variable operating in the schedules presented in Fig. 38, Schedules 1, 2, and 3, was the number of intermediate β heat treatments (two, followed by an air cool, for Schedule 1; two, followed by a water quench for Schedule 2; and one, followed by an air cool, for Schedule 3) before the final reduction and anneal. Schedules 4, 5, and 6 (Fig. 39) were designed to show the effect of increased final percent reduction; 25% for Schedule 4, 50% for Schedule 5, and 70% for Schedule 6. The curve for Schedule 8 (Fig. 39) shows the isotropy which was developed in the plane of the plate when no β heat treatment was given during fabrication. The data of Fig. 40 demonstrate the effects of rotational cross rolling after β heat treatment (Schedule 13) and before β heat treatment at 1450°F (Schedule 14) versus straight rolling (Schedule 11). The effect of rotational cross rolling versus straight rolling at a temperature in the β field (Schedules 16 vs 15) before β heat treatment and final α reduction is shown in Fig. 41.

<u>k Values as a Function of Temperature</u>. The values of the k's for the major sheet fabrication directions, determined on specimens fractured at 302 and 572°F, are shown in Table IV for all but five schedules. The values of the k's for room-temperature specimens, presented previously in Table I, are given for comparison. Plots of k_{ij} versus temperature are shown in Figs. 42–44. Strain-strain plots determined from tensile specimens tested at room temperature, 302°F, and 572°F are shown for one of the experimentally fabricated schedules of Zircaloy-2 (Schedule 12) in Fig. 45. The variation in the values of the k's with temperature, on the whole, seems nearly random. No major change in the values of the k's was effected by increasing the temperature of testing from room temperature to 572°F.

<u>Correlation of Inverse Pole Figures and Strain Data</u>. Some correlation of the inverse pole figures and the strain data has been made in the analysis of Schedules 1 through 6. The relationship between the two methods of analysis is quite simple and is intuitively derivable. The relationship is, however, only qualitative. From the pole figures of Schedule 8 (Fig. 10), for example, it is obvious that, since the location and concentration of the transverse and rolling direction reference axes are almost identical, the strain properties in the transverse and rolling directions also will be almost identical.

TABLE IV

k VALUES FOR ZIRCALOY-2 TESTED AT

ROOM TEMPERATURE, 302°F, AND 572°F

Schedule	Temperature (°F)	k_{xy}	k_{xz}	k_{yx}	k_{yz}	k_{zx}	k_{zy}
1	75	0.520	0.480	0.773	0.227	0.759	0.241
	302	0.533	0.467	-	-	-	-
	572	0.540	0.460	-	-	-	-
2	75	0.619	0.381	0.692	0.308	0.580	0.420
	302	0.591	0.409	-	-	-	-
	572	0.600	0.400	-	-	-	-
3	75	0.700	0.300	0.715	0.285	0.518	0.482
	302	0.695	0.305	-	-	-	-
	572	0.713	0.287	-	-	-	-
4	75	0.665	0.335	0.700	0.300	0.540	0.460
	302	0.665	0.335	-	-	-	-
	572	0.680	0.320	-	-	-	-
6	75	0.739	0.261	0.812	0.188	0.604	0.396
	302	0.768	0.232	-	-	-	-
	572	0.785	0.215	-	-	-	-
8	75	0.885	0.115	0.884	0.116	0.498	0.502
	302	0.890	0.110	-	-	-	-
	572	0.885	0.115	-	-	-	-
10	75	0.678	0.322	0.784	0.216	0.633	0.367
	302	0.630	0.370	-	-	-	-
	572	0.642	0.358	0.760	0.240	0.638	0.362
11	75	0.530	0.470	0.650	0.350	0.622	0.378
	302	0.515	0.485	0.638	0.362	0.624	0.376
	572	0.530	0.470	0.665	0.335	0.638	0.362

(continued)

TABLE IV (continued)

Schedule	Temperature (°F)	k_{xy}	k_{xz}	k_{yx}	k_{yz}	k_{zx}	k_{zy}
12	75	0.592	0.408	0.709	0.291	0.627	0.373
	302	0.595	0.405	0.700	0.300	0.663	0.337
	572	0.609	0.391	0.725	0.275	0.629	0.371
13	75	0.735	0.265	0.741	0.259	0.508	0.492
	302	0.714	0.286	0.739	0.261	0.532	0.468
	572	0.720	0.280	0.740	0.260	0.526	0.474
14	75	0.544	0.456	0.780	0.220	0.742	0.258
	302	0.525	0.475	0.740	0.260	0.720	0.280
	572	0.520	0.480	0.713	0.287	0.697	0.303
15	75	0.570	0.530	0.662	0.338	0.596	0.404
	302	0.535	0.465	0.653	0.347	0.625	0.375
	572	0.542	0.458	0.675	0.325	0.632	0.368
17	75	0.620	0.380	0.733	0.267	0.627	0.373
	302	-	-	-	-	-	-
	572	0.642	0.358	0.745	0.255	0.620	0.380
18	75	0.531	0.469	0.693	0.307	0.666	0.334
	302	0.530	0.470	0.682	0.320	0.653	0.347
	572	0.535	0.465	0.700	0.300	0.670	0.330
J	75	0.304	0.696	0.600	0.400	0.774	0.226
	302	0.292	0.708	0.530	0.470	0.732	0.268
	572	0.331	0.669	0.575	0.425	0.733	0.267

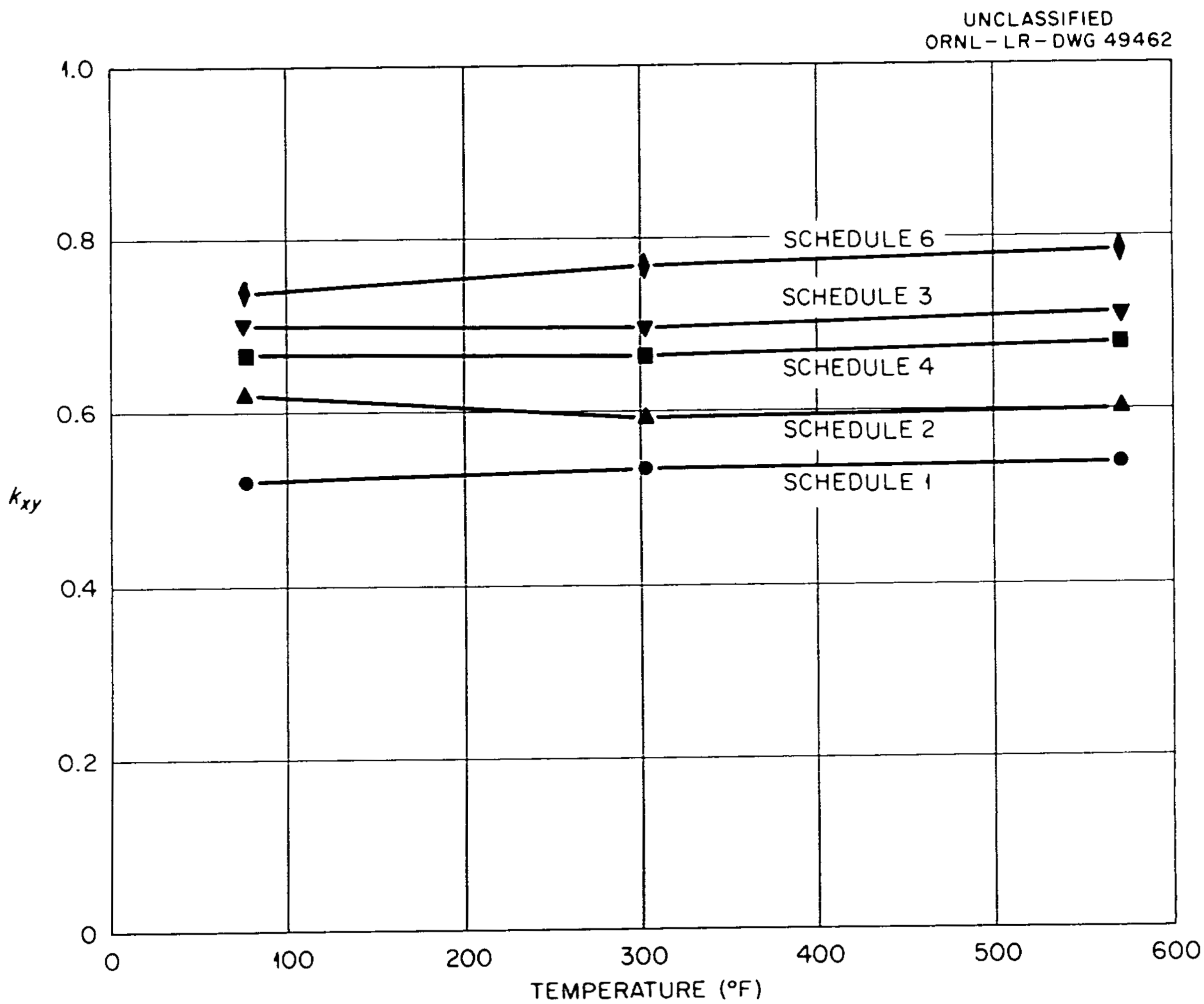

Fig. 42. k_{xy} as a Function of Tempeature. Schedules 1–4, and 6.

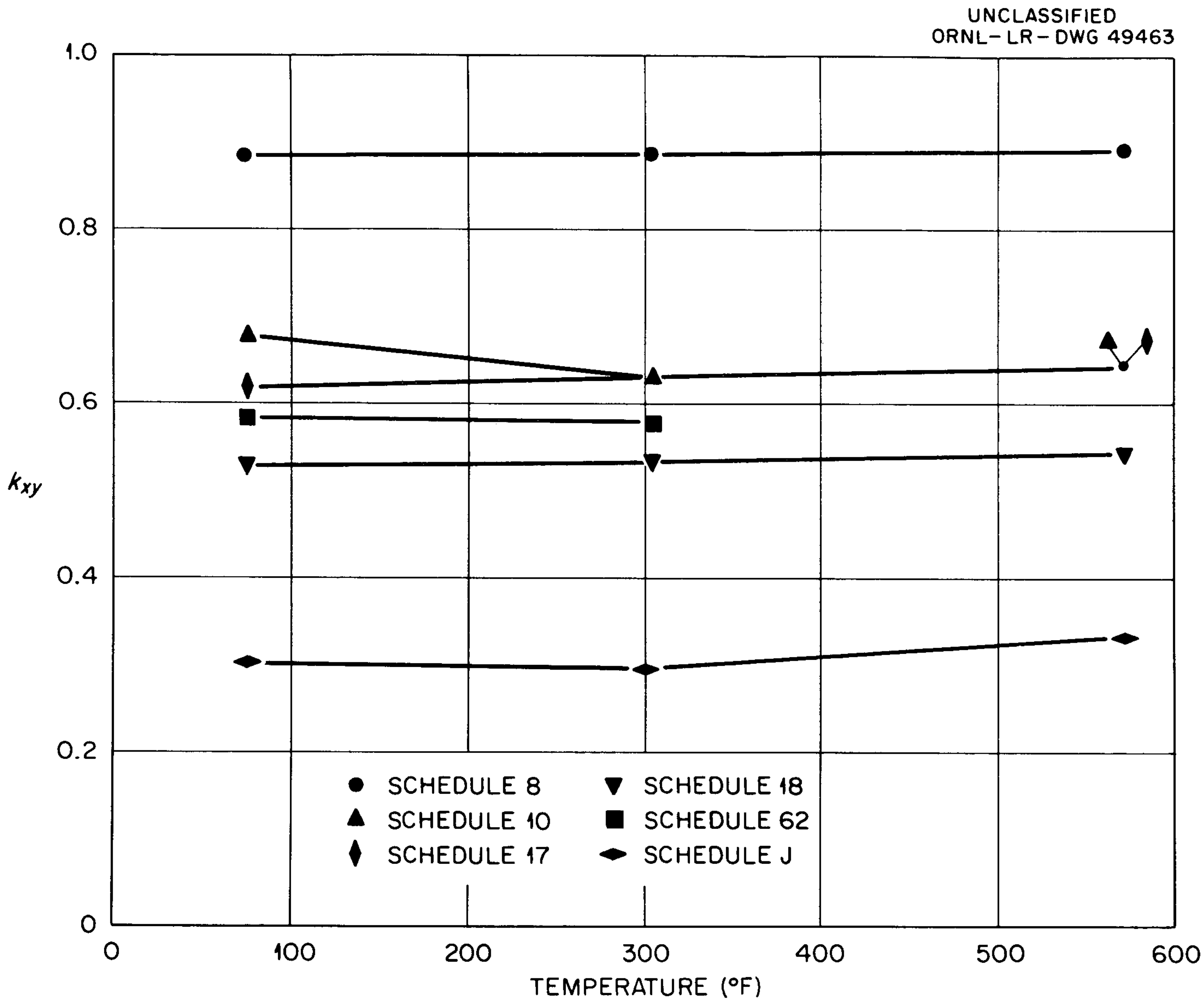

Fig. 43. k_{xy} as a Function of Temperature. Schedules 8, 10, 17, 18, 62 and J.

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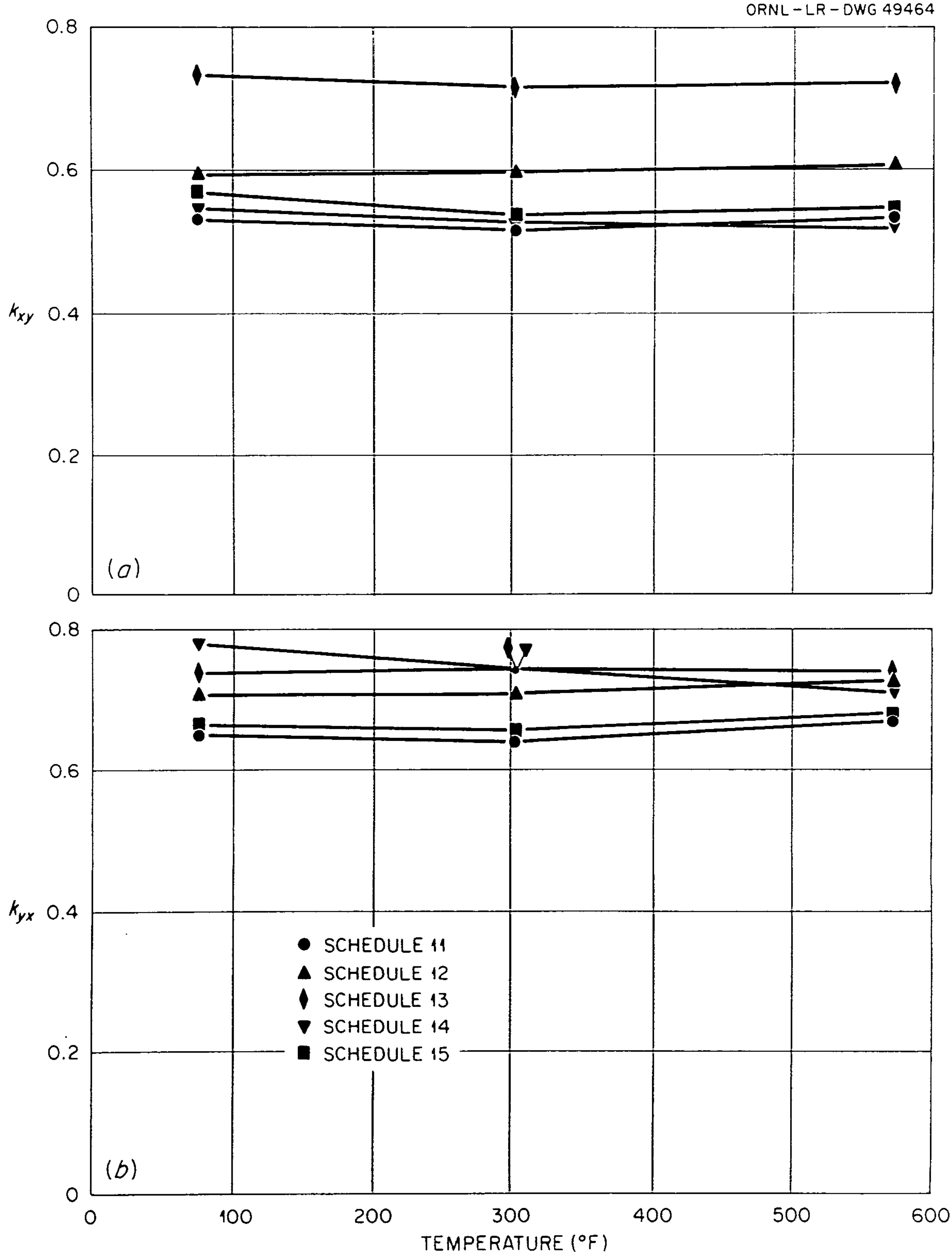

Fig. 44. k_{xy} and k_{yx} as Functions of Temperature.

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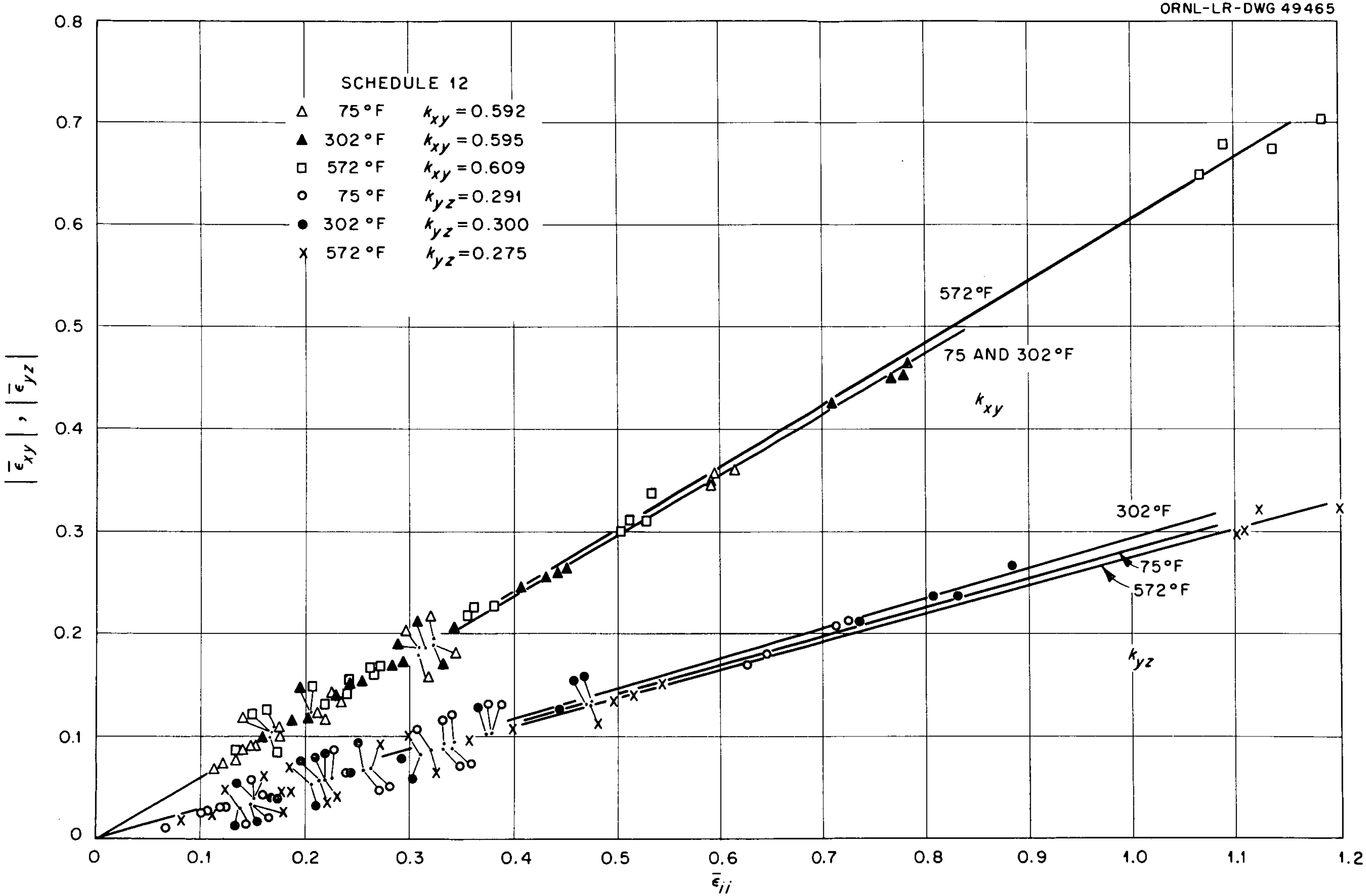

Fig. 45. Plots of $|\bar{\epsilon}_{xy}|$ and $|\bar{\epsilon}_{yz}|$ vs. $\bar{\epsilon}_{ii}$ for Tensile Specimens Tested at Room Temperature, 302°F, and 572°F. Schedule 12 Zircaloy-2.

Also, the contractile strain expected in the normal direction for specimens with tensile axes in the rolling plane will be small because of the high density of basal poles, and thereby the absence of slip systems ($\{10\bar{1}0\}$ $\langle\bar{1}2\bar{1}0\rangle$) in the normal direction. From these observations, it may be conjectured that the values of k_{xy} and k_{yx} will be approximately equal and considerably greater than 0.5; and, therefore, that $k_{zx} \simeq k_{zy} \simeq 0.5$. The experimentally determined values of the k's for this schedule were $k_{xy} = 0.885$ and $k_{yx} = 0.884$ ($k_{zx} = 0.498$ - calculated), showing that the correlation of the pole figures with the strain data was valid.

This type of analysis may be illustrated further by examination of the pole figures and strain data for Schedule J, Figs. 8 and 25. The major feature of the pole figures is a very high density of basal poles in the transverse direction (R = 5.5). Therefore, when a rolling direction specimen is pulled in tension, the greatest contractile strain must occur in the normal direction and the k_{xz} will be greater than k_{xy}. It was found experimentally that $k_{xz} = 0.696$ and $k_{xy} = 0.304$. Judging from the positions and densities of the rolling and normal direction reference axes with respect to crystallographic axes, the contractile strains in the rolling and normal directions for a transverse direction specimen should not be too different and should approach 0.500, but with k_{yx} somewhat greater than k_{yz}. The values found were $k_{yx} = 0.600$ and $k_{yz} = 0.400$. A normal direction specimen would have little contractile strain occurring in the transverse direction because the slip systems are approximately perpendicular to the stress axis. The calculated values of the k's were $k_{zx} = 0.774$ and $k_{zy} = 0.226$.

Having shown that a correlation of pole figures with the values of the k's can be made with considerable confidence, it is then possible to predict the major features of the pole figures for Zircaloy-2 fabricated by other schedules. The predicted density of each of the major reference axes at the pole of the basal plane, (0001), and at the poles of the $\{hki0\}$ planes is shown in Table V for Schedules 11 through 16.

TABLE V

THE DENSITY OF REFERENCE AXES AT THE BASAL AND {hki0}

POLES PREDICTED BY STRAIN-STRAIN ANALYSIS

Schedule	k_{xy}	k_{yx}	k_{zx}	R(0001)			R{hki0}		
				RD	TD	ND	RD	TD	ND
11	0.530	0.650	0.622	0	2	2	2	1	< 1
12	0.592	0.709	0.627	0	2	3	2	< 1	0
13	0.735	0.741	0.508	0	0	4	2	2	0
14	0.544	0.780	0.748	0	4	4	3	0	0
15	0.570	0.662	0.596	0	2	3	2	0	0
16	0.634	0.695	0.568	0	1	3	2	< 1	0

Relationship of the k Values to True Stress-True Strain Diagrams. Approximate true stress-true strain diagrams were constructed from the load-elongation curves of a few of the Zircaloy-2 materials in order to show the wide variation in the transverse and rolling direction stress-strain curve pairs and as part of an attempt to obtain a quantitative correlation between the curves and the associated values of the k's. The stress-strain curves constructed for Schedules 8, 10, 62, and J are presented in Figs. 46–49. Equations for the elastic and plastic portions of the curves and the values of the k's in the rolling and transverse directions for each of these schedules are shown on the figures. A number of things concerning the curves in general should be noted. First, the proportional limit was lower in all cases for the longitudinal specimens; second, the yield strengths for the longitudinal specimens were lower; and, third, the slope of the true stress-true strain curve in the plastic region was greater for the longitudinal specimens.

An examination of the individual stress-strain curves for each of the four schedules serves to illustrate the variation in directionality of mechanical properties which was seen from schedule to schedule. The longitudinal and transverse true stress-true strain curves for Schedule 8 material, Fig. 46, are essentially identical; the difference between the two curves being no greater than that expected between duplicate specimens

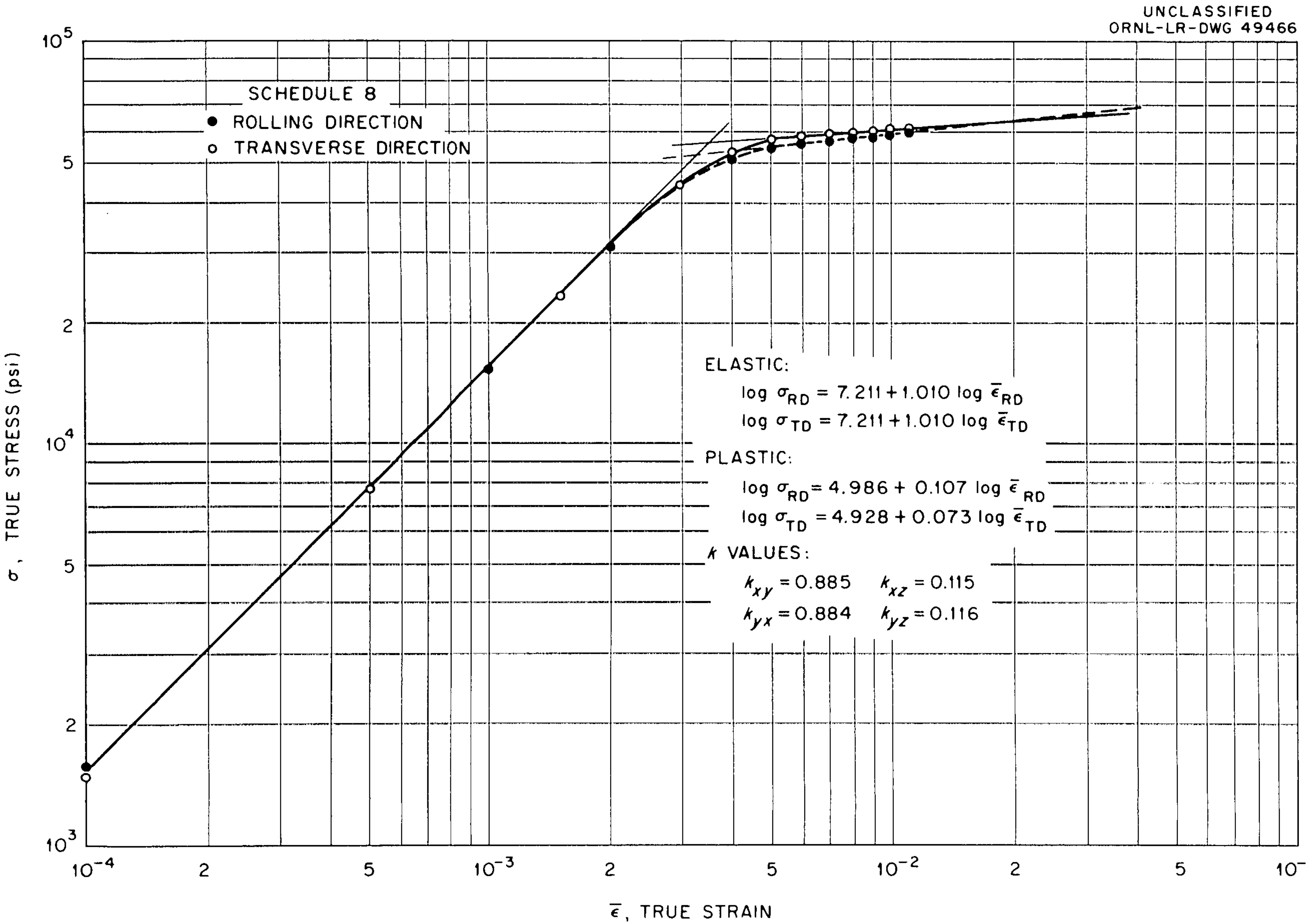

Fig. 46. True Stress – True Strain Diagram for Schedule 8 Zircaloy-2.

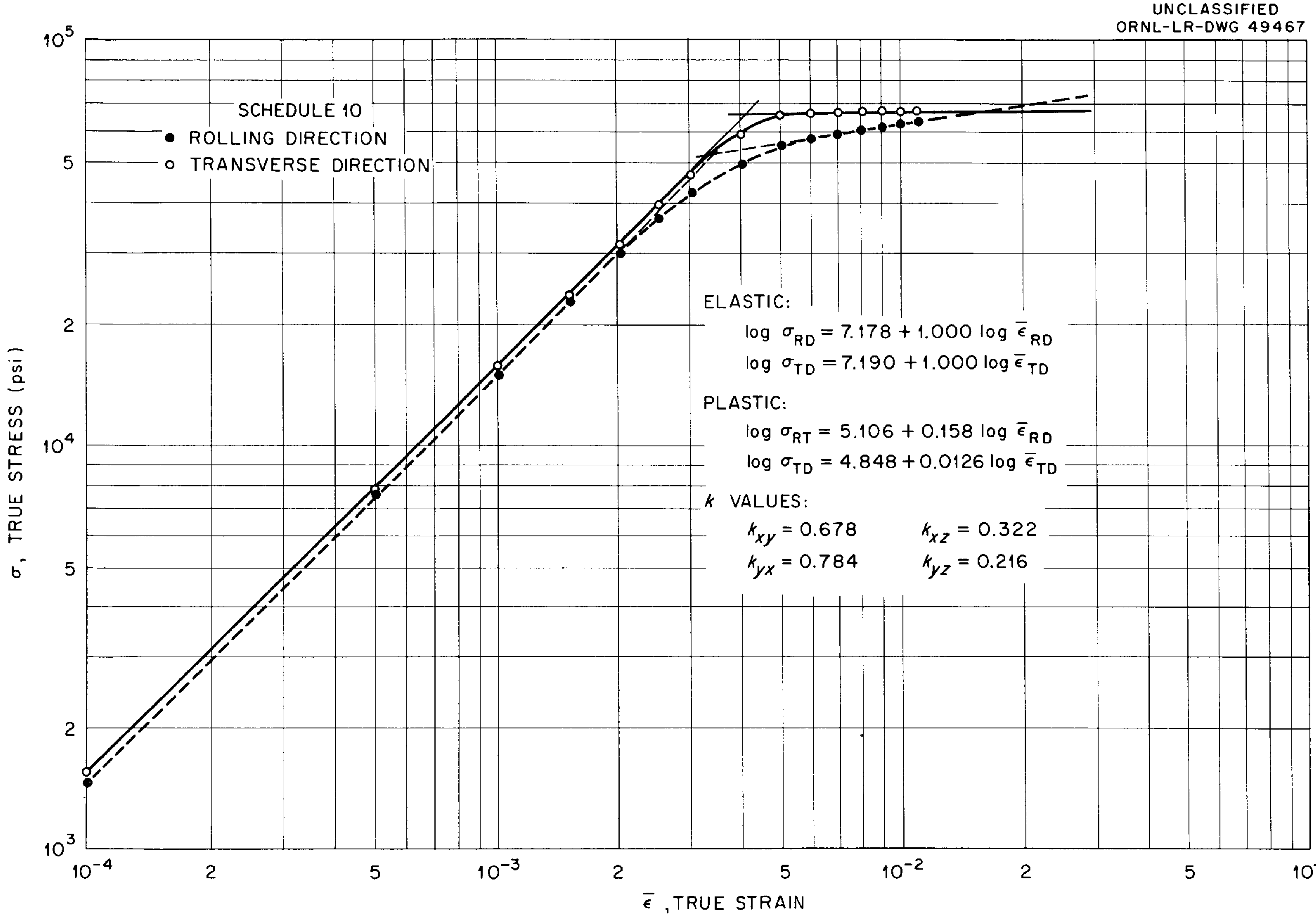

Fig. 47. True Stress – True Strain Diagram for Schedule 10 Zircaloy-2.

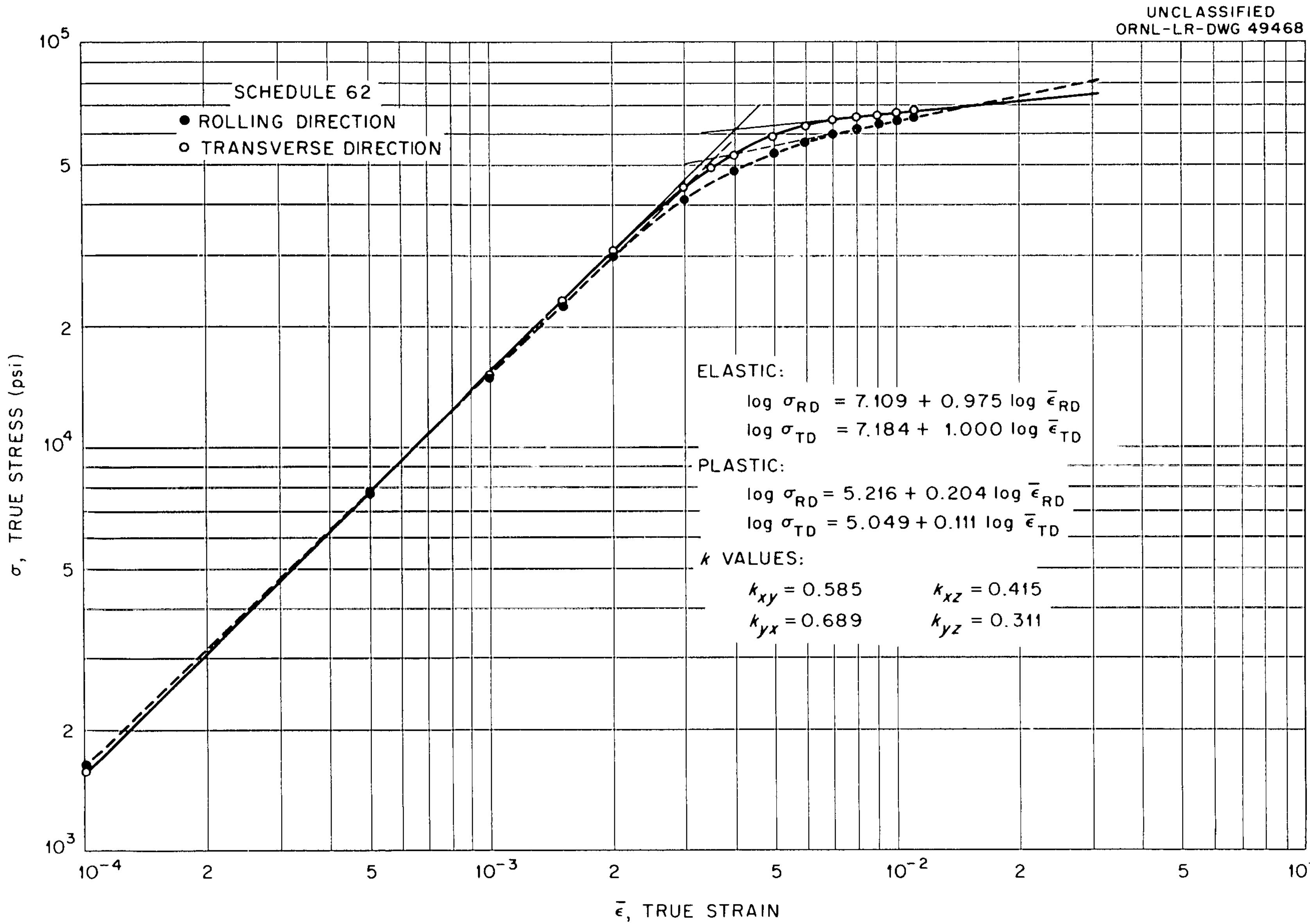

Fig. 48. True Stress – True Strain Diagram for Schedule 62 Zircaloy-2.

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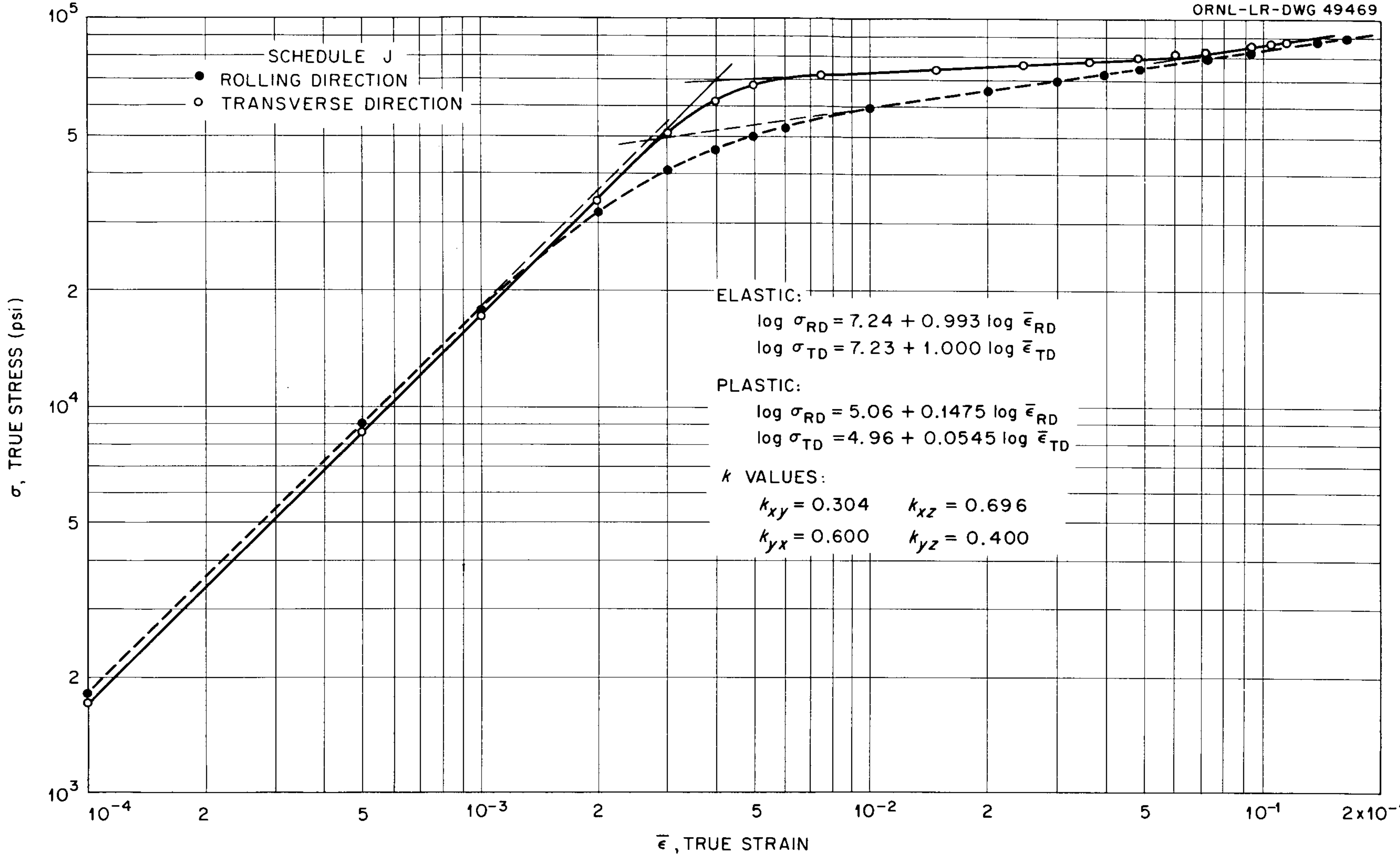

Fig. 49. True Stress–True Strain Diagram for Schedule J Zircaloy-2.

in even an isotropic material. This again shows the pseudoisotropy which existed in Schedule 8 Zircaloy-2. Construction of stress-strain curves by the usual method, without realization of the variation in contractile strains and preferred orientation, would lead one to surmise that this material was completely isotropic.

The true stress-true strain curves for Schedules 10, 62, and J, all fabricated by variations of the ORNL-HRP Metallurgy fabrication procedure, show a progression away from the case of pseudoisotropy. The curves for the longitudinal and transverse direction specimens of Schedule 62 Zircaloy-2, when examined in light of the values of the k's, lead to the conclusion that this material was one of the most isotropic examined in the fabrication study.

Attempts to relate the equations of the stress-strain curves to the values of the k's for each of the materials met with little success. One qualitative correlation, however, can be made. The Δ stress (the difference in the stress for the longitudinal and transverse direction specimens at any given strain in a region intermediate to the straight line portions of the stress-strain curves) or the area between the curves for longitudinal and transverse specimens of the same schedule of Zircaloy-2 is proportional to the differences between the values of k_{xy} and k_{yx} or k_{xz} and k_{yz}. On the basis of the inverse pole figures, since the preferred orientation in the transverse direction for Schedule J is almost identical to the texture for Schedule 8 in the normal direction, the transverse direction stress-strain curve of Schedule J may be assumed to approximate that for the normal direction of Schedule 8. This is not a completely true analogy because the values of the k's for the transverse direction of Schedule J are not equal to 0.5 as are the values of the k's for Schedule 8 normal direction. The differences that would be seen between the transverse-longitudinal direction curve for Schedule 8 and the normal direction curve would, however, be of the order of magnitude indicated by a comparison with the curve for the transverse direction of Schedule J.

Yield Strength-k Value Relationships. An extension of a theory of Hill[16] on the yielding and plastic flow of anisotropic metals was used to

[16] R. Hill, "A Theory of the Yielding and Plastic Flow of Anisotropic Metals," Proc. Roy. Soc., (London) Ser. A, 193, pp. 281-297 (1948).

see if the yield strengths in the direction normal to the rolling plane could be calculated using the yield strengths in the rolling and transverse directions and their corresponding k values. The relationship as developed is that the yield strength in one direction, I, is proportional to the yield strength in a second direction, J, and that the constant of proportionality is the square root of the ratio k_{ij}/k_{ji}.

$$I = \sqrt{k_{ij}/k_{ji}}\ J$$

Since experimentally determined yield strengths are available for the transverse and rolling directions, this relationship was checked by calculating the transverse direction yield strengths from the rolling direction yield strengths. The calculated yield strengths for the transverse direction were, in almost every case, considerably different from the experimental values. Then, using the empirical approach, the yield strengths were assumed to be functions of the ratio of the k's with an exponent of one, $(k_{ij}/k_{ji})^{1}$, instead of an exponent of one half, $(k_{ij}/k_{ji})^{1/2}$. In almost every instance the equation with an exponent of one yielded a better fit with the experimental data, but it still broke down for several of the schedules.

It must be noted that the yield strength relationships were derived by Hill on the basis of two assumptions which are known not to hold in this case. The first assumption is that the material under analysis has a sharp and definite yield point as does a mild steel. There is no true "yield point" in Zircaloy-2 and the yield strength measured is the stress at 0.2% offset strain. The stress at 0.1% offset strain was also used to try to verify the yield strength-k value relationships, but with very little more success than was experienced with the 0.2% offset yield strength. Both the characteristic curvature (or shape) of the load-elongation curves for Zircaloy-2 and the accuracy of the data prohibit the use of equations based on the proportional limit.

The second assumption made in the derivation of the yield strength correlation equation is that the tensile axes of the specimens are the principal axes of anisotropy; that is, the components of the preferred orientation are centered on the stress axes. Of the twelve schedules for which the preferred orientation was determined, only for one material (Schedule 9) are the tensile axes the principal axes of anisotropy.

This same fact, the noncorrespondence of the tensile axes (the major fabrication directions) and the principal axes of anisotropy, was also shown by the plots of the values of the k's versus the angle of the specimen tensile axis from one of the major fabrication directions (Figs. 38–41).

The positions and intensities of the sheet direction reference axes with respect to crystallographic axes for a number of schedules are shown in Figs. 50–53 and in Appendix V. For Schedule 9, Fig. 50, all three of the major sheet directions lie on the principal axes of anisotropy. The experimental value of the transverse direction yield strength for Schedule 9 is 55 700 psi, while those calculated by using $(k_{yx}/k_{xy})^{1/2}$ and $(k_{yx}/k_{xy})^{1}$ are 54 500 and 55 600 psi, respectively. It will be noticed that the transverse direction and rolling direction reference axes are split between the poles of the $\{10\bar{1}0\}$ and $\{11\bar{2}0\}$ planes. If, however, as in Schedule 5 (Fig. 51), one of the rolling plane axes shares a maximum at one of the crystallographic poles with the normal direction reference axes, the yield strength calculations will not be valid because of the differences in deformation characteristics between the two orientations. The known slip system, $\{10\bar{1}0\}$ $\langle\bar{1}2\bar{1}0\rangle$, in zirconium cannot operate when the basal poles are parallel to the stress axis, and, if no basal slip occurs, all deformation must be by twinning. Therefore, it is obvious that a very special set of conditions are necessary for the prediction of properties in one direction from those in another direction. To circumvent some of the difficulties herein encountered in the yield strength calculations, it would be necessary to first obtain the preferred orientation of the material and thereby allow determination of the orientations of the mechanical property specimens which could be used to check the yield strength equations.

DATA SUMMARY

The purpose of this section is to combine, for ease of comparison, some of the more pertinent data (from this report and in Metallurgy of Zircaloy-2 Part I)[17] for each of the Zircaloy-2 materials produced by the

[17] P. L. Rittenhouse and M. L. Picklesimer, Metallurgy of Zircaloy-2 Part I The Effects of Fabrication Variables on the Anisotropy of Mechanical Properties, ORNL-2944 (Oct., 1960).

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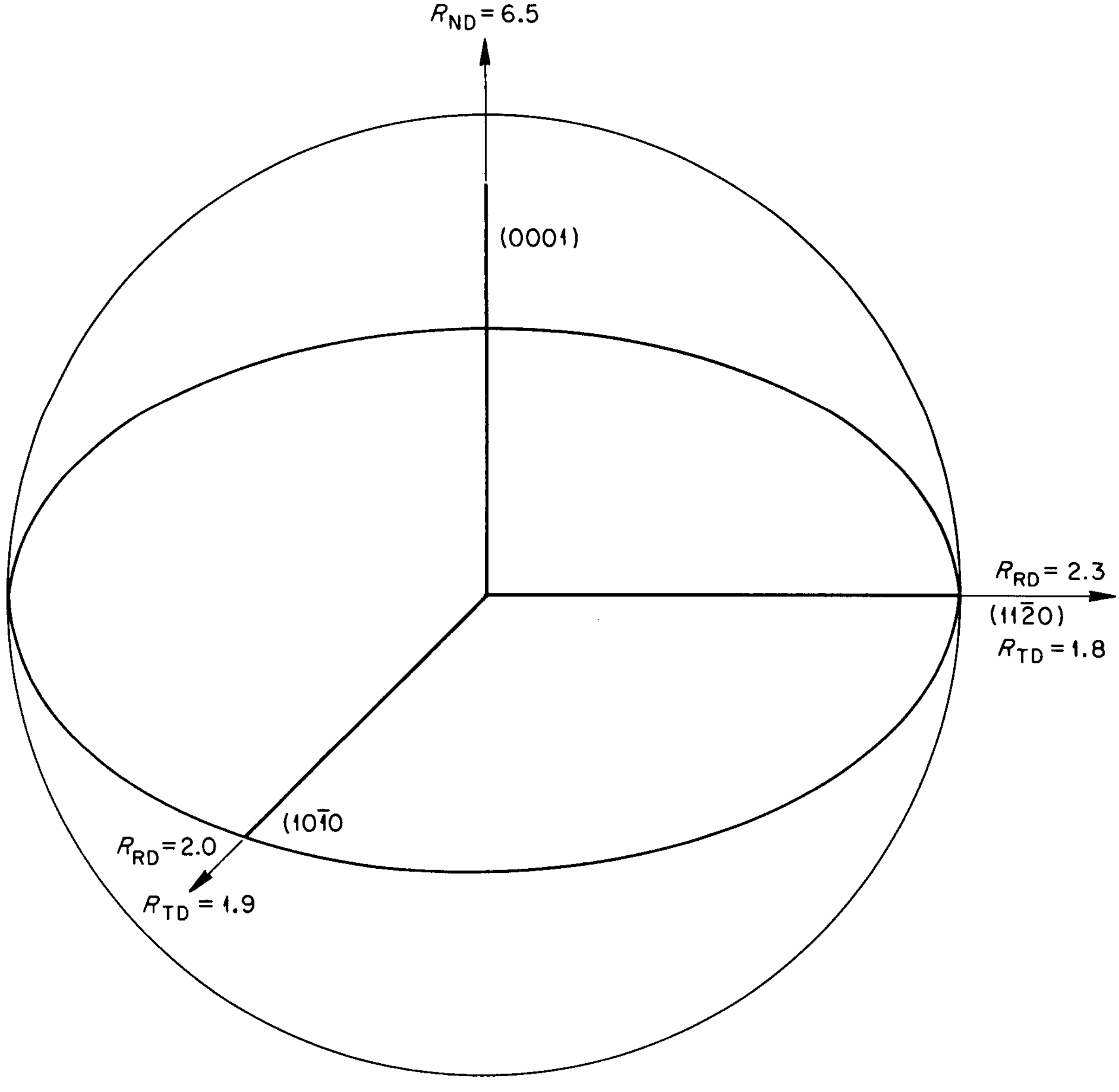

Fig. 50. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 9 Zircaloy-2.

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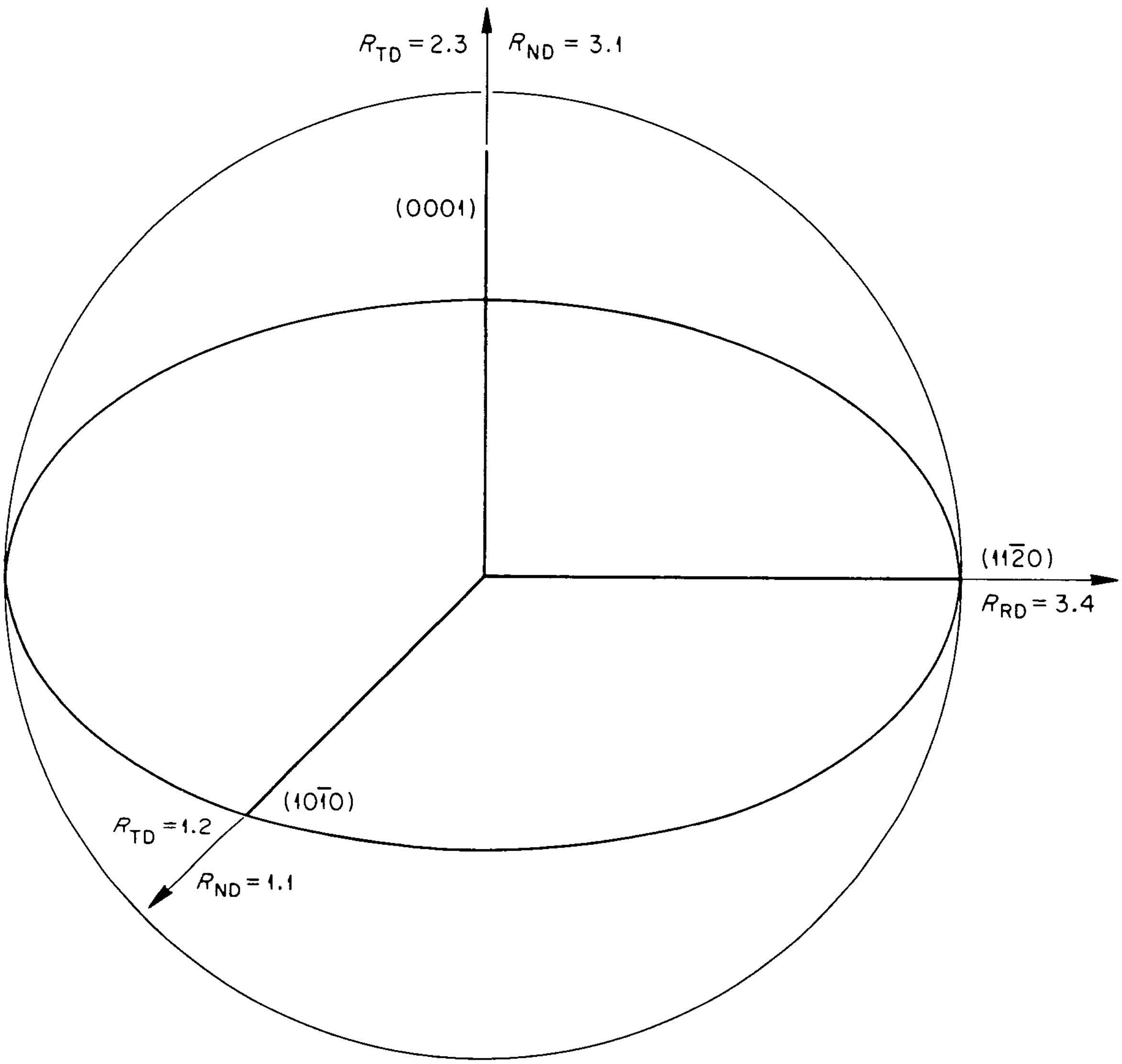

Fig. 51. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 5 Zircaloy-2.

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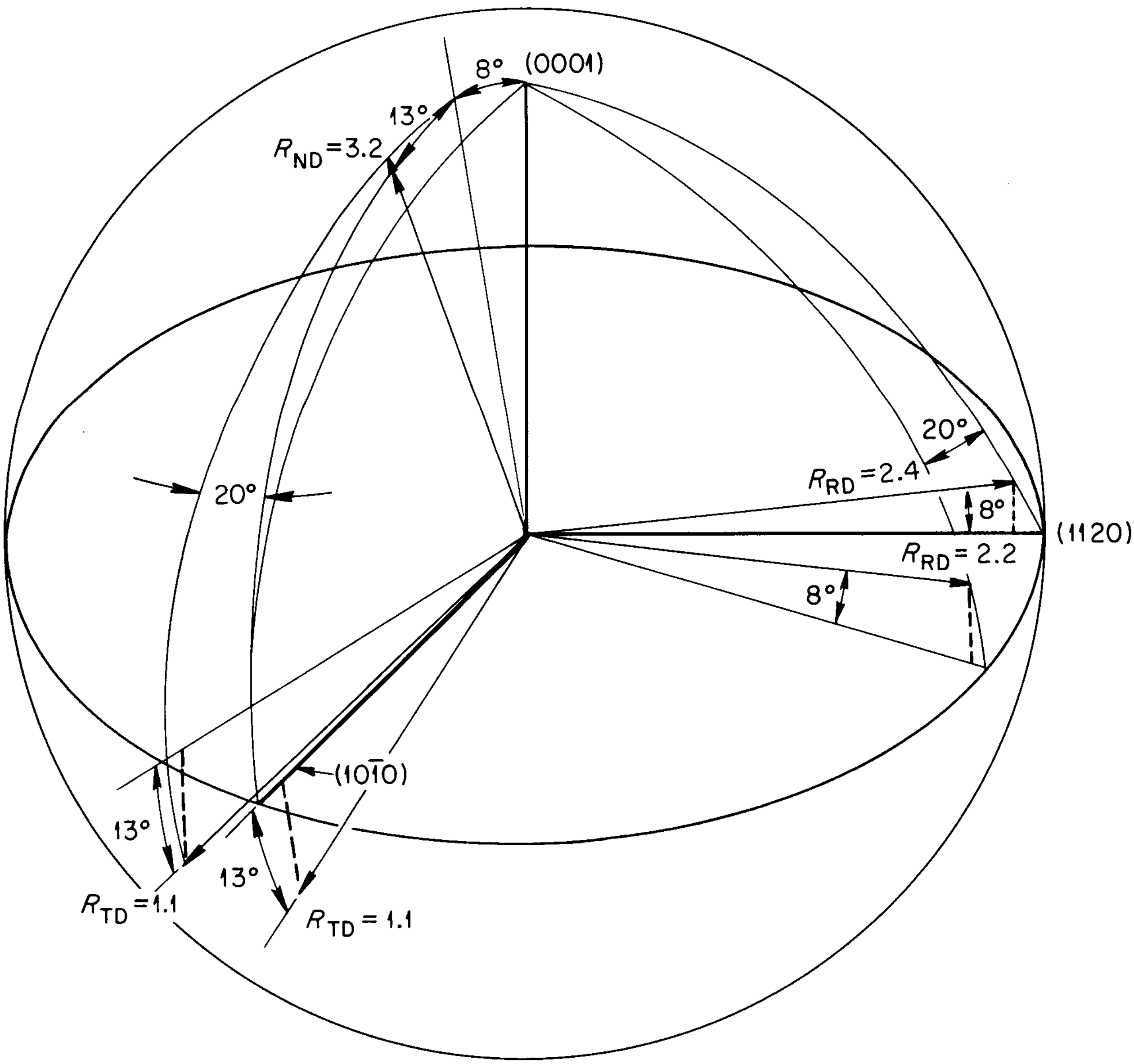

Fig. 52. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 2 Zircaloy-2.

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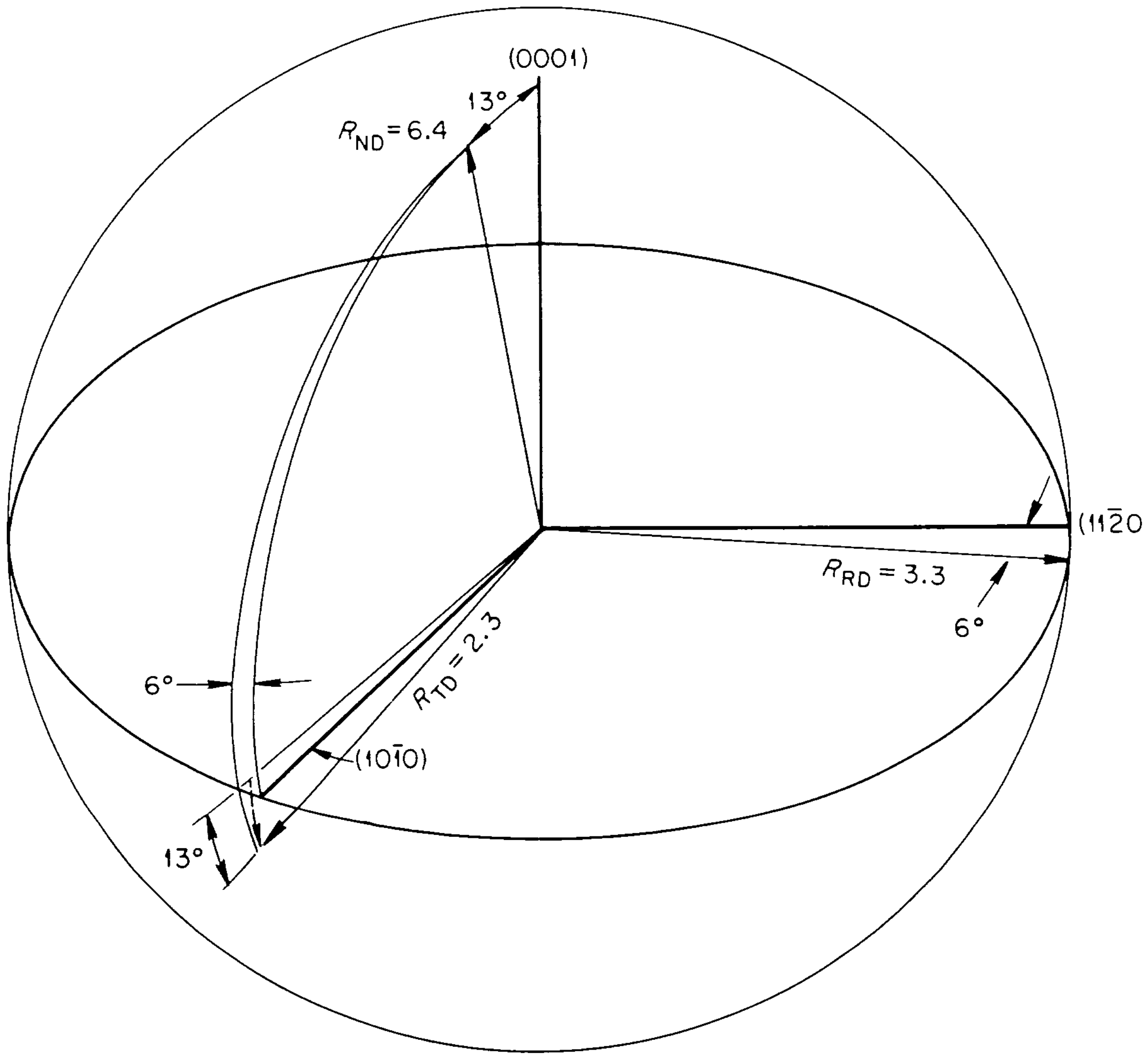

Fig. 53. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 8 Zircaloy-2.

various fabrication schedules. The maximum and minimum yield and tensile strengths with the corresponding k's for each maximum and minimum and for the major sheet directions are presented in semi-tabular form. Also included are the major components of texture presented as intensities at simple planes.

Schedule 1

Max TS[18] = 77.8[19] - RD[20], k_{xy} = 0.520. Max YS = 64.6 - 67-1/2°RD, k_{az} = 0.320.
Min TS = 72.4 - 45° RD, k_{bz} = 0.312. Min YS = 56.6 - 22-1/2° RD, k_{cz} = 0.324.
For major sheet directions: k_{xy} = 0.520, k_{yx} = 0.773, and k_{zx} = 0.759.
The major texture components are: RD - R$\{21\bar{3}0\}$ = 2.0; TD - R(0001) = 2.3, R$\{11\bar{2}0\}$ = 2.3; ND - R(0001) = 2.1.

Schedule 2

Max TS = 77.1 and Max YS = 69.1 - TD, k_{yx} = 0.692.
Min YS = 56.3 - RD, k_{xy} = 0.619. Min TS = 74.3 - 45° RD, k_{bz} = 0.351.
ND - k_{zx} = 0.580.
Texture components: RD - R$\{11\bar{2}0\}$ = 2.0, TD - R$\{10\bar{1}0\}$ = 1.1, and ND - R(0001) = 2.2.

Schedule 3

Max YS = 70.2 - TD, k_{yx} = 0.715. Max TS = 81.2 - 22-1/2° RD, k_{cz} = 0.331.
Min YS = 61.9 - RD, k_{xy} = 0.700. Min TS = 77.5 - 45° RD, k_{bz} = 0.321.
ND - k_{zx} = 0.518.
Texture components: RD - R$\{21\bar{3}0\}$ = 2.8, TD - R$\{10\bar{1}0\}$ = 1.3, and ND - R(0001) = 4.0.

Schedule 4

Max TS = 74.5 - 22-1/2° RD, k_{cz} = 0.291. Max YS = 61.4 - TD, k_{yx} = 0.700.
Min TS = 72.1 - 67-1/2° RD, k_{az} = 0.236. Min YS = 52.2 - RD, k_{xy} = 0.665.
ND - k_{zx} = 0.540.
Texture components: RD - R$\{21\bar{3}0\}$ = 3.5, TD - R$\{21\bar{3}0\}$ = 1.5, and ND - R(0001) = 2.5.

---

[18]TS - Tensile Strength, YS - Yield Strength

[19]All strength values are in units of 1000 psi.

[20]RD - Rolling Direction, TD - Transverse Direction, ND - Normal Direction.

<u>Schedule 5</u>

RD TS = 80.2 and RD YS = 62.4, k_{xy} = 0.700.

TD TS = 79.5 and TD YS = 73.0, k_{yx} = 0.756. k_{zx} = 0.570.

Texture components: RD - R$\{11\bar{2}0\}$ = 3.4, TD - R(0001) = 2.3, and ND - R(0001) = 3.1.

<u>Schedule 6</u>

Max TS = 72.9 - RD, k_{xy} = 0.739. Max YS = 62.6 - TD, k_{yx} = 0.812.

Min TS = 66.8 - 45° RD, k_{bz} = 0.190. Min YS = 54.8 - 22-1/2° RD, k_{cz} = 0.211.

ND - k_{zx} = 0.604.

Texture components: RD - R$\{21\bar{3}0\}$ = 2.9 and R$\{11\bar{2}0\}$ = 2.8, TD - R$\{11\bar{2}0\}$ = 1.9, and ND - R(0001) = 3.8.

<u>Schedule 7</u>

RD TS = 82.0 and RD YS = 56.0, k_{xy} = 0.707.

TD TS = 78.6 and TD YS = 68.4, k_{yx} = 0.851, k_{zx} = 0.703.

Texture components: RD - R$\{10\bar{1}0\}$ = 3.1 and R$\{21\bar{3}0\}$ = 3.0, TD - R(0001) = 2.5, and ND - R(0001) = 3.3.

<u>Schedule 8</u>

Max TS = 68.0 and Max YS = 58.3 - TD, k_{yx} = 0.884.

Min TS = 65.3 - 67-1/2° RD, k_{az} = 0.116. Min YS = 53.7 - 22-1/2° RD, k_{cz} = 0.115.

For major sheet directions: k_{xy} = 0.885, k_{yx} = 0.884, and k_{zx} = 0.498.

Texture components: RD - R$\{21\bar{3}0\}$ = 2.8 and R$\{11\bar{2}0\}$ = 2.7, TD - R$\{21\bar{3}0\}$ = 2.2, and ND - R(0001) = 5.6.

<u>Schedule 9</u>

RD TS = 68.3 and RD YS = 53.3, k_{xy} = 0.855.

TD YS = 55.7 and TD TS = 67.0, k_{yx} = 0.888. k_{zx} = 0.573.

Texture components: RD - R$\{11\bar{2}0\}$ = 2.3, R$\{21\bar{3}0\}$ = 2.3, TD - R$\{hki0\}$ = 1.9, and ND - R(0001) = 6.5.

<u>Schedule 10</u>

RD TS = 75.0 and RD YS = 57.0, k_{xy} = 0.678.

TD TS = 73.5 and TD YS = 66.6, k_{yx} = 0.784, k_{zx} = 0.633.

Texture components: RD - R$\{10\bar{1}0\}$ = 2.4, TD - R$\{10\bar{1}0\}$ = 1.8, and ND - R(0001) = 2.4.

Schedule 11

Max TS = 72.9 and Min YS = 52.1 - RD, k_{xy} = 0.530.

Max YS = 62.6 - TD, k_{yx} = 0.650.

Min TS = 71.8 - 45° RD, k_{bz} = 0.390.

k_{zx} = 0.622.

Schedule 12

Max TS = 74.7 and Min YS = 52.5 - RD, k_{xy} = 0.592.

Min TS = 70.8 - 45° RD, k_{bz} = 0.298.

Max YS = 62.7 - TD, k_{yx} = 0.709.

k_{zx} = 0.627.

Schedule 13

Max TS = 72.9 - 45° RD, k_{bz} = 0.267.

Min TS = 70.9 and Max YS = 59.0 - TD, k_{yx} = 0.741.

Min YS = 55.5 - RD, k_{xy} = 0.735.

k_{zx} = 0.508.

Schedule 14

Min TS = 69.1 and Min YS = 58.6 - TD, k_{yx} = 0.780.

Max TS = 75.7 - RD, k_{xy} = 0.544.

Max YS = 63.6 - 45° RD, k_{bz} = 0.390.

k_{zx} = 0.748.

Schedule 15

Max TS = 74.4 and Min YS = 56.3 - RD, k_{xy} = 0.570.

Max YS = 65.0 - TD, k_{yx} = 0.662.

Min TS = 72.6 - 45° RD, k_{bz} = 0.386.

k_{zx} = 0.596.

Schedule 16

Max TS = 73.9 and Min YS = 57.5 - RD, k_{xy} = 0.634.

Max YS = 60.5 and Min TS = 71.7 - 45° RD, k_{bz} = 0.320.

k_{yx} = 0.695 and k_{zx} = 0.568.

Schedule 17

RD TS = 80.2 and RD YS = 57.2, k_{xy} = 0.620.

TD YS = 69.8 and TD TS = 77.4, k_{yx} = 0.733.

k_{zx} = 0.627.

Schedule 18

RD TS = 77.6 and RD YS = 54.7, k_{xy} = 0.531.

TD YS = 69.4 and TD TS = 74.9, k_{yx} = 0.693.

k_{zx} = 0.666.

Schedule 62

RD TS = 75.8 and RD YS = 55.8, k_{xy} = 0.586.

TD TS = 74.2 and TD YS = 63.2, k_{yx} = 0.611.

Texture components: RD - R$\{11\bar{2}0\}$ = 2.5, TD - R[25° from (0001)] = 2.0, and ND - R[5° from (0001)] = 3.0.

Schedule J

Max TS = 78.1 - TD, k_{yx} = 0.600.

Min TS = 74.3 - 45° RD, k_{bz} = 0.554.

Min YS = 52.0 - RD, k_{xy} = 0.304.

Max YS = 71.0 - 67-1/2° RD, k_{az} = 0.625.

k_{zx} = 0.774.

Texture components: RD - R$\{11\bar{2}0\}$ = 3.5, TD - R(0001) = 5.1, and ND - R$\{10\bar{1}0\}$ = 2.1.

CONCLUSIONS AND RECOMMENDATIONS

It is unlikely that, with an inherently anisotropic material like Zircaloy-2, a true state of isotropy can be reached with any fabrication procedure. Anisotropic behavior, however, is not always detrimental, and in many cases is actually beneficial. Since the particular application of any material is the factor which determines whether isotropy or a particular degree of anisotropy is to be preferred, no recommendation as to the fabrication schedule which will yield Zircaloy-2 of 'ultimate' properties will be made. Instead, conclusions regarding the control of anisotropy and the effects of the fabrication variables on the state of anisotropy will be given.

A. Preferred Orientation of Zircaloy-2

1. Although considerable differences in axis density and exact position existed, the distribution of the reference axes (the major sheet directions) with respect to crystallographic axes was similar for most of the schedules studied.

2. The preferred orientation of Zircaloy-2 produced by the ORNL-HRP Metallurgy fabrication schedule with no cross rolling (Schedule 62) was weak compared to that of most of the other schedules investigated.

3. A high degree of preferred orientation, with R = 5.5 at the basal poles for the transverse direction, was developed when a Zircaloy-2 ingot (after initial lengthening and flattening along the ingot axis) with the ingot axis in the transverse direction was fabricated by the ORNL-HRP Metallurgy schedule (Schedule J).

4. When Zircaloy-2 was fabricated by the ORNL-HRP Metallurgy procedure and the final low α reduction was at 90° to the major rolling direction (Schedule 10), the major effect found on the preferred orientation was the exclusion of the pole of the basal plane from the transverse direction.

5. If the β heat treatment used in the ORNL-HRP Metallurgy fabrication procedure before the final low α reduction was replaced by an α anneal (Schedules 8 and 9), a high degree of preferred orientation was developed with basal poles in the normal direction and with the $\{hki0\}$ poles evenly distributed between the rolling and transverse direction reference axes. Thus, a state of pseudoisotropy, or isotropy only in the plane of the plate, existed.

6. The effect of two versus one intermediate β heat treatments (Schedule 1 versus Schedule 3) on the preferred orientation was to cause a decrease in the intensity of basal poles parallel to the normal direction, an increase in the intensity of basal poles parallel to the transverse direction, and a decrease in $\{hki0\}$ pole density in the rolling direction.

7. Water quenching instead of air cooling from two β heat treatments (Schedule 2 versus Schedule 1), produced a preferred orientation, intermediate in degree of perfection to those produced by air cooling after one and two β heat treatments (Schedules 1 and 3), but with an absence of basal poles parallel to the transverse direction.

8. A final low α reduction of 70 versus 25% (Schedule 6 versus Schedule 4) caused an increase in the intensity of basal poles in the normal direction, a decrease of basal pole intensity in the transverse direction, and an over-all increase in the perfection of the texture.

9. When a high rather than a low α final reduction temperature was used (Schedule 7 versus Schedule 6), the basal pole intensity in the transverse direction was increased from $R = 0.4$ to $R = 2.5$ while that in the normal direction remained approximately constant at $R \simeq 3.5$.

B. Strain-Strain Analysis

1. Zircaloy-2 specimens of circular cross section did not neck (or deform) uniformly when strained; the originally circular cross sections became elliptical wherever plastic strain had occurred.

2. The ellipticity observed was characteristic of each experimental schedule of Zircaloy-2 and varied with the specimen tensile axis in each schedule.

3. The natural contractile strains observed for the Zircaloy-2 tensile specimens were linear functions of the natural axial tensile strain ($\bar{\epsilon}_{ij} = k_{ij}\, \bar{\epsilon}_{ii}$ and $\bar{\epsilon}_{ik} = k_{ik}\, \bar{\epsilon}_{ii}$) for all strains > 0.03, the values of k_{ij} and k_{ik} remaining constant after this strain was reached.

4. Values of k_{zx} and k_{zy} can be calculated from relationships involving the experimentally determined values of k_{xy}, k_{xz}, k_{yx}, and k_{yz}, thus determining all values necessary for characterization of the state of anisotropy of strain by the k or strain-strain analysis.

5. The reference axes for the k or strain-strain analysis should be those of the principal axes of anisotropy, not those of the major fabrication directions.

6. The deviation of the values of the k's from 0.5, the value for an isotropic material, may be used as a measure of the degree of anisotropy.

7. Round, rather than sheet-type, tensile specimens must be used if the strain-strain (k) analysis is to be performed.

8. For Zircaloy-2 produced by the standard straight-rolling ORNL-HRP Metallurgy fabrication schedule, the strain behavior was identical whether the ingot axis was in the normal direction (Schedule 12) or the rolling direction (Schedule 62) of the finished plate. If the ingot axis was turned from the rolling direction to the transverse direction after some degree of hot working (to flatten and lengthen the ingot), the strain behavior was changed appreciably and depended on the degree of reduction before and after the axis rotation.

9. Increased percent final reduction (Schedule 12 versus Schedule 11 and Schedules 4, 5, and 6) above 25% increased the anisotropy of strain behavior, increasing both k_{xy} and k_{yx}.

10. Unidirectional cross rolling at 1000°F after β heat treatment (Schedule 10) caused an increase in anisotropy (k_{xy} and k_{yx} increased) over that for straight-rolled material (Schedule 62). While the deviation of the values of the k's for Schedule 10 from those for isotropy became larger in both the transverse and rolling directions, k_{zx} and k_{zy} were approximately the same as those for the straight-rolled material.

11. Cross rolling after β heat treatment by rotating the plate 90° after each pass had a more significant effect than did unidirectional cross rolling after β heat treatment. A state of pseudoisotropy (isotropy of strain behavior in the rolling plane) was produced by rotational cross rolling. The strain behavior in the rolling plane was, however, quite different from that occurring in the direction normal to the rolling plane.

12. Rotational cross rolling at a temperature in the α field before β heat treatment (Schedule 14) caused an increase in anisotropy over that for straight-rolled material (Schedule 11). Although there was little difference in the strain behavior for the rolling directions of the two schedules, there was a considerable difference in the transverse and normal direction strain behavior of the two materials.

13. When a Zircaloy-2 ingot, after initial lengthening along the ingot axis, was turned so that the ingot axis was in the transverse direction of the plate and then fabricated to the ORNL-HRP Metallurgy schedule, the contractile strain in the normal direction for a longitudinal tensile specimen was greater than the contractile strain in the transverse direction. Only for this material, Schedule J, was this observed. If, however, considerable reduction (from 12-in.-diam ingot to 4-in. slab) was done before ingot axis rotation (Schedule 18), the strain behavior in the longitudinal direction approached isotropic behavior ($k_{xy} \simeq k_{xz} \simeq 0.5$).

14. The effect of rotational cross rolling versus straight rolling at a temperature in the β field before β heat treatment and final low α reduction (Schedule 16 versus Schedule 15) was to increase slightly the deviation of the values of the k's from the isotropic value (0.5) in the plane of the plate and to increase the degree of pseudoisotropy.

15. When the final α reduction step was not preceded by a β heat treatment (Schedules 8 and 9), the strain behavior in any direction in the rolling plane was isotropic but quite different from that in the normal direction. A state of pseudoisotropy existed.

16. The strain behavior of Schedules 1 and 2 was consistent with the pole figures for these materials, but it did not explain the differences which existed between these materials, which differed from one another only in the rate of quench from the β heat treatment temperature.

17. Decreasing the number of β heat treatments before final low α reduction from two (Schedule 1) to one (Schedule 3) caused a shift in the plane of pseudoisotropy from the transverse-normal plane (Schedule 1) to the transverse-longitudinal plane (Schedule 3).

18. Examination of the values of the k's for specimens with tensile axis orientations intermediate to the rolling and transverse directions shows that the major sheet fabrication directions are not necessarily the principal axes of anisotropy.

19. There is little, if any, effect of increased temperature of testing (room temperature to 572°F) on the strain behavior of Zircaloy-2 except for the expected increase in the amount of total strain.

20. A simple qualitative relationship between the inverse pole figures and the strain-strain analyses exists which allows prediction of the major features of either one from a knowledge of the other.

21. Approximate true stress-true strain diagrams for Zircaloy-2 fabricated to various schedules can be correlated, but only qualitatively so, with the values of the k's for each material.

22. Although the possibility exists for the prediction of mechanical properties in one direction from a knowledge of the properties in another direction and the values of the k's for both directions, it may be realized only when a very special set of conditions are met (the principal axes of anisotropy coincide with the reference axes).

A number of very interesting and important problems for further study are suggested from the results of the present investigation:

1. The anisotropy of strain behavior found in Zircaloy-2 plate and sheet has also been seen in Zircaloy-2 and α titanium rod and has been observed to vary from the center to the surface of the rod. Since one of the principal uses of Zircaloy-2 is as tubing, there is a need to extend the study of the effects of fabrication variables on anisotropy to rod and tube products.

2. It is believed that the anisotropy which is observed with uniaxial loading will become an even more serious consideration when multiaxial loads are applied. The obtention of information on the behavior of Zircaloy-2 (and other anisotropic metals) under conditions of multiaxial loading is a necessity.

3. The possibility of the prediction of a tensile property from the strain-strain analysis has been presented. A test of this possibility might be accomplished by use of either single crystal or polycrystalline materials of known preferred orientation. Because of the difficulty in obtaining single crystals of Zircaloy-2, it would probably be best to cut mechanical property specimens with tensile axes parallel to the principal axes of anisotropy found by a preferred orientation determination.

4. Of more fundamental interest would be the determination of the strain-strain and strength properties of single crystals of iodide zirconium, iodide titanium, or other anisotropic pure metals whose deformation systems are well established and of which single crystals of reasonable size can be obtained.

5. A logical extension of the investigation would be to use single crystals to determine the effects of impurities and alloying additions on the deformation systems and on the resulting anisotropy.

It is hoped that this investigation has shown the importance of an awareness of the misconceptions and misinterpretations which can arise in the analysis of anisotropic materials by the common or conventional mechanical property testing techniques, and that it has shed some light on the plastic flow of anisotropic metals. The importance of the effects of fabrication variables on the resulting preferred orientation and anisotropy of mechanical properties has been demonstrated, and it is trusted that the results of the investigation will serve to alert those concerned in the production and use of Zircaloy-2, or other anisotropic materials, to the problems which exist and which must be considered, especially so where multiaxial loading will be experienced.

APPENDIX I

Details of the Zircaloy-2 Experimental Fabrication Schedules

Experimental Schedules[21]

Schedule 1 - Two Intermediate β Heat Treatments, Air Cooled

1. Forged from 4-in. diam to 1-in. plate from 1950°F
2. Annealed 30 min at 1832°F, air cooled
3. Rolled to 1/2 in. at 1000°F
4. As (2)
5. Rolled to 11/32 in. at 1000°F
6. As (2)
7. Rolled to 1/4 in. at 1000°F
8. Annealed 30 min at 1425°F, air cooled

Schedule 2 - Two Intermediate β Heat Treatments, Water Quenched

1. Forged from 4-in. diam to 1-in. plate from 1950°F
2. Annealed 30 min at 1832°F, water quenched
3. Rolled to 1/2 in. at 1000°F
4. As (2)
5. Rolled to 11/32 in. at 1000°F
6. As (2)
7. Rolled to 1/4 in. at 1000°F
8. Annealed 30 min at 1425°F, air cooled

Schedule 3 - One Intermediate β Heat Treatment

1. Forged from 4-in. diam to 1-in. plate from 1950°F
2. Annealed 30 min at 1832°F, air cooled
3. Rolled to 11/32 in. at 1000°F
4. As (2)
5. Rolled to 1/4 in. at 1000°F
6. Annealed 30 min at 1425°F, air cooled

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[21] Schedules 1–10: All 1-in. plate machined on both surfaces to 13/16 in. before further fabrication to remove forging defects and oxygen-contaminated surface layer.

Schedule 4 - β Reduction Plus 25% Low α Reduction

1. Forged from 4-in. diam to 1-3/4-in. plate from 1950°F
2. Forged to 1 in. at 1475°F
3. Annealed 30 min at 1832°F, air cooled
4. Rolled to 11/32 in. at 1832°F
5. As (2)
6. Rolled to 1/4 in. at 1000°F
7. Annealed 30 min at 1425°F, air cooled

Schedule 5 - β Reduction Plus 50% Low α Reduction

1. Forged from 4-in. diam to 1-in. plate from 1950°F
2. Rolled to 1/2 in. at 1832°F
3. Annealed 30 min at 1832°F, air cooled
4. Rolled to 1/4 in. at 1000°F
5. Annealed 30 min at 1425°F, air cooled

Schedule 6 - β Reduction Plus 70% Low α Reduction

1. Forged from 4-in. diam to 1-in. plate from 1950°F
2. Annealed 30 min at 1832°F, air cooled
3. Rolled to 1/4 in. at 1000°F
4. Annealed 30 min at 1425°F, air cooled

Schedule 7 - β Reduction Plus High α Reduction

1. Forged from 4-in. diam to 1-in. plate from 1950°F
2. Annealed 30 min at 1832°F, air cooled
3. Rolled to 1/4 in. at 1475°F
4. Annealed 30 min at 1425°F, air cooled

Schedule 8 - α Worked, 70% Low α

1. Forged from 4-in. diam to 1-3/4-in. plate from 1950°F
2. Forged to 1 in. at 1475°F
3. Annealed 30 min at 1475°F, air cooled
4. Rolled to 1/4 in. at 1000°F
5. Annealed 30 min at 1425°F, air cooled

Schedule 9 - α Worked, 50% Low α

1. Forged from 4-in. diam to 1-3/4-in. plate from 1950°F
2. Forged to 1 in. at 1475°F
3. Rolled to 1/2 in. at 1475°F
4. Annealed 30 min at 1475°F, air cooled
5. Rolled to 1/4 in. at 1000°F
6. Annealed 30 min at 1425°F, air cooled

Schedule 10 - Cross Rolled After β Heat Treatment

1. Forged from 4-in. diam to 1-3/4-in. plate from 1950°F
2. Forged to 1 in. at 1475°F
3. Annealed 45 min at 1832°F, water quenched
4. Rolled to 1/2 in. at 1400°F
5. Annealed 30 min at 1832°F, water quenched
6. Cross rolled to 9/32 in. at 1000°F
7. Annealed 30 min at 1425°F, air cooled

Schedule 11 - HRP Commercial Fabrication Procedure - 25% Final Reduction

1. Rolled from 1-1/2-in. ingot slice to 3/4 in. from 1900°F
2. Rolled to 3/8 in. at 1450°F
3. Annealed 30 min at 1850°F, air cooled
4. Rolled to 9/32 in. at 1000°F
5. Annealed 30 min at 1425°F, air cooled

Schedule 12 - Modified HRP Commercial Fabrication Procedure - 40% Final Reduction

1. Rolled from 1-1/2-in. ingot slice to 3/4 in. from 1900°F
2. Rolled to 15/32 in. at 1450°F
3. Annealed 30 min at 1850°F, air cooled
4. Rolled to 9/32 in. at 1000°F
5. Annealed 30 min at 1425°F

Schedule 13 - Cross Rolled After β Heat Treatment

1. Rolled from 1-1/2-in. ingot slice to 3/4 in. from 1900°F
2. Rolled to 15/32 in. at 1450°F
3. Annealed 30 min at 1850°F, air cooled
4. Rolled to 9/32 in. at 1000°F, turning plate 90° after each pass (first and last passes in cross-rolling direction)
5. Annealed 30 min at 1425°F, air cooled

Schedule 14 - Cross Rolled During High α Reduction

1. Rolled from 1-1/2-in. ingot slice to 3/4 in. from 1900°F
2. Rolled to 3/8 in. at 1450°F, turning plate 90° after each pass
3. Annealed 30 min at 1850°F, air cooled
4. Rolled to 9/32 in. at 1000°F in original rolling direction
5. Annealed 30 min at 1425°F, air cooled

Schedule 15 - Straight-Rolled β Reduction

1. Rolled from 1-1/2-in. ingot slice to 3/8 in. from 1900°F
2. Annealed 30 min at 1850°F, air cooled
3. Rolled to 9/32 in. at 1000°F
4. Annealed 30 min at 1425°F, air cooled

Schedule 16 - Cross-Rolled β Reduction

1. Rolled from 1-1/2-in. ingot slice to 3/8 in. from 1900°F, turning plate 90° after each pass
2. Annealed 30 min at 1850°F, air cooled
3. Rolled to 9/32 in. at 1000°F in original direction of rolling
4. Annealed 30 min at 1425°F, air cooled

Commercially Fabricated Schedules

Schedule 17 - HRP Commercial Fabrication Procedure (Jessop Steel Company)

1. Rolled from 12-in.-diam ingot to 4-in. slab from 1850°F
2. Rolled to 3/4 in. at 1800°F
3. Rolled to 27/64 in. at 1450°F
4. Annealed 45 min at 1850°F, water-spray quench
5. Rolled to 9/32 in. at 1100°F
6. Annealed 30 min at 1425°F, air cooled

Schedule 18 - HRP Commercial Fabrication Procedure for Wide Plate (Jessop Steel Company)

1. Rolled from 12-in.-diam ingot to 4-in. slab at 1850°F
2. Slab turned and rolled to 7/8 in. at 1800°F (ingot axis in transverse direction)
3. Rolled to 25/32 in. at 1450°F
4. Annealed 45 min at 1850°F, water-spray quench
5. Rolled to 1/2 in. at 1100°F
6. Annealed 30 min at 1425°F, air cooled

Schedule 62 - HRP Commercial Fabrication Procedure (Item 62 - Allegheny-Ludlum Steel Company)

1. Rolled from 12-in.-diam ingot to 1-in. plate at 1900°F
2. Rolled to 5/16 in. at 1450°F
3. Annealed 30 min at 1832°F, air cooled
4. Rolled to 1/4 in. at 1000°F
5. Annealed 30 min at 1425°F, air cooled

Schedule J - HRP Commercial Fabrication Procedure for Wide Plate (Jessop Steel Company)

1. Rolled from 12-in.-diam by 38-in.-long ingot to 52 in. long at 1850°F
2. Slab turned and rolled to 3/4 in. at 1850°F (ingot axis in transverse direction)
3. Rolled to 7/16 in. at 1450°F
4. Annealed 30 min at 1832°F, water-spray quench
5. Rolled to 5/16 in. at 1000°F
6. Annealed 30 min at 1425°F, air cooled

APPENDIX II

Calculation of β and r_β

Calculation of β and r_β

The equation of the ellipse in Fig. 54 is

$$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1 \tag{16}$$

and the equation of the tangent to the ellipse is

$$y = mx \pm \sqrt{m^2b^2+a^2} \tag{17}$$

where a = major axis of the ellipse

b = minor axis of the ellipse

m = slope of the tangent to the ellipse.

Substituting for y from Eq. 17 in Eq. 16

$$\frac{x^2}{b^2} + \frac{(mx + \sqrt{m^2b^2+a^2})^2}{a^2} = 1 \tag{18}$$

Expanding and solving for x

$$x = \mp \frac{mb^2 \sqrt{m^2b^2+a^2}}{m^2b^2+a^2} \tag{19}$$

Substituting for x from Eq. 19 in Eq. 17

$$y = \pm \frac{a^2 \sqrt{m^2b^2+a^2}}{m^2b^2+a^2} \tag{20}$$

The tangent of the angle β is

$$\tan \beta = \frac{x}{y} \tag{21}$$

and substituting from Eqs. 19 and 20

$$\tan \beta = - \frac{mb^2}{a^2} \tag{22}$$

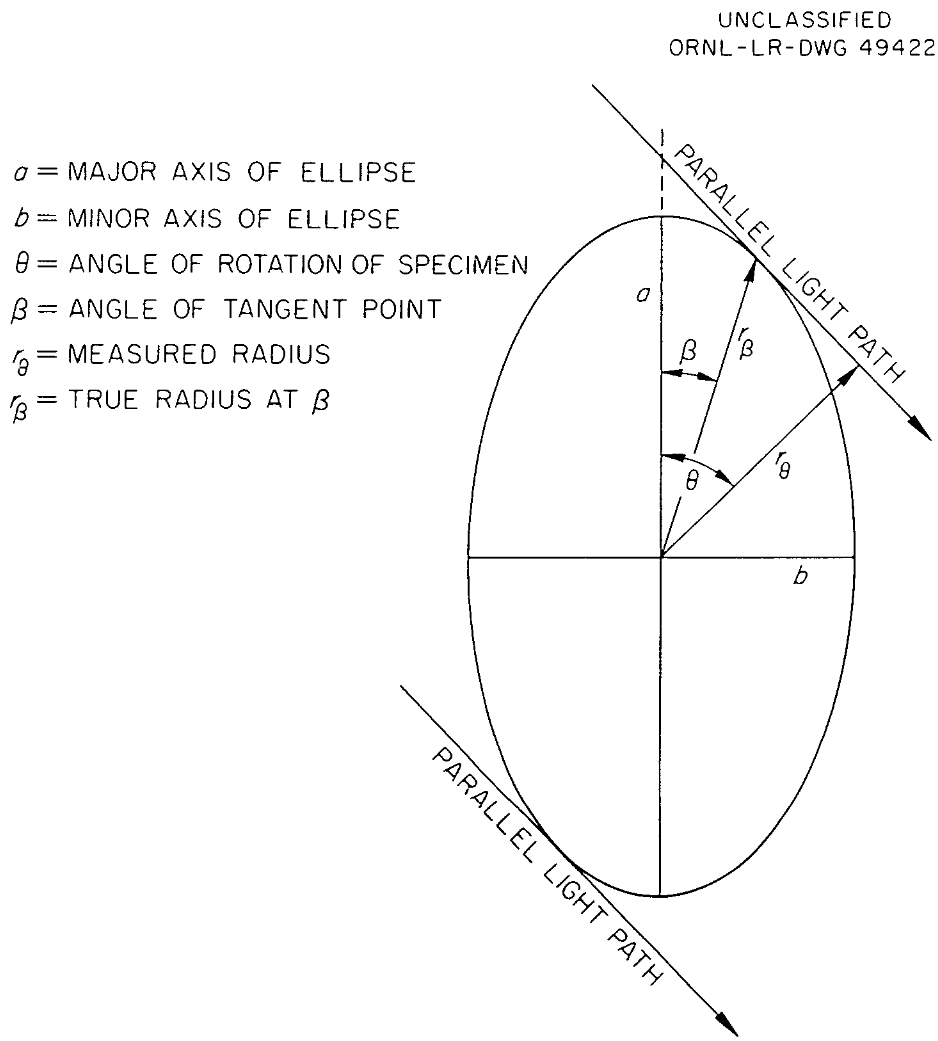

Fig. 54. Dimensions Involved in the Ellipticity Calculations.

Since $m = (-\tan\theta)$

θ = Angle of rotation of the specimen (23)

$$\tan\beta = \frac{b^2 \tan\theta}{a^2} \tag{24}$$

$$\beta = \tan^{-1}\left(\frac{b^2 \tan\theta}{a^2}\right) \tag{25}$$

Solving for r_β in terms of r_θ, θ, and β

$$r_\beta = \frac{r_\theta}{\cos(\theta-\beta)} \tag{26}$$

θ, r_θ, a, and b are measured directly on the specimen so that β and r_β may be calculated by Eqs. 25 and 26.

Proof of the ellipticity of the tensile specimens after plastic strain is obtained by plotting values of r_β calculated by Eq. 26 on a polar plot of the perimeter of a true ellipse having as major and minor axes those measured on the tensile specimen. Such plots are presented in Figs. 2 and 3 in the body of the report.

$$r_\theta = \sqrt{\frac{a^2 b^2}{a^2 \sin^2\theta + b^2 \cos^2\theta}}$$

(27)

$$r_\theta = \sqrt{\frac{a^2}{\frac{a^2}{b^2}\sin^2\theta + \cos^2\theta}}$$

TABLE VI

CALCULATION OF β AND r_β FOR SPECIMEN 2-31 AT THE FRACTURE

a = 0.0488 in., b = 0.0416 in., b^2/a^2 = 0.7252

θ	r_θ	tan θ	tan β	β (deg-min)	θ-β (deg-min)	cos (θ-β)	r_β
0	0.0488	0.00000	0.00000	0	0	1.00000	0.0488
5	0.0488	0.08749	0.06345	3-38	1-22	0.99972	0.0488
10	0.0487	0.17633	0.12787	7-17	2-43	0.99888	0.0488
15	0.0483	0.26795	0.19431	11-0	4-0	0.99756	0.0484
20	0.0482	0.36397	0.26395	14-47	5-13	0.99586	0.0484
25	0.0479	0.46631	0.33820	18-41	6-19	0.99393	0.0482
30	0.0475	0.57735	0.41868	22-43	7-17	0.99193	0.0479
35	0.0469	0.70021	0.50781	26-55	8-5	0.99006	0.0474
40	0.0464	0.83910	0.60849	31-19	8-41	0.98854	0.0470
45	0.0456	1.00000	0.72520	35-57	9-3	0.98755	0.0462
50	0.0452	1.1918	0.86426	40-50	9-10	0.98723	0.0458
55	0.0442	1.4281	1.0357	46-1	9-0	0.98769	0.0448
60	0.0437	1.7321	1.2561	51-29	8-31	0.98897	0.0442
65	0.0433	2.1445	1.5552	57-16	7-44	0.99091	0.0438
70	0.0428	2.7475	1.9980	63-25	6-35	0.99341	0.0430
75	0.0424	3.7321	2.7065	69-43	5-17	0.99575	0.0426
80	0.0420	5.6713	4.1127	76-20	3-40	0.99795	0.0421
85	0.0416	11.430	8.2889	83-7	1-53	0.99946	0.0416
90	0.0419	∞	∞	90	0	1.00000	0.0419
95	0.0422	11.430	8.2889	96-53	1-53	0.99946	0.0422
100	0.0428	5.6713	4.1127	103-40	3-40	0.99795	0.0428
105	0.0429	3.7321	2.7065	110-17	5-17	0.99575	0.0431
110	0.0432	2.7475	1.9980	116-35	6-35	0.99341	0.0435
115	0.0435	2.1445	1.5552	122-44	7-44	0.99091	0.0439
120	0.0437	1.7321	1.2561	128-31	8-31	0.98897	0.0442
125	0.0443	1.4281	1.0357	134-0	9-0	0.98769	0.0448
130	0.0450	1.1918	0.86426	139-10	9-10	0.98723	0.0456
135	0.0456	1.00000	0.72520	144-3	9-3	0.98755	0.0462
140	0.0460	0.83910	0.60849	148-41	8-41	0.98854	0.0466
145	0.0464	0.70021	0.50781	153-5	8-5	0.99006	0.0468
150	0.0468	0.57735	0.41868	157-17	7-17	0.99193	0.0472
155	0.0472	0.46631	0.33820	161-19	6-19	0.99393	0.0475
160	0.0476	0.36397	0.26395	165-13	5-13	0.99586	0.0478
165	0.0482	0.26795	0.19431	169-0	4-0	0.99756	0.0483
170	0.0484	0.17633	0.12787	172-43	2-43	0.99888	0.0484
175	0.0486	0.08749	0.06345	176-22	1-22	0.99972	0.0486
180	0.0488	0.00000	0.00000	180	0	1.00000	0.0488

TABLE VII

CALCULATION OF r_θ OF TRUE ELLIPSE - SPECIMEN 2-31

$a = 0.0488$ in. $\quad a^2 = 0.00238 \quad a^2/b^2 = 1.380$

$b = 0.0416$ in. $\quad b^2 = 0.00172$

(1)	(2)	(3)	(4)	(5)	(6)	(7)
θ	$\cos^2\theta$	$\sin^2\theta$	$a^2/b^2 \sin^2\theta$	$a^2/b^2 \sin^2\theta + \cos^2\theta$	$a^2/(5)$	r_θ
0	1.00000	0.00000	0.00000	1.00000	0.00238	0.0488
10	0.96985	0.03015	0.04161	1.01146	0.00235	0.0485
20	0.88302	0.11698	0.16143	1.04445	0.00228	0.0477
30	0.75000	0.25000	0.34500	1.09501	0.00220	0.0469
40	0.58682	0.41318	0.57019	1.15701	0.00205	0.0453
50	0.41318	0.58682	0.80981	1.22299	0.00196	0.0442
60	0.25000	0.75000	1.03501	1.28501	0.00185	0.0430
70	0.11698	0.88302	1.21857	1.33555	0.00178	0.0422
80	0.03015	0.96985	1.33839	1.36854	0.00173	0.0416
90	0.00000	1.00000	1.38000	1.38000	0.00173	0.0416

APPENDIX III

Strain-Strain Curve Showing the Progression of the k's Toward
A Constant Value at Low Strains - Schedule J

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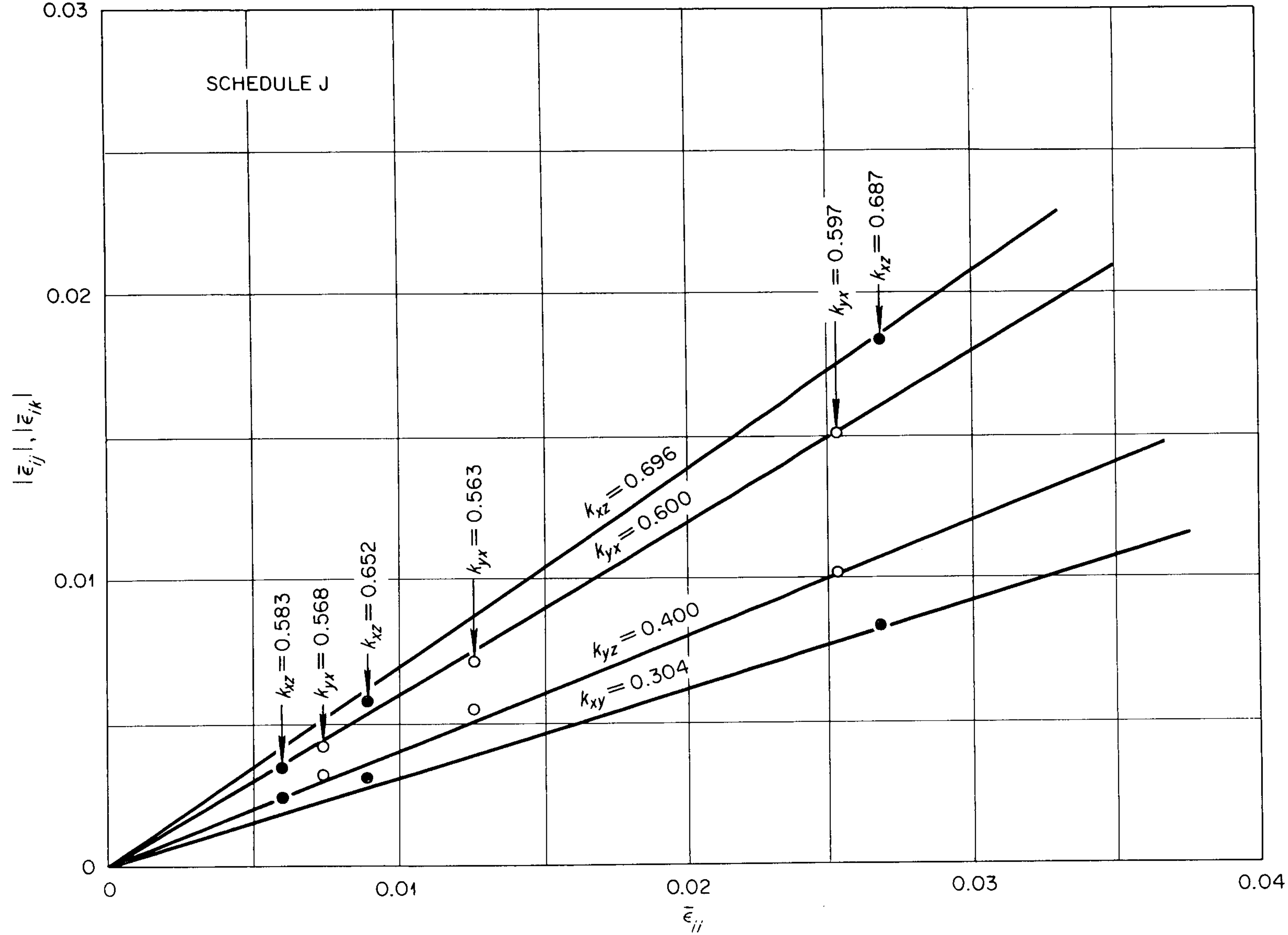

Fig. 55. Progression of k's Toward Constant Value at Low Strains.

APPENDIX IV

Calculation of k_{zx} and k_{zy}

The yield criterion for anisotropic materials given by Hill[22] has the form

$$2f = F(\sigma_{yy}-\sigma_{zz})^2 + G(\sigma_{zz}-\sigma_{xx})^2 + H(\sigma_{xx}-\sigma_{yy})^2 + 2L\tau_{yz}^2 + 2M\tau_{zx}^2 + 2Nt_{xy}^2 = 1 \qquad (28)$$

F, G, H, L, M, and N are constants characteristic of the state of anisotropy.

The equations relating the components of the strain-increment tensor to the stress components are:

$$d\bar{\epsilon}_{xx} = d\lambda\ [H(\sigma_{xx}-\sigma_{yy}) + G(\sigma_{xx}-\sigma_{zz})] \qquad (29)$$

$$d\bar{\epsilon}_{yy} = d\lambda\ [F(\sigma_{yy}-\sigma_{zz}) + H(\sigma_{yy}-\sigma_{xx})] \qquad (30)$$

$$d\bar{\epsilon}_{zz} = d\lambda\ [G(\sigma_{zz}-\sigma_{xx}) + F(\sigma_{zz}-\sigma_{yy})] \qquad (31)$$

In pure tension parallel to the principal x axis of anisotropy, the incremental strains at a certain stage are, with appropriate changes in subscript notation,

$$d\bar{\epsilon}_{xx}:d\bar{\epsilon}_{xy}:d\bar{\epsilon}_{xz} = (G + H):-H:-G \qquad (32)$$

Similarly, for tension parallel to the y and z principal axes of anisotropy

$$d\bar{\epsilon}_{yy}:d\bar{\epsilon}_{yz}:d\bar{\epsilon}_{yx} = (H + F):-F:-H \qquad (33)$$

$$d\bar{\epsilon}_{zz}:d\bar{\epsilon}_{zx}:d\bar{\epsilon}_{zy} = (F + G):-G:-F \qquad (34)$$

Since

$$\bar{\epsilon}_{ij} = k_{ij}\ \bar{\epsilon}_{ii} \qquad (35)$$

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[22] R. Hill, "A Theory of the Yielding and Plastic Flow of Anisotropic Metals," Proc. Roy. Soc., (London) Ser. A, 193, pp. 281–297 (1948).

$$d\bar{\epsilon}_{xx}:k_{xy}d\bar{\epsilon}_{xx}:k_{xz}d\bar{\epsilon}_{xx} = (G + H):-H:-G \tag{36}$$

or

$$1:k_{xy}:k_{xz} = (G + H):-H:-G \tag{37}$$

Similarly

$$1:k_{yz}:k_{yx} = (H + F):-F:-H \tag{38}$$

$$1:k_{zx}:k_{zy} = (F + G):-G:-F \tag{39}$$

Then

$$\frac{H}{G} = \frac{k_{xy}}{k_{xz}} \quad \frac{F}{H} = \frac{k_{yz}}{k_{yx}} \quad \frac{G}{F} = \frac{k_{zx}}{k_{zy}} \tag{40–42}$$

but

$$\frac{H}{G} \times \frac{F}{H} \times \frac{G}{F} = 1 \tag{43}$$

so that

$$\frac{k_{xy}}{k_{xz}} \times \frac{k_{yz}}{k_{yx}} \times \frac{k_{zx}}{k_{zy}} = 1 \tag{44}$$

$$\frac{k_{xy}\,k_{yz}\,k_{zx}}{k_{xz}\,k_{yx}\,k_{zy}} = 1$$

APPENDIX V

The Positions and Intensities of the Sheet Direction Reference Axes with Respect to Crystallographic Axes

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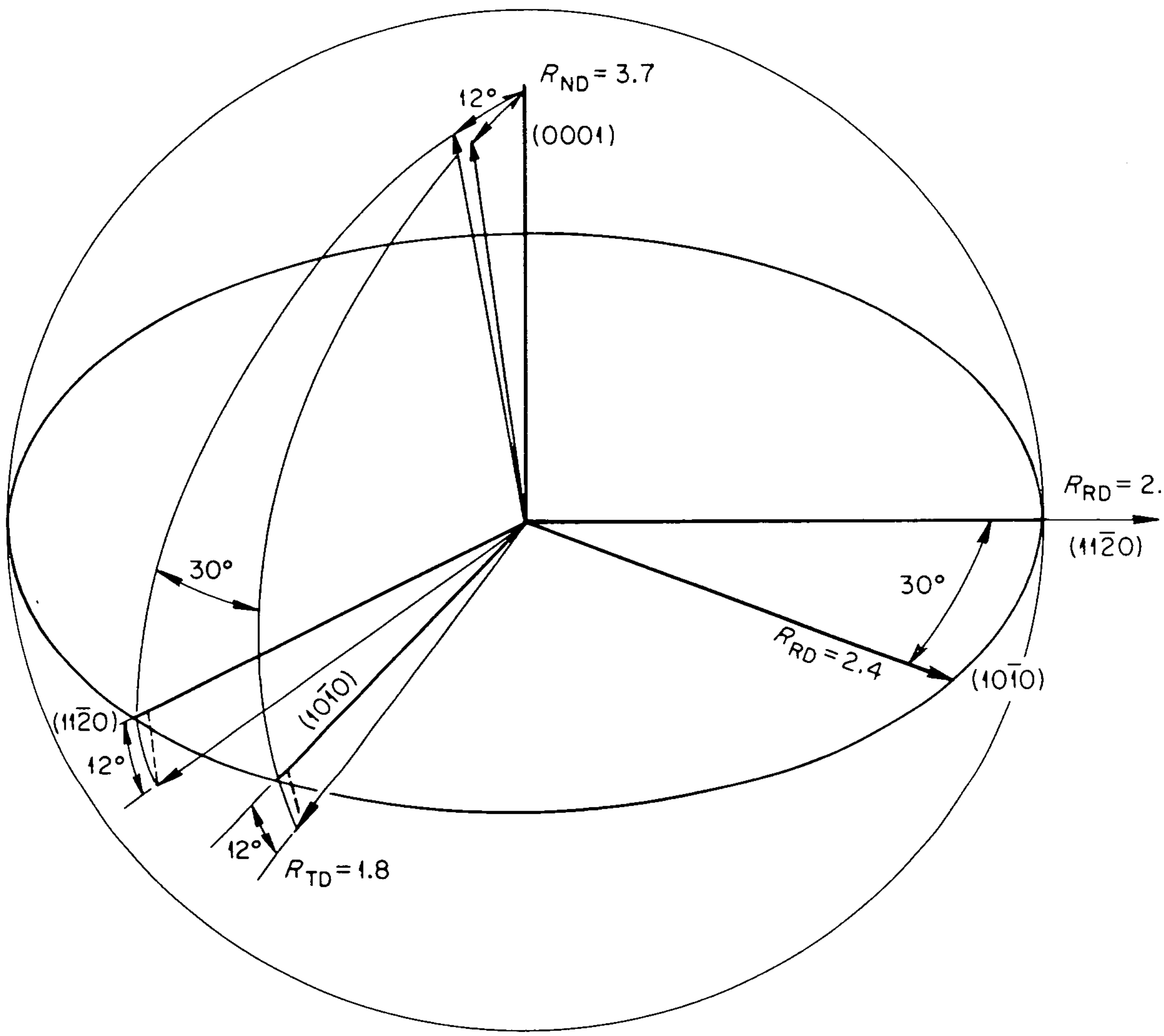

Fig. 56. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 10 Zircaloy-2.

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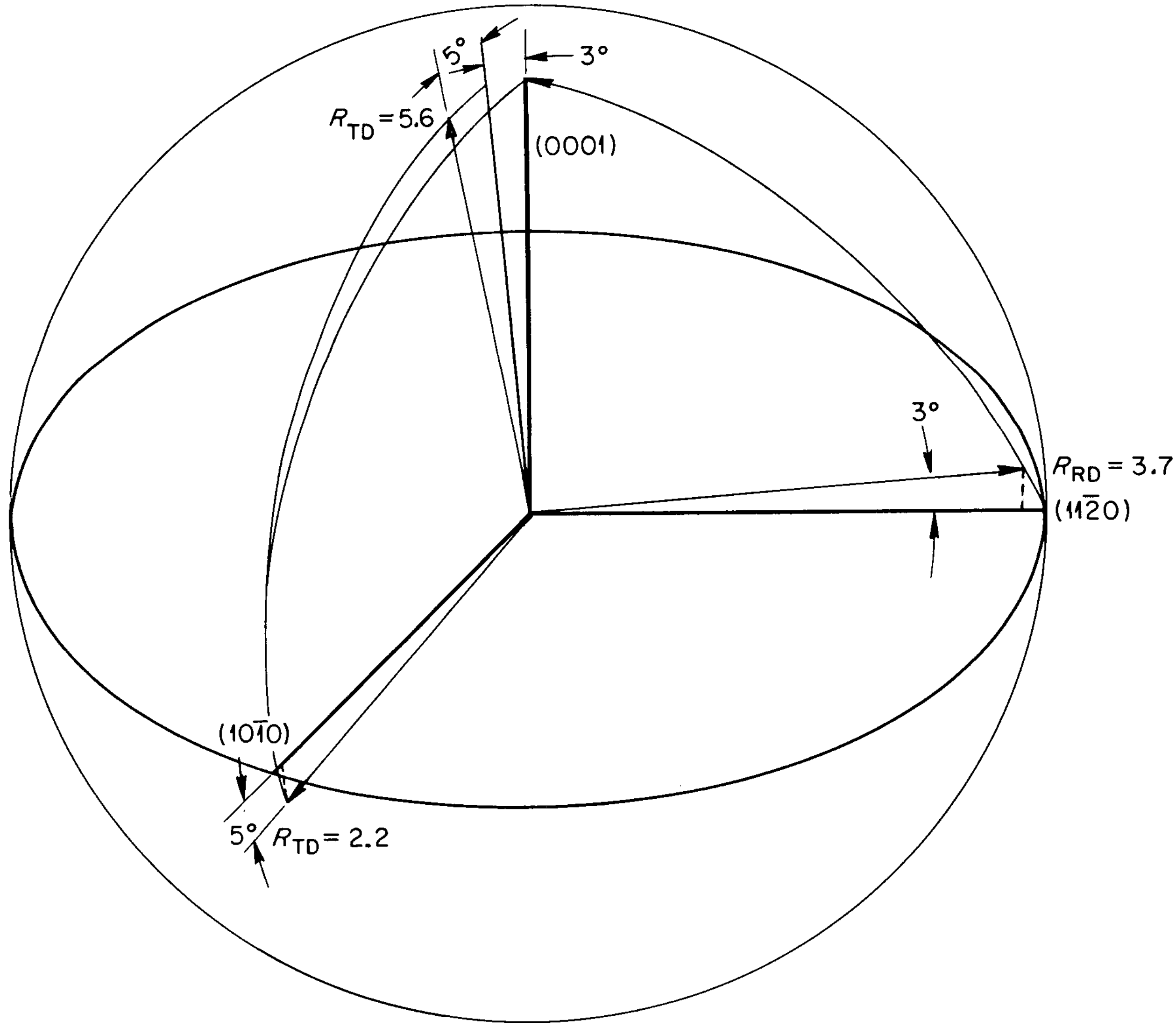

Fig. 57. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule J Zircaloy-2.

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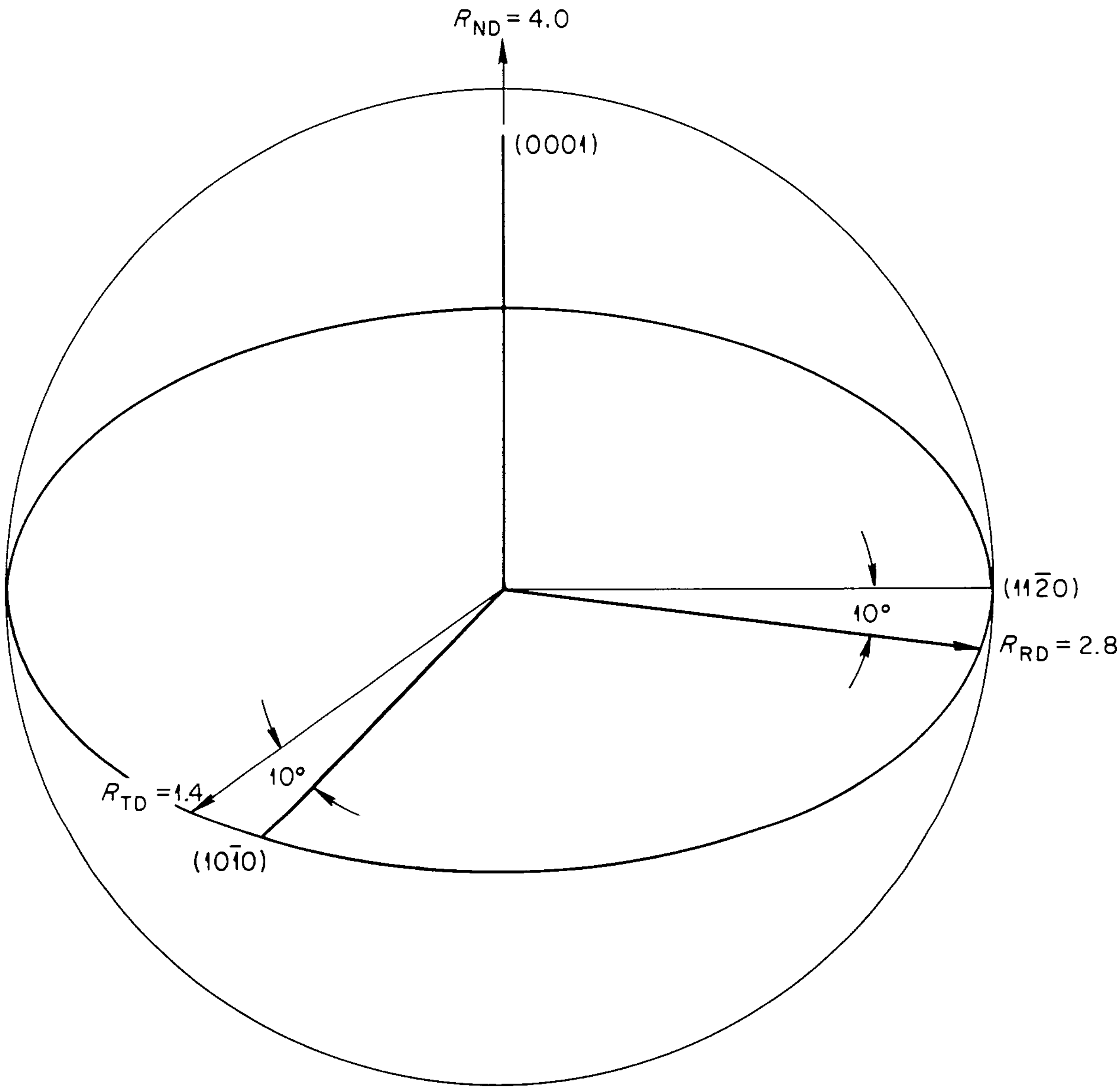

Fig. 58. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 3 Zircaloy-2.

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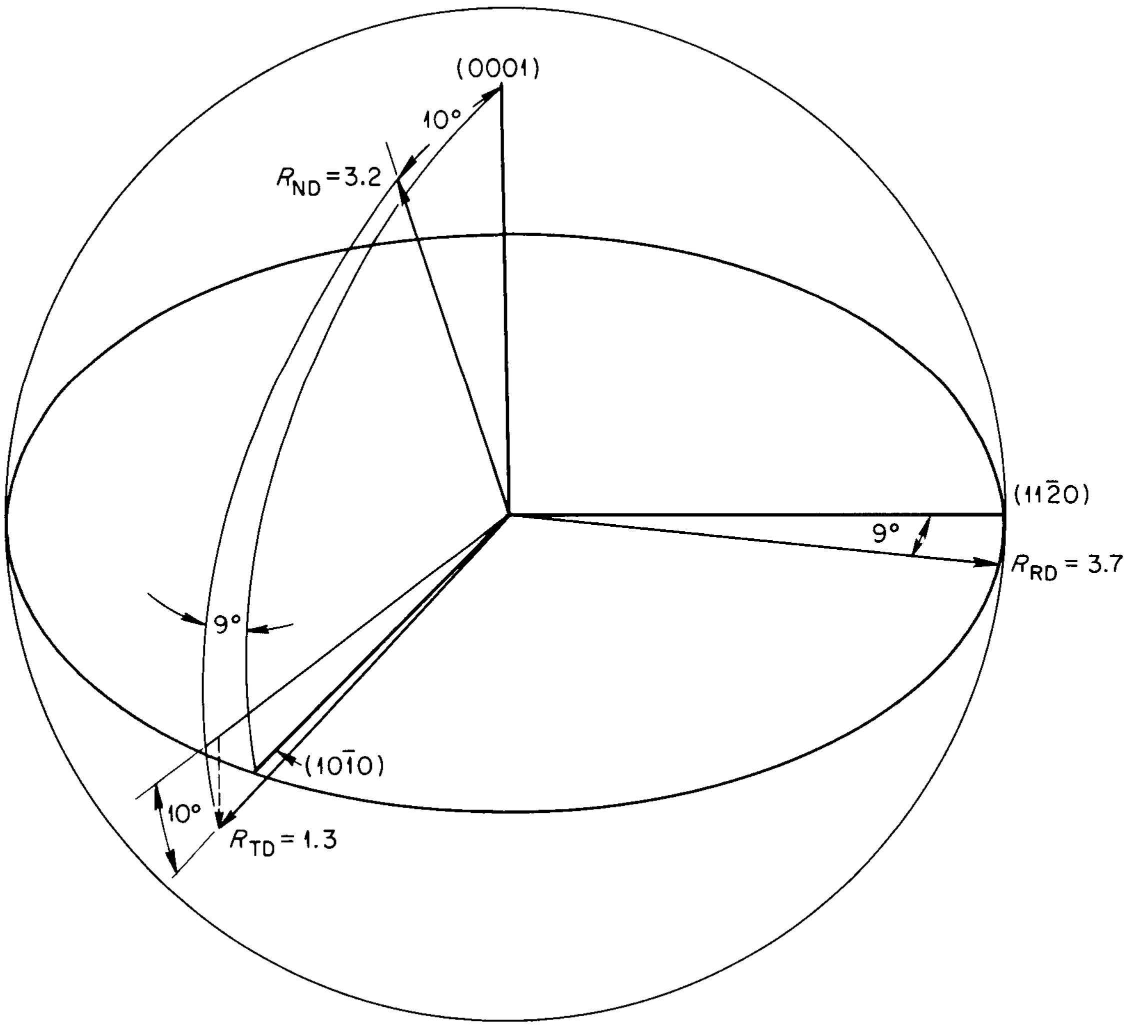

Fig. 59. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 4 Zircaloy-2.

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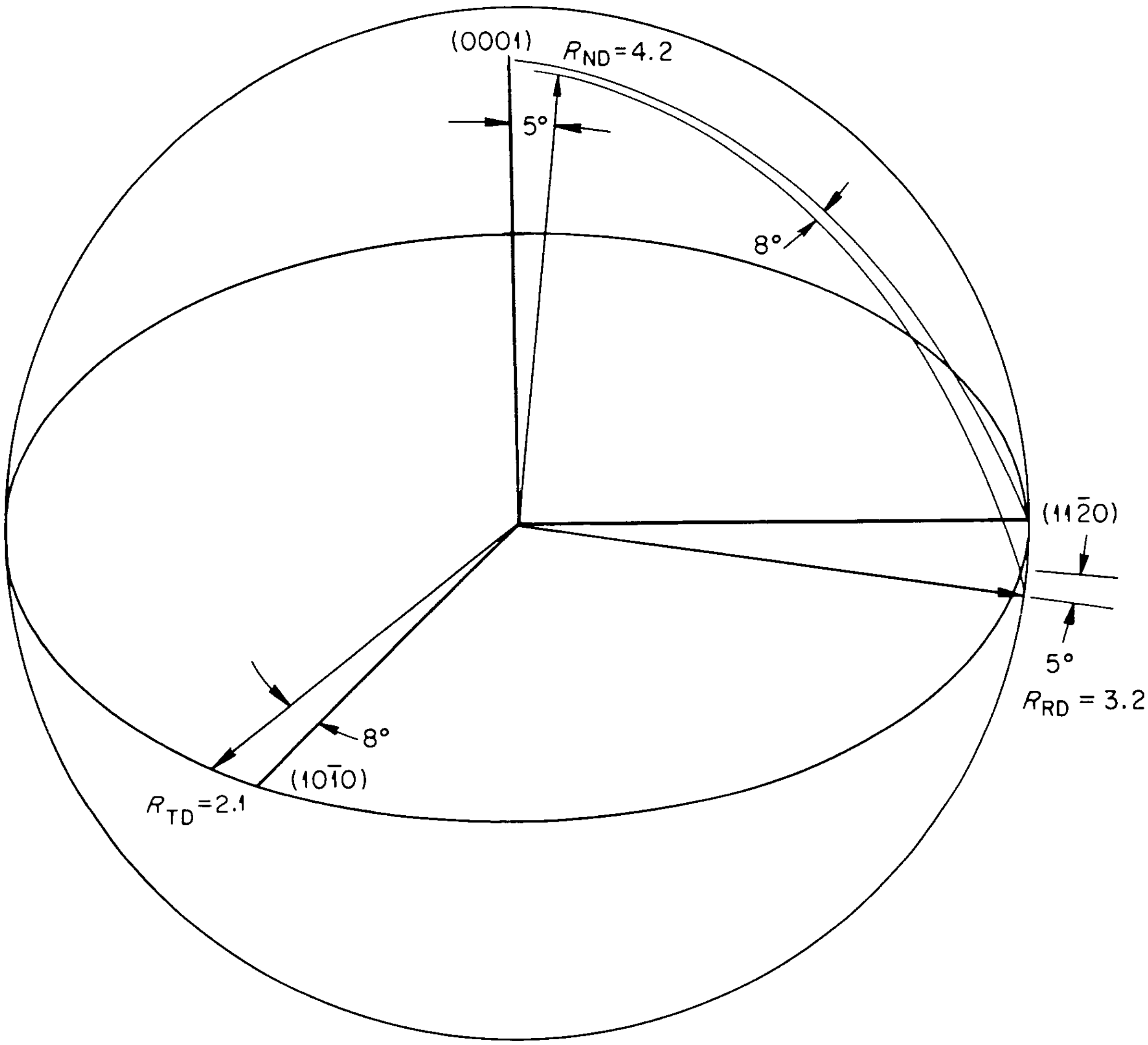

Fig. 60. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 6 Zircaloy-2.

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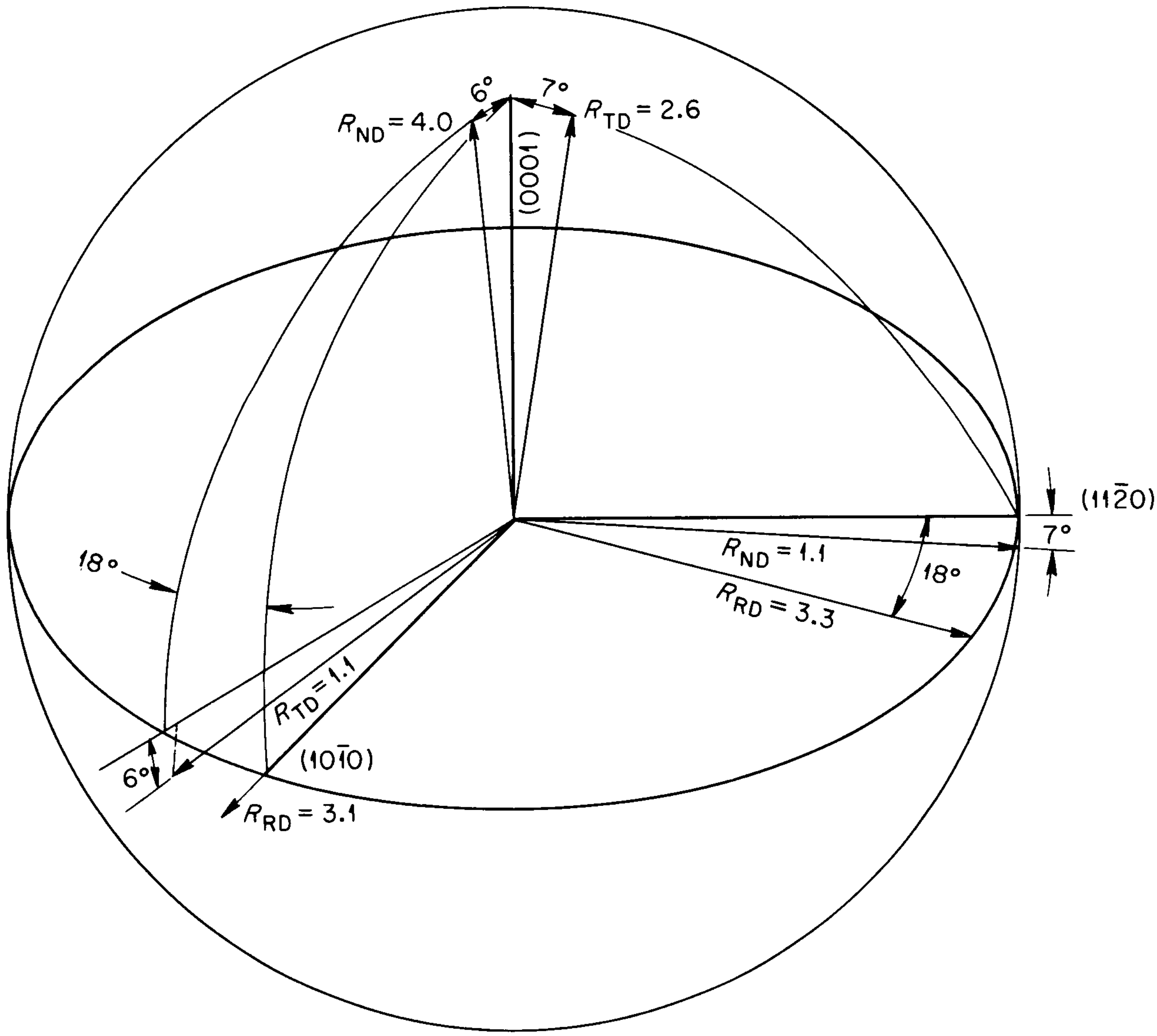

Fig. 61. The Position and Intensity of Sheet Direction Reference Axes with Respect to Crystallographic Axes. Schedule 7 Zircaloy-2.

APPENDIX VI

Experimental Data for Strain-Strain Calculations

Legend for Schedules 1–18, 62, and J

a: S - Short half of fractured tensile specimen.
L - Long half of fractured tensile specimen.

b: RD - Rolling direction.
TD - Transverse direction.
22.5° - 22.5° from RD.
45° - 45° from RD.
67.5° - 67.5° from RD.

c: Original diameter of tensile specimen.

d: Measured specimen thickness in the normal direction to the rolling plane. 2a is normally the major axis of the ellipse of cross section.

e: Measured specimen thickness in the plane of the plate 90° from 2a. 2b is normally the minor axis of the ellipse of cross section.

f: Natural axial tensile strain.

g: Natural contractile strain in the plane of the plate.

h: Natural contractile strain in the normal direction to the rolling plane.

SCHEDULE 1

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
1-1 S		Break	0.125	0.1027	0.0649	0.5734	0.8526	-0.6560	-0.1966
		0.0625		0.1146	0.0917	0.3274	0.3968	-0.3100	-0.0868
		0.1250		0.1187	0.1026	0.2206	0.2502	-0.1985	-0.0517
		0.2500		0.1208	0.1092	0.1558	0.1694	-0.1352	-0.0342
		0.3750		0.1211	0.1112	0.1382	-	-	-
	TD	0.5000		0.1217	0.1125	0.1238	-	-	-
1-1 L	Room	Break	0.125	0.1058	0.0700	0.5260	0.7471	-0.5801	-0.1670
	Temp.	0.0625		0.1158	0.0948	0.2974	0.3532	-0.2768	-0.0764
		0.1250		0.1186	0.1044	0.2076	0.2318	-0.1801	-0.0517
		0.2500		0.1206	0.1117	0.1379	0.1483	-0.1125	-0.0368
		0.3750		0.1215	0.1147	0.1081	0.1144	-0.0860	-0.0284
		0.5000		0.1219	0.1161	0.0942	0.0989	-0.0738	-0.0251
1-2 L		Break	0.121	0.1036	0.0717	0.4927	0.6794	-0.5240	-0.1554
		0.0625		0.1121	0.0927	0.2902	0.3421	-0.2667	-0.0754
		0.1250		0.1151	0.1015	0.2021	0.2357	-0.1857	-0.0500
		0.2500		0.1178	0.1101	0.1142	0.1213	-0.0944	-0.0269
		0.3750		0.1183	0.1131	0.0862	0.0900	-0.0674	-0.0226
	TD	0.5000		0.1191	0.1148	0.0661	0.0684	-0.0526	-0.0158
1-2 S	Room	Break	0.121	0.1026	0.0691	0.5158	0.7256	-0.5604	-0.1652
	Temp.	0.0625		0.1123	0.0914	0.2989	0.3554	-0.2808	-0.0746
		0.1250		0.1149	0.0993	0.2207	0.2494	-0.1978	-0.0516
		0.2500		0.1165	0.1041	0.1717	0.1885	-0.1506	-0.0379
		0.3750		0.1174	0.1069	0.1428	0.1551	-0.1241	-0.0310
		0.5000		0.1186	0.1108	0.1025	0.1080	-0.0880	-0.0200
1-4 L		Break	0.123	0.0997	0.0771	0.4919	0.6779	-0.4678	-0.2101
		0.0625		0.1113	0.0963	0.2916	0.3450	-0.2450	-0.1000
		0.1250		0.1148	0.1041	0.2101	0.2360	-0.1670	-0.0690
		0.2500		0.1175	0.1092	0.1519	0.1648	-0.1191	-0.0457
		0.3750		0.1192	0.1132	0.1081	0.1144	-0.0830	-0.0314
	67.5° Room Temp.	0.5000		0.1200	0.1153	0.0855	0.0893	-0.0646	-0.0247

SCHEDULE 1 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
1-4 S	67.5°	Break	0.123	0.1006	0.0792	0.4734	0.6419	-0.4408	-0.2011
	Room	0.0625		0.1112	0.0966	0.2900	0.3428	-0.2418	-0.1010
	Temp.	0.1250		0.1148	0.1031	0.2177	0.2456	-0.1766	-0.0690
		0.2500		0.1184	0.1101	0.1384	0.1499	-0.1110	-0.0389
		0.3750		0.1192	0.1128	0.1113	0.1179	-0.0865	-0.0314
		0.5000		0.1197	0.1137	0.1004	0.1058	-0.0786	-0.0272
1-6 L		Break	0.124	0.1003	0.0772	0.4964	0.6874	-0.4743	-0.2131
		0.0625		0.1106	0.0945	0.3203	0.3862	-0.2717	-0.1145
	45°	0.1250		0.1137	0.1002	0.2591	0.2988	-0.2131	-0.0857
	Room	0.2500		0.1159	0.1041	0.2153	0.2433	-0.1750	-0.0683
	Temp.	0.3750		0.1171	0.1062	0.1912	0.2122	-0.1560	-0.0572
		0.5000		0.1181	0.1081	0.1697	0.1869	-0.1374	-0.0495
1-6 S		Break	0.124	0.1012	0.0780	0.4866	0.6663	-0.4640	-0.2023
		0.0625		0.1107	0.0956	0.3117	0.3738	-0.2603	-0.1135
		0.1250		0.1132	0.1004	0.2608	0.3022	-0.2112	-0.0910
		0.2500		0.1162	0.1067	0.1936	0.2144	-0.1504	-0.0640
		0.3750		0.1175	0.1108	0.1533	0.1654	-0.1126	-0.0528
		0.5000		0.1187	0.1132	0.1261	0.1346	-0.0910	-0.0436
1-12 L		Break	0.124	0.1010	0.0807	0.4699	0.6351	-0.4300	-0.2051
		0.0625		0.1115	0.0979	0.2901	0.3428	-0.2365	-0.1063
		0.1250		0.1150	0.1042	0.2207	0.2492	-0.1740	-0.0752
	22.5°	0.2500		0.1177	0.1100	0.1580	0.1726	-0.1198	-0.0528
	Room	0.3750		0.1186	0.1126	0.1315	0.1407	-0.0973	-0.0444
	Temp.	0.5000		0.1199	0.1147	0.1056	0.1113	-0.0778	-0.0335
1-12 S		Break	0.124	0.1013	0.0797	0.4749	0.6448	-0.4425	-0.2023
		0.0625		0.1112	0.0974	0.2956	0.3508	-0.2418	-0.1090

SCHEDULE 1 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1152	0.1042	0.2193	0.2475	-0.1740	-0.0735
		0.2500		0.1177	0.1094	0.1626	0.1774	-0.1254	-0.0520
		0.3750		0.1190	0.1119	0.1340	0.1439	-0.1028	-0.0411
		0.5000		0.1200	0.1134	0.1150	0.1227	-0.0892	-0.0335
1-32 L		Break	0.124	0.0923	0.0920	0.4477	0.5943	-0.2990	-0.2953
		0.0625		0.1050	0.1032	0.2953	0.3502	-0.1837	-0.1665
		0.1250		0.1090	0.1090	0.2230	0.2525	-0.1290	-0.1235
	RD	0.2500		0.1124	0.1120	0.1813	0.2009	-0.1028	-0.0918
1-32 S	Room Temp.	Break	0.124	0.0945	0.0937	0.4241	0.5524	-0.2806	-0.2718
		0.0625		0.1061	0.1042	0.2810	0.3301	-0.1741	-0.1560
		0.1250		0.1106	0.1097	0.2109	0.2380	-0.1226	-0.1154
1-25 L		Break	0.125	0.0900	0.0872	0.4977	0.6886	-0.3601	-0.3285
		0.0625		0.1028	0.1017	0.3309	0.4918	-0.2063	-0.1955
		0.1250		0.1076	0.1046	0.2797	0.3281	-0.1782	-0.1499
	RD	0.2500		0.1099	0.1076	0.2432	0.2786	-0.1499	-0.1287
	302°F	0.3750		0.1122	0.1108	0.2044	0.2286	-0.1206	-0.1080
		0.5000		0.1147	0.1133	0.1683	0.1843	-0.0983	-0.0860
1-25 S		Break	0.125	0.0903	0.0864	0.5007	0.6945	-0.3693	-0.3252
		0.0625		0.1033	0.0999	0.3395	0.4148	-0.2241	-0.1907
		0.1250		0.1085	0.1065	0.2605	0.3017	-0.1602	-0.1416
		0.2500		0.1127	0.1107	0.2015	0.2251	-0.1215	-0.1036
1-28 S		Break	0.125	0.0910	0.0870	0.4933	0.6799	-0.3624	-0.3175
		0.0625		0.1048	0.1001	0.3286	0.3984	-0.2221	-0.1763
		0.1250		0.1101	0.1065	0.2496	0.2871	-0.1602	-0.1269
	RD	0.2500		0.1155	0.1132	0.1632	0.1782	-0.0992	-0.0790
	302°F	0.3750		0.1181	0.1160	0.1232	0.1315	-0.0747	-0.0568
		0.5000		0.1201	0.1188	0.0869	0.0909	-0.0509	-0.0400

SCHEDULE 1 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
1-28 L		Break	0.125	0.0935	0.0877	0.4752	0.6447	-0.3544	-0.2904
		0.0625		0.1053	0.1005	0.3227	0.3897	-0.2182	-0.1715
		0.1250		0.1092	0.1067	0.2543	0.2934	-0.1583	-0.1351
		0.2500		0.1121	0.1098	0.2122	0.2386	-0.1297	-0.1089
		0.3750		0.1141	0.1126	0.1778	0.1957	-0.1045	-0.0912
		0.5000		0.1168	0.1149	0.1411	0.1521	-0.0843	-0.0678
1-14 L		Break	0.125	0.0802	0.0739	0.6207	0.9694	-0.5256	-0.4438
		0.0625		0.1002	0.0960	0.3844	0.4851	-0.2640	-0.2211
		0.1250		0.1083	0.1041	0.2785	0.3264	-0.1830	-0.1434
	RD	0.2500		0.1136	0.1107	0.1952	0.2171	-0.1215	-0.0956
	572°F	0.3750		0.1162	0.1142	0.1507	0.1634	-0.0904	-0.0730
		0.5000		0.1182	0.1174	0.1119	0.1187	-0.0627	-0.0560
1-14 S		Break	0.125	0.0814	0.0741	0.6140	0.9518	-0.5230	-0.4289
		0.0625		0.1026	0.0968	0.3644	0.4531	-0.2557	-0.1975
		0.1250		0.1093	0.1052	0.2641	0.3067	-0.1725	-0.1342
		0.2500		0.1151	0.1119	0.1757	0.1932	-0.1107	-0.0825
		0.3750		0.1174	0.1150	0.1359	0.1461	-0.0834	-0.0627
1-18 L		Break	0.125	0.0785	0.0731	0.6328	1.0017	-0.5365	-0.4652
		0.0625		0.0980	0.0958	0.3991	0.5094	-0.2660	-0.2434
		0.1250		0.1057	0.1019	0.3107	0.3720	-0.2043	-0.1677
		0.2500		0.1113	0.1088	0.2250	0.2549	-0.1388	-0.1161
	RD	0.3750		0.1146	0.1122	0.1771	0.1949	-0.1080	-0.0869
	572°F	0.5000		0.1184	0.1173	0.1112	0.1178	-0.0636	-0.0543
1-18 S		Break	0.125	0.0763	0.0714	0.6513	1.0537	-0.5600	-0.4936
		0.0625		0.0980	0.0950	0.4042	0.5178	-0.2744	-0.2434
		0.1250		0.1051	0.1039	0.3011	0.3583	-0.1849	-0.1734
		0.2500		0.1129	0.1104	0.2023	0.2260	-0.1242	-0.1018
		0.3750		0.1141	0.1119	0.1829	0.2020	-0.1107	-0.0912

SCHEDULE 2

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
2-1 L		Break	0.125	0.1010	0.0763	0.5068	0.7072	-0.4940	-0.2132
		0.0625		0.1126	0.0982	0.2923	0.3460	-0.2415	-0.1045
		0.1250		0.1175	0.1082	0.1863	0.2062	-0.1444	-0.0618
		0.2500		0.1173	0.1096	0.1772	0.1951	-0.1316	-0.0635
		0.3750		0.1152	0.1032	0.2391	0.2734	-0.1918	-0.0816
	TD	0.5000		0.1196	0.1135	0.1312	0.1406	-0.0964	-0.0442
	Room								
2-1 S	Temp.	Break	0.125	0.0984	0.0753	0.5258	0.7463	-0.5070	-0.2393
		0.0625		0.1108	0.0960	0.3192	0.3847	-0.2640	-0.1207
		0.1250		0.1157	0.1044	0.2269	0.2574	-0.1802	-0.0772
		0.2500		0.1196	0.1134	0.1320	0.1415	-0.0973	-0.0442
		0.3750		0.1208	0.1162	0.1016	0.1072	-0.0730	-0.0342
		0.5000		0.1215	0.1178	0.0840	0.0877	-0.0593	-0.0284
2-2 L		Break	0.125	0.1031	0.0794	0.4761	0.6468	-0.4540	-0.1928
		0.0625		0.1139	0.0998	0.2725	0.3181	-0.2252	-0.0929
		0.1250		0.1177	0.1084	0.1834	0.2027	-0.1425	-0.0602
	TD	0.2500		0.1195	0.1141	0.1274	0.1361	-0.0911	-0.0450
	Room	0.3750		0.1205	0.1139	0.1216	0.1295	-0.0929	-0.0366
	Temp.	0.5000		0.1212	0.1155	0.1041	0.1098	-0.0790	-0.0308
2-2 S		Break	0.125	0.1025	0.0794	0.4791	0.6526	-0.4540	-0.1986
		0.0625		0.1135	0.0994	0.2780	0.3255	-0.2291	-0.0964
		0.1250		0.1175	0.1068	0.1969	0.2193	-0.1575	-0.0618
		0.2500		0.1212	0.1154	0.1049	0.1106	-0.0798	-0.0308
		0.3750		0.1216	0.1166	0.0926	0.0971	-0.0695	-0.0276
2-4 L		Break	0.125	0.1026	0.0788	0.4826	0.6595	-0.4618	-0.1977
		0.0625		0.1125	0.0982	0.2930	0.3473	-0.2418	-0.1055
		0.1250		0.1165	0.1051	0.2164	0.2447	-0.1735	-0.0712
	67.5°	0.2500		0.1182	0.1082	0.1815	0.2003	-0.1444	-0.0559
	Room	0.3750		0.1196	0.1112	0.1488	0.1620	-0.1170	-0.0450
	Temp.	0.5000		0.1212	0.1155	0.1041	0.1098	-0.0790	-0.0308

SCHEDULE 2 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o [c] (in.)	2 a [d] (in.)	2 b [e] (in.)	Reduction in Area	$\bar{\epsilon}_1$ [f]	$\bar{\epsilon}_2$ [g]	$\bar{\epsilon}_3$ [h]
2-4 S	67.5°	Break	0.125	0.1011	0.0772	0.5005	0.6947	-0.4824	-0.2123
	Room	0.0625		0.1121	0.0962	0.3098	0.3700	-0.2620	-0.1080
	Temp.	0.1250		0.1171	0.1056	0.2086	0.2341	-0.1689	-0.0652
		0.2500		0.1203	0.1130	0.1300	0.1393	-0.1010	-0.0383
		0.3750		0.1207	0.1137	0.1217	0.1296	-0.0946	-0.0350
		0.5000		0.1224	0.1185	0.0717	0.0744	-0.0534	-0.0210
2-6 L		Break	0.125	0.1011	0.0840	0.4565	0.6102	-0.3979	-0.2123
		0.0625		0.1134	0.1022	0.2583	0.2990	-0.2017	-0.0973
		0.1250		0.1167	0.1088	0.1874	0.2076	-0.1390	-0.0686
	45°	0.2500		0.1192	0.1126	0.1410	0.1520	-0.1045	-0.0475
	Room	0.3750		0.1202	0.1153	0.1130	0.1198	-0.0807	-0.0391
	Temp.	0.5000		0.1211	0.1167	0.0955	0.1003	-0.0686	-0.0317
2-6 S		Break	0.125	0.1026	0.0852	0.4405	0.5815	-0.3839	-0.1976
		0.0625		0.1131	0.1020	0.2617	0.3035	-0.2035	-0.1000
		0.1250		0.1169	0.1081	0.1912	0.2115	-0.1455	-0.0660
		0.2500		0.1190	0.1123	0.1447	0.1565	-0.1073	-0.0492
		0.3750		0.1194	0.1136	0.1319	0.1414	-0.0956	-0.0458
		0.5000		0.1202	0.1147	0.1176	0.1250	-0.0859	-0.0391
2-8 L		Break	0.125	0.0968	0.0842	0.4784	0.6516	-0.3958	-0.2558
		0.0625		0.1098	0.1019	0.2839	0.3343	-0.2045	-0.1298
		0.1250		0.1141	0.1084	0.2084	0.2338	-0.1426	-0.0912
		0.2500		0.1165	0.1119	0.1657	0.1812	-0.1108	-0.0704
	22.5°	0.3750		0.1164	0.1111	0.1724	0.1892	-0.1180	-0.0712
	Room	0.5000		0.1180	0.1136	0.1421	0.1531	-0.0955	-0.0576
	Temp.								
2-8 S		Break	0.125	0.0976	0.0852	0.4678	0.6459	-0.3979	-0.2480
		0.0625		0.1103	0.1022	0.2786	0.3277	-0.2017	-0.1260
		0.1250		0.1141	0.1088	0.2055	0.2302	-0.1390	-0.0912
		0.2500		0.1181	0.1145	0.1346	0.1445	-0.0877	-0.0568
		0.5000		0.1197	0.1171	0.1029	0.1085	-0.0652	-0.0433

SCHEDULE 2 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o [c] (in.)	2 a [d] (in.)	2 b [e] (in.)	Reduction in Area	$\bar{\epsilon}_1$ [f]	$\bar{\epsilon}_2$ [g]	$\bar{\epsilon}_3$ [h]
2-27 L		Break	0.125	0.0970	0.0827	0.4866	0.6673	-0.4135	-0.2538
		0.0625		0.1096	0.0982	0.3112	0.3732	-0.2417	-0.1315
		0.1250		0.1136	0.1055	0.2330	0.2654	-0.1698	-0.0956
		0.2500		0.1163	0.1101	0.1805	0.1999	-0.1270	-0.0729
		0.3750		0.1173	0.1122	0.1577	0.1725	-0.1081	-0.0644
	RD	0.5000		0.1185	0.1135	0.1392	0.1498	-0.0964	-0.0534
	Room								
2-27 S	Temp.	Break	0.125	0.0987	0.0837	0.4713	0.6379	-0.4015	-0.2364
		0.0625		0.1109	0.1011	0.2824	0.3322	-0.2124	-0.1198
		0.1250		0.1159	0.1081	0.1982	0.2209	-0.1454	-0.0755
		0.2500		0.1186	0.1131	0.1414	0.1535	-0.1010	-0.0525
		0.3750		0.1194	0.1146	0.1243	0.1326	-0.0868	-0.0458
		0.5000		0.1200	0.1161	0.1084	0.1146	-0.0738	-0.0408
2-31 L		Break	0.125	0.0974	0.0832	0.4814	0.6580	-0.4073	-0.2507
		0.0625		0.1103	0.1016	0.2828	0.3334	-0.2074	-0.1260
		0.1250		0.1144	0.1080	0.2093	0.2350	-0.1464	-0.0886
		0.2500		0.1166	0.1106	0.1747	0.1920	-0.1225	-0.0695
		0.3750		0.1178	0.1133	0.1458	0.1584	-0.0982	-0.0602
	RD	0.5000		0.1186	0.1144	0.1317	0.1411	-0.0886	-0.0525
	Room								
2-31 S	Temp.	Break	0.125	0.0977	0.0832	0.4798	0.6541	-0.4073	-0.2468
		0.0625		0.1098	0.1005	0.2938	0.3480	-0.2182	-0.1298
		0.1250		0.1143	0.1080	0.2100	0.2358	-0.1464	-0.0894
		0.2500		0.1168	0.1118	0.1643	0.1796	-0.1118	-0.0678
		0.3750		0.1181	0.1137	0.1406	0.1523	-0.0947	-0.0576
		0.5000		0.1182	0.1137	0.1399	0.1506	-0.0947	-0.0559
2-21 L		Break	0.126	0.0938	0.0829	0.5102	0.7138	-0.4187	-0.2951
		0.0625		0.1073	0.0982	0.3363	0.4099	-0.2493	-0.1606
		0.1250		0.1116	0.1054	0.2591	0.2999	-0.1785	-0.1214

SCHEDULE 2 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1145	0.1090	0.2139	0.2406	-0.1449	-0.0957
		0.3750		0.1171	0.1132	0.1650	0.1804	-0.1071	-0.0733
	RD 302°F	0.5000		0.1192	0.1153	0.1343	0.1442	-0.0887	-0.0555
2-21 S	RD 302°F	Break	0.126	0.0938	0.0826	0.5120	0.7174	-0.4223	-0.2951
		0.0625		0.1078	0.0980	0.3346	0.4073	-0.2513	-0.1560
		0.1250		0.1119	0.1053	0.2578	0.2981	-0.1795	-0.1187
		0.2500		0.1145	0.1090	0.2139	0.2406	-0.1449	-0.0957
		0.3750		0.1172	0.1134	0.1629	0.1778	-0.1054	-0.0724
		0.5000		0.1191	0.1152	0.1358	0.1459	-0.0896	-0.0563
2-23 L		Break	0.125	0.0947	0.0843	0.4891	0.6715	-0.3939	-0.2776
		0.0625		0.1052	0.0971	0.3462	0.4250	-0.2526	-0.1724
		0.1250		0.1100	0.1032	0.2735	0.3195	-0.1916	-0.1278
		0.2500		0.1130	0.1073	0.2240	0.2536	-0.1527	-0.1009
		0.3750		0.1158	0.1111	0.1766	0.1943	-0.1179	-0.0764
		0.5000		0.1189	0.1142	0.1376	0.1480	-0.0904	-0.0576
2-23 S	RD 302°F	Break	0.125	0.0961	0.0837	0.4852	0.6640	-0.4011	-0.2629
		0.0625		0.1072	0.0992	0.3194	0.3848	-0.2312	-0.1536
		0.1250		0.1120	0.1057	0.2423	0.2775	-0.1677	-0.1098
		0.2500		0.1147	0.1095	0.1962	0.2184	-0.1324	-0.0860
		0.3750		0.1167	0.1127	0.1583	0.1723	-0.1036	-0.0687
		0.5000		0.1183	0.1152	0.1278	0.1367	-0.0816	-0.0551
2-12 L		Break	0.125	0.0727	0.0553	0.7427	1.3575	-0.8155	-0.5420
		0.0625		0.1017	0.0892	0.4194	0.5437	-0.3374	-0.2063
		0.1250		0.1102	0.1027	0.2757	0.3225	-0.1965	-0.1260
		0.2500		0.1161	0.1117	0.1700	0.1864	-0.1125	-0.0739
		0.3750		0.1177	0.1138	0.1428	0.1541	-0.0939	-0.0602
		0.5000		0.1197	0.1174	0.1006	0.1060	-0.0627	-0.0433
	RD 572°F								

SCHEDULE 2 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
2-21 S		Break	0.125	0.0744	0.0589	0.7195	1.2713	-0.7525	-0.5189
		0.0625		0.1025	0.0916	0.3991	0.5093	-0.3109	-0.1984
		0.1250		0.1102	0.1042	0.2651	0.3080	-0.1820	-0.1260
		0.2500		0.1150	0.1090	0.1978	0.2204	-0.1370	-0.0834
		0.3750		0.1171	0.1133	0.1509	0.1636	-0.0983	-0.0653
2-16 L		Break	0.124	0.0729	0.0608	0.7117	1.2439	-0.7127	-0.5312
		0.0625		0.0990	0.0911	0.4134	0.5335	-0.3083	-0.2252
		0.1250		0.1088	0.1017	0.2804	0.3290	-0.1982	-0.1308
		0.2500		0.1137	0.1093	0.1918	0.2129	-0.1262	-0.0867
		0.3750		0.1148	0.1107	0.1735	0.1906	-0.1135	-0.0771
	RD 572°F	0.5000		0.1168	0.1136	0.1371	0.1474	-0.0876	-0.0598
2-16 S		Break	0.124	0.0734	0.0615	0.7064	1.2256	-0.7012	-0.5244
		0.0625		0.1016	0.0907	0.4007	0.5120	-0.3127	-0.1992
		0.1250		0.1099	0.1027	0.2660	0.3092	-0.1885	-0.1207
		0.2500		0.1151	0.1118	0.1631	0.1781	-0.1036	-0.0745
		0.3750		0.1185	0.1161	0.1052	0.1112	-0.0658	-0.0454

SCHEDULE 3

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
3-1 L	TD	Break	0.125	0.1052	0.0794	0.4654	0.6265	-0.4540	-0.1725
	Room	0.0625		0.1187	0.1058	0.1963	0.1980	-0.1463	-0.0517
	Temp.	0.1250		0.1227	0.1172	0.0796	0.0830	-0.0644	-0.0186
		0.2500		0.1237	0.1208	0.0436	0.0446	-0.0342	-0.0104
		0.3750		0.1239	0.1213	0.0381	0.0396	-0.0300	-0.0096
		0.5000		0.1237	0.1212	0.0405	0.0413	-0.0309	-0.0104
3-2 S		Break	0.126	0.1032	0.0771	0.4988	0.6913	-0.4917	-0.1996
		0.0625		0.1143	0.0985	0.2908	0.3440	-0.2466	-0.0974
	TD	0.1250		0.1200	0.1100	0.1686	0.1847	-0.1360	-0.0487
	Room								
3-2 L	Temp.	Break	0.126	0.1043	0.0798	0.4757	0.6470	-0.4570	-0.1900
		0.0625		0.1151	0.0994	0.2794	0.3286	-0.2373	-0.0913
		0.1250		0.1185	0.1064	0.2058	0.2307	-0.1694	-0.0613
		0.2500		0.1197	0.1096	0.1737	0.1916	-0.1395	-0.0521
		0.3750		0.1202	0.1113	0.1573	0.1721	-0.1242	-0.0479
		0.5000		0.1208	0.1130	0.1402	0.1161	-0.0740	-0.0421
3-3 S		Break	0.125	0.1087	0.0821	0.4288	0.5608	-0.4210	-0.1398
		0.0625		0.1166	0.1000	0.2538	0.2935	-0.2231	-0.0704
		0.1250		0.1191	0.1069	0.1852	0.2048	-0.1565	-0.0483
		0.2500		0.1211	0.1125	0.1281	0.1372	-0.1055	-0.0317
	67.5°	0.3750		0.1220	0.1158	0.0958	0.1007	-0.0764	-0.0243
	Room								
3-3 L	Temp.	Break	0.125	0.1066	0.0785	0.4644	0.6251	-0.4657	-0.1594
		0.0625		0.1158	0.0983	0.2715	0.3168	-0.2404	-0.0765
		0.1250		0.1189	0.1060	0.1934	0.2150	-0.1650	-0.0500
		0.2500		0.1205	0.1101	0.1509	0.1636	-0.1270	-0.0366
		0.3750		0.1203	0.1106	0.1485	0.1608	-0.1225	-0.0383
		0.5000		0.1209	0.1116	0.1365	0.1468	-0.1135	-0.0333

SCHEDULE 3 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
3-5 S		Break	0.126	0.1032	0.0816	0.4696	0.6350	-0.4350	-0.2000
		0.0625		0.1141	0.1012	0.2727	0.3181	-0.2191	-0.0990
		0.1250		0.1175	0.1085	0.1970	0.2203	-0.1496	-0.0707
		0.2500		0.1197	0.1126	0.1510	0.1646	-0.1125	-0.0521
		0.3750		0.1212	0.1142	0.1282	0.1371	-0.0983	-0.0388
		0.5000		0.1222	0.1171	0.0987	0.1038	-0.0732	-0.0306
3-5 L	45° Room Temp.	Break	0.126	0.1029	0.0827	0.4640	0.6243	-0.4215	-0.2028
		0.0625		0.1140	0.1012	0.2733	0.3191	-0.2191	-0.1000
		0.1250		0.1171	0.1077	0.2056	0.2302	-0.1570	-0.0732
		0.2500		0.1201	0.1131	0.1444	0.1559	-0.1080	-0.0479
		0.3750		0.1213	0.1178	0.1000	0.1052	-0.0672	-0.0380
		0.5000		0.1221	0.1174	0.0971	0.1022	-0.0707	-0.0315
3-7 S		Break	0.126	0.1017	0.0821	0.4741	0.6274	-0.4210	-0.2064
		0.0625		0.1131	0.1008	0.2819	0.3152	-0.2152	-0.1000
		0.1250		0.1168	0.1076	0.2084	0.2178	-0.1500	-0.0678
		0.2500		0.1190	0.1122	0.1590	0.1571	-0.1080	-0.0491
		0.3750		0.1194	0.1124	0.1547	0.1530	-0.1064	-0.0466
		0.5000		0.1204	0.1146	0.1309	0.1243	-0.0868	-0.0375
3-7 L	22.5° Room Temp.	Break	0.126	0.1028	0.0841	0.4554	0.5925	-0.3969	-0.1956
		0.0625		0.1125	0.1006	0.2871	0.3227	-0.2172	-0.1055
		0.1250		0.1154	0.1058	0.2310	0.2462	-0.1664	-0.0998
		0.2500		0.1174	0.1099	0.1873	0.1915	-0.1288	-0.0627
		0.3750		0.1187	0.1135	0.1514	0.1489	-0.0964	-0.0525
		0.5000		0.1192	0.1144	0.1411	0.1361	-0.0886	-0.9475
3-30 L		Break	0.125	0.1026	0.0794	0.4786	0.6356	-0.4380	-0.1976
		0.0625		0.1146	0.0992	0.2724	0.3263	-0.2315	-0.0948

SCHEDULE 3 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1188	0.1086	0.1743	0.1915	-0.1407	-0.0508
	RD	0.2500		0.1207	0.1135	0.1232	0.1314	-0.0964	-0.0350
	Room	0.3750		0.1201	0.1122	0.1376	0.1481	-0.1081	-0.0400
	Temp.	0.5000		0.1206	0.1127	0.1301	0.1394	-0.1036	-0.0358
3-32 S		Break	0.125	0.1041	0.0824	0.4510	0.6308	-0.4477	-0.1831
		0.0625		0.1152	0.1021	0.2472	0.2850	-0.2025	-0.0825
		0.1250		0.1189	0.1105	0.1591	0.1742	-0.1234	-0.0508
		0.2500		0.1209	0.1150	0.1102	0.1167	-0.0834	-0.0333
		0.3750		0.1215	0.1158	0.0995	0.1048	-0.0764	-0.0284
	RD	0.5000		0.1204	0.1146	0.1169	0.1251	-0.0868	-0.0383
	Room								
3-32 L	Temp.	Break	0.125	0.1048	0.0843	0.4346	0.5706	-0.3941	-0.1765
		0.0625		0.1151	0.1030	0.2413	0.2770	-0.1936	-0.0834
		0.1250		0.1175	0.1091	0.1796	0.1979	-0.1361	-0.0618
		0.2500		0.1188	0.1110	0.1560	0.1706	-0.1189	-0.0517
		0.3750		0.1202	0.1144	0.1199	0.1277	-0.0886	-0.0391
		0.5000		0.1208	0.1146	0.1140	0.1210	-0.0868	-0.0342
3-21 L		Break	0.124	0.0974	0.0707	0.5522	0.8033	-0.5618	-0.2415
		0.0625		0.1108	0.0934	0.3270	0.3960	-0.2834	-0.1126
		0.1250		0.1154	0.1041	0.2187	0.2468	-0.1749	-0.0719
		0.2500		0.1179	0.1088	0.1657	0.1812	-0.1308	-0.0504
		0.3750		0.1191	0.1117	0.1348	0.1448	-0.1045	-0.0403
	RD	0.5000		0.1206	0.1144	0.1027	0.1084	-0.0806	-0.0278
	302°F								
3-21 S		Break	0.124	0.0978	0.0718	0.5433	0.7838	-0.5464	-0.2374
		0.0625		0.1102	0.0932	0.3320	0.4035	-0.2855	-0.1180
		0.1250							
		0.2500		0.1181	0.1094	0.1597	0.1740	-0.1253	-0.0488
		0.3750		0.1202	0.1138	0.1104	0.1170	-0.0858	-0.0311
		0.5000		0.1210	0.1152	0.0934	0.0981	-0.0736	-0.0245

SCHEDULE 3 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o [c] (in.)	2 a [d] (in.)	2 b [e] (in.)	Reduction in Area	$\bar{\epsilon}_1$ [f]	$\bar{\epsilon}_2$ [g]	$\bar{\epsilon}_3$ [h]
3-26 L		Break	0.124	0.1048	0.0846	0.4234	0.5506	-0.3824	-0.1682
		0.0625		0.1115	0.0951	0.3104	0.3716	-0.2654	-0.1063
		0.1250		0.1155	0.1033	0.2240	0.2537	-0.1826	-0.0710
	RD	0.2500		0.1175	0.1077	0.1770	0.1948	-0.1409	-0.0538
	302°F	0.3750		0.1183	0.1099	0.1544	0.1678	-0.1207	-0.0471
		0.5000		0.1201	0.1132	0.1158	0.1231	-0.0911	-0.0320
3-26 S	RD	Break	0.124	0.1056	0.0825	0.4334	0.5681	-0.4075	-0.1606
	302°F	0.0625		0.1113	0.1955	0.3087	0.3692	-0.2612	-0.1081
		0.1250		0.1143	0.1001	0.2559	0.2956	-0.2141	-0.0815
		0.2500		0.1173	0.1072	0.1822	0.2011	-0.1456	-0.0556
3-17 L		Break	0.124	0.0886	0.0616	0.6450	1.0358	-0.6996	-0.3362
		0.0625		0.1078	0.0873	0.3880	0.4909	-0.3509	-0.1400
		0.1250		0.1141	0.1006	0.2535	0.2923	-0.2091	-0.0832
		0.2500		0.1176	0.1091	0.1656	0.1810	-0.1280	-0.0530
		0.3750		0.1183	0.1110	0.1460	0.1578	-0.1108	-0.0471
	RD	0.5000		0.1188	0.1127	0.1292	0.1384	-0.0956	-0.0428
	572°F								
3-17 S		Break	0.124	0.0928	0.0675	0.5926	0.8980	-0.6082	-0.2898
		0.0625		0.1094	0.0903	0.3575	0.4424	-0.3171	-0.1253
		0.1250		0.1154	0.1017	0.2367	0.2701	-0.1982	-0.0719
		0.2500		0.1187	0.1100	0.1508	0.1635	-0.1198	-0.0437
		0.3750		0.1208	0.1162	0.0871	0.0911	-0.0650	-0.0262
3-19 L		Break	0.124	0.0797	0.0662	0.6569	1.0696	-0.6276	-0.4420
		0.0625		0.1025	0.0960	0.3600	0.4464	-0.2559	-0.1904
		0.1250		0.1102	0.1048	0.2489	0.2862	-0.1682	-0.1180
		0.2500		0.1102	0.1053	0.2453	0.2814	-0.1635	-0.1180
		0.2750		0.1083	0.1026	0.2773	0.3248	-0.1894	-0.1354
	RD	0.5000		0.1107	0.1065	0.2332	0.2656	-0.1521	-0.1135
	572°F								

SCHEDULE 3 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
3-19 S		Break	0.124	0.0804	0.0680	0.6444	1.0340	-0.6008	-0.4333
		0.0625		0.1045	0.0954	0.3516	0.4333	-0.2622	-0.1711
		0.1250		0.1131	0.1076	0.2085	0.2339	-0.1419	-0.0920

SCHEDULE 4

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
4-1 S		Break	0.126	0.1063	0.0844	0.4349	0.5710	-0.4010	-0.1700
		0.0625		0.1153	0.1004	0.2708	0.3160	-0.2273	-0.0887
		0.1250		0.1202	0.1111	0.1588	0.1731	-0.1260	-0.0471
		0.2500		0.1232	0.1193	0.0742	0.0770	-0.0546	-0.0224
		0.3750		0.1236	0.1210	0.0580	0.0597	-0.0405	-0.0192
	TD	0.5000		0.1236	0.1198	0.0673	0.0696	-0.0504	-0.0192
	Room								
4-1 L	Temp.	Break	0.126	0.1095	0.0908	0.3737	0.4694	-0.3280	-0.1414
		0.0625		0.1185	0.1077	0.1961	0.2183	-0.1570	-0.0613
		0.1250		0.1204	0.1136	0.1385	0.1498	-0.1036	-0.0462
		0.2500		0.1211	0.1140	0.1304	0.1396	-0.1000	-0.0396
		0.3750		0.1216	0.1133	0.1322	0.1419	-0.1064	-0.0355
		0.5000		0.1222	0.1164	0.1040	0.1099	-0.0792	-0.0307
4-2 S		Break	0.126	0.1050	0.0837	0.4464	0.5915	-0.4090	-0.1825
		0.0625		0.1149	0.1013	0.2669	0.3104	-0.2182	-0.0922
		0.1250		0.1202	0.1128	0.1460	0.1579	-0.1108	-0.0471
		0.2500		0.1216	0.1173	0.1016	0.1069	-0.0714	-0.0355
		0.3750		0.1219	0.1182	0.0924	0.0968	-0.0638	-0.0330
	TD	0.5000		0.1229	0.1213	0.0610	0.0629	-0.0380	-0.0249
	Room								
4-2 L	Temp.	Break	0.126	0.1077	0.0872	0.4085	0.5252	-0.3680	-0.1572
		0.0625		0.1152	0.1020	0.2599	0.3007	-0.2115	-0.0895
		0.1250		0.1192	0.1104	0.1711	0.1877	-0.1322	-0.0555
		0.2500		0.1215	0.1160	0.1122	0.1189	-0.0826	-0.0363
		0.3750		0.1179	0.1073	0.2032	0.2271	-0.1607	-0.0664
		0.5000		0.1214	0.1155	0.1168	0.1239	-0.0869	-0.0370
4-3 L		Break	0.125	0.1103	0.0827	0.4162	0.5395	-0.4135	-0.1260
		0.0625		0.1174	0.1023	0.2314	0.2633	-0.2007	-0.0626
		0.1250		0.1200	0.1129	0.1329	0.1427	-0.1019	-0.0408

SCHEDULE 4 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
	67.5°	0.2500		0.1197	0.1119	0.1428	0.1541	-0.1108	-0.0433
	Room	0.3750		0.1192	0.1077	0.1784	0.1973	-0.1490	-0.0483
	Temp.	0.5000		0.1210	0.1158	0.1032	0.1097	-0.0772	-0.0325
4-3 S	67.5°	Break	0.125	0.1096	0.0838	0.4122	0.5315	-0.4000	-0.1315
	Room	0.0625		0.1160	0.0986	0.2680	0.3123	-0.2377	-0.9746
	Temp.	0.1250		0.1191	0.1046	0.2027	0.2277	-0.1794	-0.0226
		0.2500		0.1222	0.1156	0.0959	0.1007	-0.0781	-0.0226
		0.3750		0.1232	0.1186	0.0649	0.0670	-0.0525	-0.0145
		0.5000		0.1234	0.1198	0.0539	0.0554	-0.0425	-0.0129
4-5 L		Break	0.125	0.1076	0.0826	0.4312	0.5650	-0.4150	-0.1500
		0.0625		0.1155	0.1021	0.2453	0.2815	-0.2025	-0.0790
		0.1250		0.1196	0.1119	0.1435	0.1558	-0.1108	-0.0450
		0.2500		0.1213	0.1164	0.0964	0.1012	-0.0712	-0.0300
		0.3750		0.1216	0.1158	0.0988	0.1029	-0.0754	-0.0275
	45°	0.5000		0.1217	0.1167	0.0910	0.0953	-0.0686	-0.0267
	Room								
4-5 S	Temp.	Break	0.125	0.1107	0.0866	0.3865	0.4891	-0.3676	-0.1215
		0.0625		0.1192	0.1058	0.1929	0.2153	-0.1670	-0.0483
		0.1250		0.1212	0.1160	0.1002	0.1056	-0.0747	-0.0309
		0.2500		0.1229	0.1182	0.0703	0.0728	-0.0559	-0.0169
		0.3750		0.1229	0.1178	0.0734	0.0771	-0.0602	-0.0169
4-8 L		Break	0.124	0.1066	0.0877	0.3920	0.4980	-0.3467	-0.1513
		0.0625		0.1160	0.1053	0.2056	0.2301	-0.1635	-0.0666
		0.1250		0.1183	0.1126	0.1337	0.1433	-0.0963	-0.0470
		0.2500		0.1172	0.1107	0.1562	0.1699	-0.1136	-0.0563
		0.3750		0.1184	0.1128	0.1314	0.1407	-0.0946	-0.0461
	22.5°	0.5000		0.1177	0.1117	0.1450	0.1565	-0.1045	-0.0520
	Room								
4-8 S	Temp.	Break	0.124	0.1060	0.0874	0.3975	0.5070	-0.3500	-0.1570
		0.0625		0.1135	0.1054	0.2220	0.2483	-0.1625	-0.0868

SCHEDULE 4 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1180	0.1134	0.1297	0.1387	-0.0892	-0.0495
		0.2500		0.1197	0.1161	0.0962	0.1010	-0.0658	-0.0352
		0.3750		0.1185	0.1157	0.1083	0.1145	-0.0692	-0.0453
		0.5000		0.1151	0.1102	0.1751	0.1924	-0.1180	-0.0744
4-27 L		Break	0.125	0.1161	0.1099	0.1834	0.2026	-0.1288	-0.0738
		0.0625		0.1197	0.1134	0.1313	0.1406	-0.0973	-0.0433
		0.1250		0.1196	0.1146	0.1228	0.1309	-0.0868	-0.0441
		0.2500		0.1178	0.1105	0.1669	0.1826	-0.1234	-0.0592
		0.3750		0.1191	0.1129	0.1394	0.1502	-0.1019	-0.0483
	RD	0.5000		0.1200	0.1148	0.1183	0.1258	-0.0850	-0.0408
4-27 S	Room Temp.	Break	0.125	0.1157	0.1073	0.2055	0.2301	-0.1529	-0.0772
		0.0625		0.1190	0.1118	0.1485	0.1609	-0.1117	-0.0492
		0.1250		0.1203	0.1163	0.1046	0.1104	-0.0721	-0.0383
		0.2500		0.1203	0.1192	0.0823	0.0858	-0.0475	-0.0383
		0.3750		0.1215	0.1183	0.0801	0.0834	-0.0550	-0.0284
4-34 L		Break	0.125	0.1173	0.1064	0.2012	0.2247	-0.1612	-0.0635
	RD	0.0625		0.1194	0.1123	0.1419	0.1531	-0.1073	-0.0458
	Room	0.1250		0.1193	0.1140	0.1296	0.1386	-0.0920	-0.0466
	Temp.	0.2500		0.1200	0.1151	0.1160	0.1233	-0.0825	-0.0408
		0.3750		0.1198	0.1158	0.1121	0.1180	-0.0755	-0.0425
		0.5000		0.1201	0.1171	0.0999	0.1052	-0.0652	-0.0400
4-21 L		Break	0.125	0.1025	0.0811	0.4680	0.6311	-0.4326	-0.1985
		0.0625		0.1133	0.1015	0.2640	0.3065	-0.2082	-0.0983
		0.1250		0.1173	0.1103	0.1720	0.1887	-0.1251	-0.0636
		0.2500		0.1189	0.1118	0.1492	0.1616	-0.1116	-0.0500
		0.3750		0.1205	0.1150	0.1131	0.1201	-0.0834	-0.0367
	RD 302°F	0.5000		0.1212	0.1192	0.0754	0.0784	-0.0475	-0.0309

SCHEDULE 4 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
4-21 S		Break	0.125	0.1046	0.0847	0.4330	0.5673	-0.3892	-0.1782
		0.0625		0.1140	0.1020	0.2558	0.2955	-0.2033	-0.0921
		0.1250		0.1163	0.1068	0.2051	0.2295	-0.1574	-0.0721
		0.2500		0.1199	0.1120	0.1406	0.1515	-0.1098	-0.0417
		0.3750		0.1197	0.1116	0.1450	0.1567	-0.1134	-0.0433
4-23 L		Break	0.124	0.1013	0.0818	0.4611	0.6182	-0.4160	-0.2022
		0.0625		0.1089	0.0988	0.3003	0.3570	-0.2272	-0.1298
		0.1250		0.1123	0.1034	0.2448	0.2808	-0.1817	-0.0991
		0.2500		0.1148	0.1066	0.2041	0.2283	-0.1512	-0.0771
		0.3750		0.1160	0.1127	0.1498	0.1622	-0.0956	-0.0667
	RD 302°F	0.5000		0.1188	0.1106	0.1455	0.1572	-0.1144	-0.0428
4-23 S		Break	0.124	0.0991	0.0800	0.4844	0.6624	-0.4382	-0.2242
		0.0625		0.1097	0.0967	0.3101	0.3712	-0.2487	-0.1225
		0.1250		0.1154	0.1058	0.2060	0.2306	-0.1587	-0.0719
		0.2500		0.1171	0.1089	0.1706	0.1871	-0.1298	-0.0573
4-13 L		Break	0.125	0.0896	0.0537	0.6921	1.1779	-0.8449	-0.3330
		0.0625							
		0.1250		0.1144	0.1020	0.2532	0.2920	-0.2033	-0.0886
		0.2500		0.1160	0.1118	0.1700	0.1863	-0.1116	-0.0747
		0.3750		0.1161	0.1097	0.1849	0.2044	-0.1306	-0.0739
	RD 572°F	0.5000		0.1165	0.1096	0.1828	0.2019	-0.1315	-0.0704
4-13 S		Break	0.125	0.0912	0.0553	0.6772	1.1308	-0.8155	-0.3153
		0.0625		0.1106	0.0888	0.3714	0.4643	-0.3419	-0.1224
		0.1250		0.1165	0.1046	0.2201	0.2486	-0.1782	-0.0704
		0.2500		0.1188	0.1098	0.1652	0.1805	-0.1296	-0.0509
		0.3750		0.1215	0.1163	0.0957	0.1005	-0.0721	-0.0284
		0.5000		0.1227	0.1195	0.0616	0.0636	-0.0450	-0.0186

SCHEDULE 4 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
4-17 L	RD 572°F	Break	0.124	0.0896	0.0740	0.5688	0.8411	-0.5162	-0.3249
		0.0625		0.1078	0.0933	0.3459	0.4245	-0.2845	-0.1400
		0.1250		0.1144	0.1083	0.1942	0.2160	-0.1354	-0.0806
		0.2500		0.1191	0.1140	0.1170	0.1244	-0.0841	-0.0403
		0.3750		0.1204	0.1176	0.0792	0.0825	-0.0530	-0.0295
		0.5000		0.1205	0.1165	0.0870	0.0910	-0.0624	-0.0286
4-17 S		Break	0.124	0.0907	0.0634	0.6260	0.9835	-0.6708	-0.3127
		0.0625		0.1077	0.0938	0.3430	0.4200	-0.2791	-0.1409
		0.1250		0.1116	0.1036	0.2481	0.2851	-0.1797	-0.1054
		0.2500		0.1158	0.1058	0.2032	0.2272	-0.1587	-0.0684
		0.3750		0.1183	0.1079	0.1698	0.1861	-0.1391	-0.0471
		0.5000		0.1189	0.1134	0.1231	0.1314	-0.0894	-0.0420

SCHEDULE 5

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
5-16 L		Break	0.125	0.1060	0.0759	0.4851	0.6640	-0.4990	-0.1650
		0.0625		0.1173	0.1015	0.2380	0.2719	-0.2083	-0.0636
		0.1250		0.1210	0.1123	0.1304	0.1399	-0.1074	-0.0325
		0.2500		0.1220	0.1160	0.0943	0.0998	-0.0747	-0.0251
		0.3750		0.1216	0.1151	0.1043	0.1101	-0.0825	-0.0276
	TD	0.5000		0.1216	0.1151	0.1043	0.1101	-0.0825	-0.0276
	Room								
5-17 L	Temp.	Break	0.125	0.1083	0.0795	0.4490	0.5965	-0.4530	-0.1435
		0.0625		0.1171	0.0989	0.2588	0.3003	-0.2342	-0.0661
		0.1250		0.1194	0.1066	0.1854	0.2052	-0.1594	-0.0458
		0.2500		0.1218	0.1149	0.1043	0.1101	-0.0842	-0.0259
		0.3750		0.1226	0.1165	0.0859	0.0898	-0.0704	-0.0194
5-17 S		Break	0.125	0.1073	0.0763	0.4760	0.6468	-0.4940	-0.1528
		0.0625		0.1182	0.1034	0.2178	0.2457	-0.1898	-0.0559
	TD	0.1250		0.1211	0.1123	0.1296	0.1390	-0.1073	-0.0317
	Room	0.2500		0.1222	0.1154	0.0975	0.1024	-0.0798	-0.0226
	Temp.	0.3750		0.1224	0.1166	0.0866	0.0905	-0.0695	-0.0210
		0.5000		0.1225	0.1175	0.0788	0.0820	-0.0618	-0.0202
5-2 L		Break	0.125	0.1018	0.0851	0.4456	0.5905	-0.3850	-0.2055
		0.0625		0.1128	0.1012	0.2694	0.3139	-0.2111	-0.1028
		0.1250		0.1167	0.1113	0.1687	0.1849	-0.1163	-0.0686
	RD	0.2500		0.1185	0.1130	0.1430	0.1544	-0.1010	-0.0534
	Room	0.3750		0.1195	0.1153	0.1182	0.1265	-0.0807	-0.0458
	Temp.	0.5000		0.1192	0.1142	0.1288	0.1378	-0.0903	-0.0475
5-12 L		Break	0.125	0.1065	0.0885	0.3968	0.5062	-0.3458	-0.1604
		0.0625		0.1142	0.1063	0.2231	0.2525	-0.1622	-0.0903
		0.1250		0.1171	0.1118	0.1621	0.1769	-0.1117	-0.0652

SCHEDULE 5 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1178	0.1130	0.1481	0.1603	-0.1010	-0.0593
		0.3750		0.1181	0.1127	0.1482	0.1604	-0.1036	-0.0568
		0.5000		0.1197	0.1160	0.1114	0.1180	-0.0747	-0.0433
5-12 S	RD Room Temp.	Break	0.125	0.1055	0.0864	0.4166	0.5392	-0.3695	-0.1697
		0.0625		0.1153	0.1064	0.2149	0.2427	-0.1611	-0.0816
		0.1250		0.1185	0.1134	0.1400	0.1507	-0.0973	-0.0534
		0.2500		0.1196	0.1164	0.1090	0.1153	-0.0712	-0.0441
		0.3750		0.1202	0.1178	0.0938	0.0984	-0.0593	-0.0391
		0.5000		0.1213	0.1182	0.0824	0.0859	-0.0559	-0.0300

SCHEDULE 6

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
6-1 L		Break	0.126	0.1096	0.0703	0.5147	0.7245	-0.5840	-0.1405
		0.0625		0.1178	0.0949	0.2958	0.3507	-0.2834	-0.0673
		0.1250		0.1200	0.1037	0.2162	0.2437	-0.1950	-0.0487
		0.2500		0.1202	0.1028	0.2217	0.2404	-0.2038	-0.0366
		0.3750		0.1226	0.1122	0.1336	0.1434	-0.1160	-0.0274
	TD	0.5000		0.1234	0.1156	0.1015	0.1068	-0.0860	-0.0208
	Room								
6-1 S	Temp.	Break	0.126	0.1090	0.0686	0.5290	0.7532	-0.6082	-0.1450
		0.0625		0.1175	0.0936	0.3073	0.3674	-0.2976	-0.0698
		0.1250		0.1201	0.1056	0.2012	0.2141	-0.1766	-0.0375
		0.2500		0.1228	0.1146	0.1136	0.1205	-0.0948	-0.0257
		0.3750		0.1232	0.1154	0.1045	0.1102	-0.0878	-0.0224
6-2 L		Break	0.126	0.1098	0.0697	0.5180	0.7300	-0.5922	-0.1378
		0.0625		0.1180	0.0948	0.2954	0.3504	-0.2848	-0.0656
		0.1250		0.1206	0.1045	0.2062	0.2311	-0.1873	-0.0438
		0.2500		0.1211	0.1079	0.1770	0.1949	-0.1553	-0.0396
		0.3750		0.1219	0.1121	0.1393	0.1500	-0.1170	-0.0330
	TD	0.5000		0.1226	0.1155	0.1081	0.1143	-0.0869	-0.0274
	Room								
6-2 S	Temp.	Break	0.126	0.1107	0.0704	0.5091	0.7123	-0.5828	-0.1295
		0.0625		0.1193	0.0986	0.2591	0.3000	-0.2454	-0.0546
		0.1250		0.1218	0.1082	0.1699	0.1862	-0.1524	-0.0338
		0.2500		0.1230	0.1131	0.1238	0.1322	-0.1081	-0.0241
		0.3750		0.1241	0.1178	0.0792	0.0824	-0.0672	-0.0152
6-4 L		Break	0.126	0.1092	0.0683	0.5302	0.7561	-0.6130	-0.1431
		0.0625		0.1173	0.0905	0.3313	0.4024	-0.3310	-0.0714
		0.1250		0.1197	0.0996	0.2491	0.2863	-0.2352	-0.0511

SCHEDULE 6 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1204	0.1015	0.2303	0.2615	-0.2161	-0.0454
		0.3750		0.1219	0.1100	0.1554	0.1687	-0.1357	-0.0330
	67-1/2°	0.5000		0.1223	0.1119	0.1380	0.1484	-0.1186	-0.0298
6-4 S	Room Temp.	Break	0.126	0.1096	0.0698	0.5181	0.7311	-0.5915	-0.1396
		0.0625		0.1169	0.0896	0.3403	0.4160	-0.3412	-0.0748
		0.1250		0.1195	0.1002	0.2458	0.2829	-0.2291	-0.0538
		0.2500		0.1214	0.1073	0.1795	0.1979	-0.1607	-0.0372
		0.3750		0.1225	0.1136	0.1235	0.1317	-0.1036	-0.0281
		0.5000		0.1235	0.1161	0.0969	0.1018	-0.0818	-0.0200
6-5 L		Break	0.127	0.1105	0.0734	0.4971	0.6879	-0.5485	-0.1394
		0.0625		0.1187	0.0945	0.3045	0.3642	-0.2958	-0.0684
		0.1250		0.1205	0.1017	0.2402	0.2748	-0.2223	-0.0525
		0.2500		0.1218	0.1097	0.1716	0.1883	-0.1465	-0.0418
		0.3750		0.1221	0.1095	0.1711	0.1877	-0.1484	-0.0393
	45°	0.5000		0.1228	0.1112	0.1534	0.1666	-0.1330	-0.0336
6-5 S	Room Temp.	Break	0.127	0.1124	0.0763	0.4683	0.6322	-0.5100	-0.1222
		0.0625		0.1195	0.0975	0.2776	0.3265	-0.2648	-0.0617
		0.1250		0.1207	0.1051	0.2135	0.2412	-0.1895	-0.0517
		0.2500		0.1216	0.1086	0.1812	0.1974	-0.1540	-0.0434
		0.3750		0.1221	0.1109	0.1605	0.1775	-0.1357	-0.0418
		0.5000		0.1224	0.1116	0.1531	0.1663	-0.1294	-0.0369
6-8 L		Break	0.125	0.1094	0.0771	0.4602	0.6127	-0.4838	-0.1289
		0.0625		0.1165	0.9063	0.2820	0.3314	-0.2610	-0.0704
		0.1250		0.1182	0.1007	0.2382	0.2721	-0.2162	-0.0559
		0.2500		0.1201	0.1067	0.1799	0.1984	-0.1584	-0.0400
		0.3750		0.1214	0.1125	0.1259	0.1347	-0.1055	-0.0292
	22.5°	0.5000		0.1217	0.1129	0.1206	0.1287	-0.1020	-0.-267
6-8 S	Room Temp.	Break	0.125	0.1104	0.0776	0.4518	0.6016	-0.4773	-0.1243
		0.0625		0.1169	0.0949	0.2900	0.3428	-0.2758	-0.0670

SCHEDULE 6 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1202	0.1052	0.1907	0.2116	-0.1725	-0.0391
		0.2500		0.1214	0.1114	0.1345	0.1446	-0.1154	-0.0292
		0.3750		0.1211	0.1099	0.1482	0.1606	-0.1289	-0.0317
		0.5000		0.1216	0.1121	0.1276	0.1366	-0.1090	-0.0276
6-30 L		Break	0.126	0.1092	0.0842	0.4208	0.5473	-0.4032	-0.1441
		0.0625		0.1174	0.1032	0.2369	0.2705	-0.1998	-0.0707
		0.1250		0.1194	0.1080	0.1878	0.2081	-0.1543	-0.0538
	RD	0.2500		0.1202	0.1121	0.1513	0.1641	-0.1170	-0.0471
	Room	0.3750		0.1209	0.1131	0.1387	0.1494	-0.1081	-0.0413
	Temp.	0.5000		0.1218	0.1147	0.1200	0.1277	-0.0939	-0.0338
6-30 S	RD	Break	0.126	0.1074	0.0798	0.4602	0.6169	-0.4570	-0.1599
	Room	0.0625		0.1178	0.1012	0.2491	0.2864	-0.2192	-0.0672
	Temp.	0.1250		0.1205	0.1095	0.1689	0.1852	-0.1405	-0.0447
		0.2500		0.1215	0.1134	0.1321	0.1418	-0.1055	-0.0363
		0.3750		0.1227	0.1153	0.1089	0.1151	-0.0886	-0.0265
6-35 L		Break	0.125	0.1064	0.0752	0.4879	0.6715	-0.5100	-0.1615
		0.0625		0.1160	0.0959	0.2880	0.3398	-0.2652	-0.0746
		0.1250		0.1185	0.1037	0.2135	0.2410	-0.1876	-0.0534
		0.2500		0.1193	0.1100	0.1601	0.1751	-0.1280	-0.0471
		0.3750		0.1195	0.1119	0.1442	0.1751	-0.1110	-0.0450
	RD	0.5000		0.1195	0.1094	0.1633	0.1780	-0.1330	-0.0450
	Room								
6-35 S	Temp.	Break	0.125	0.1064	0.0745	0.4927	0.6795	-0.5180	-0.1615
		0.0625		0.1160	0.0974	0.2769	0.3244	-0.2498	-0.0746
		0.1250		0.1196	0.1087	0.1680	0.1839	-0.1399	-0.0440
		0.2500		0.1214	0.1147	0.1088	0.1155	-0.0861	-0.0294
		0.3750		0.1215	0.1126	0.1244	0.1328	-0.1044	-0.0284

SCHEDULE 6 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
6-23 L		Break	0.125	0.1040	0.0757	0.4961	0.6855	-0.5015	-0.1839
		0.0625		0.1143	0.0952	0.3036	0.3618	-0.2723	-0.0895
		0.1250		0.1184	0.1056	0.1998	0.2229	-0.1687	-0.0542
	RD	0.2500		0.1192	0.1082	0.1746	0.1918	-0.1443	-0.0475
	302°F	0.3750		0.1201	0.1090	0.1622	0.1770	-0.1370	-0.0400
		0.5000		0.1215	0.1137	0.1159	0.1232	-0.0948	-0.0284
6-23 S	RD	Break	0.125	0.1043	0.0765	0.4894	0.6721	-0.4910	-0.1810
	302°F	0.0625		0.1152	0.0951	0.2988	0.3550	-0.2734	-0.0816
		0.1250		0.1182	0.1025	0.2246	0.2544	-0.1984	-0.0559
		0.2500		0.1209	0.1108	0.1427	0.1539	-0.1206	-0.0334
		0.3750		0.1225	0.1160	0.0906	0.0949	-0.0747	-0.0202
		0.5000		0.1229	0.1184	0.0687	0.0712	-0.0542	-0.0169
6-15 L		Break	0.124	0.0953	0.0588	0.6356	1.0094	-0.7461	-0.2632
		0.0625		0.1130	0.0883	0.3511	0.4324	-0.3395	-0.0929
		0.1250		0.1175	0.1007	0.2305	0.2620	-0.2081	-0.0538
		0.2500		0.1203	0.1105	0.1355	0.1456	-0.1153	-0.0303
	RD	0.3750		0.1206	0.1096	0.1404	0.1512	-0.1234	-0.0278
	572°F								
6-15 S		Break	0.124	0.0941	0.0584	0.6426	1.0289	-0.7530	-0.2759
		0.0625		0.1113	0.0868	0.3717	0.4647	-0.3567	-0.1080
		0.1250		0.1170	0.1010	0.2315	0.2633	-0.2052	-0.0581
		0.2500		0.1218	0.1156	0.0843	0.0880	-0.0702	-0.0179
		0.3750		0.1225	0.1168	0.0695	0.0720	-0.0598	-0.0122
		0.5000		0.1232	0.1180	0.0545	0.0561	-0.0496	-0.0065
6-18 L		Break	0.125	0.0966	0.0610	0.6229	0.9752	-0.7174	-0.2577
		0.0625		0.1133	0.0869	0.3699	0.4618	-0.3636	-0.0983
		0.1250		0.1174	0.0954	0.2832	0.3330	-0.2702	-0.0627
		0.2500		0.1200	0.1043	0.1990	0.2219	-0.1810	-0.0408

SCHEDULE 6 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
6-18 S	RD 572°F	0.3750		0.1195	0.1026	0.2153	0.2425	-0.1975	-0.0450
		0.5000		0.1198	0.1028	0.2118	0.2380	-0.1955	-0.0425
		Break	0.125	0.1030	0.0653	0.5695	0.8429	-0.6493	-0.1936
		0.0625		0.1150	0.0898	0.3391	0.4141	-0.3307	-0.0834
		0.1250		0.1175	0.0974	0.2676	0.3114	-0.2495	-0.0619
		0.2500		0.1188	0.0974	0.2595	0.3004	-0.2495	-0.0509

SCHEDULE 7

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
7-17 L		Break	0.125	0.1145	0.0898	0.3420	0.4187	-0.3310	-0.0877
		0.0625		0.1189	0.1030	0.2162	0.2438	-0.1938	-0.0500
		0.1250		0.1210	0.1101	0.1474	0.1595	-0.1270	-0.0325
	TD	0.2500		0.1217	0.1153	0.1020	0.1074	-0.0807	-0.0267
	Room	0.3750		0.1213	0.1149	0.1080	0.1142	-0.0842	-0.0300
	Temp.	0.5000		0.1216	0.1171	0.0887	0.0928	-0.0652	-0.0276
7-4 L		Break	0.125	0.1083	0.1018	0.2944	0.3490	-0.2055	-0.1435
		0.0625		0.1151	0.1107	0.1845	0.2039	-0.1215	-0.0824
		0.1250		0.1167	0.1145	0.1448	0.1563	-0.0877	-0.0686
		0.2500		0.1164	0.1149	0.1440	0.1554	-0.0842	-0.0712
		0.3750		0.1163	0.1142	0.1500	0.1624	-0.0903	-0.0721
	RD	0.5000		0.1171	0.1134	0.1501	0.1625	-0.0973	-0.0652
	Room								
7-4 S	Temp.	Break	0.125	0.1060	0.1004	0.3189	0.3832	-0.2182	-0.1650
		0.0625		0.1140	0.1102	0.1960	0.2181	-0.1261	-0.0920
		0.1250		0.1170	0.1138	0.1479	0.1599	-0.0938	-0.0661
		0.2500		0.1182	0.1157	0.1248	0.1331	-0.0772	-0.0559
7-13 L		Break	0.125	0.1106	0.0977	0.3084	0.3693	-0.2468	-0.1225
		0.0625		0.1157	0.1089	0.1936	0.2152	-0.1380	-0.0772
	RD	0.1250		0.1172	0.1146	0.1404	0.1512	-0.0868	-0.0644
	Room	0.2500		0.1193	0.1166	0.1097	0.1161	-0.0695	-0.0466
	Temp.	0.3750		0.1203	0.1192	0.0823	0.0858	-0.0475	-0.0383

SCHEDULE 8

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
8-1 L		Break	0.126	0.1183	0.0778	0.4203	0.5454	-0.4825	-0.0629
		0.0625		0.1224	0.0999	0.2298	0.2621	-0.2325	-0.0296
		0.1250		0.1235	0.1084	0.1568	0.1707	-0.1505	-0.0202
		0.2500		0.1240	0.1138	0.1112	0.1177	-0.1016	-0.0161
		0.3750		0.1242	0.1148	0.1019	0.1069	-0.0923	-0.0146
	TD Room Temp.	0.5000		0.1243	0.1154	0.0965	0.1016	-0.0877	-0.0139
8-2 L		Break	0.125	0.1165	0.0733	0.4535	0.6064	-0.5342	-0.0704
		0.0625		0.1216	0.0984	0.2342	0.2667	-0.2390	-0.0277
		0.1250		0.1228	0.1077	0.1536	0.1666	-0.1486	-0.0180
		0.2500		0.1232	0.1127	0.1114	0.1177	-0.1032	-0.0145
		0.3750		0.1230	0.1119	0.1191	0.1275	-0.1114	-0.0161
		0.5000		0.1228	0.1110	0.1276	0.1369	-0.1189	-0.0180
8-4 L		Break	0.125	0.1154	0.0707	0.4778	0.6556	-0.5760	-0.0796
		0.0625		0.1200	0.0923	0.2911	0.3441	-0.3033	-0.0408
		0.1250		0.1214	0.1005	0.2192	0.2477	-0.2183	-0.0294
		0.2500		0.1223	0.1074	0.1594	0.1733	-0.1521	-0.0212
		0.3750		0.1229	0.1106	0.1301	0.1391	-0.1225	-0.0166
	67.5° Room Temp.	0.5000		0.1232	0.1130	0.1090	0.1156	-0.1010	-0.0146
8-4 S		Break	0.125	0.1141	0.0651	0.5246	0.7444	-0.6534	-0.0910
		0.0625		0.1200	0.0898	0.3103	0.3723	-0.3315	-0.0408
		0.1250		0.1212	0.0989	0.2328	0.2646	-0.2341	-0.0308
		0.2500		0.1223	0.1064	0.1672	0.1822	-0.1610	-0.0212
		0.3750		0.1228	0.1103	0.1331	0.1431	-0.1251	-0.0180
		0.5000		0.1232	0.1124	0.1138	0.1201	-0.1055	-0.0146
8-6 L		Break	0.124	0.1135	0.0689	0.4914	0.6776	-0.5892	-0.0884
		0.0625		0.1190	0.0909	0.2965	0.3521	-0.3108	-0.0413
		0.1250		0.1205	0.0987	0.2265	0.2572	-0.2283	-0.0289

SCHEDULE 8 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
	45°	0.2500		0.1200	0.1032	0.1872	0.2077	-0.1834	-0.0243
	Room	0.3750		0.1214	0.1066	0.1584	0.1732	-0.1515	-0.0217
	Temp.	0.5000		0.1221	0.1099	0.1273	0.1367	-0.1211	-0.0156
8-6 S	45°	Break	0.124	0.1142	0.0693	0.4853	0.6643	-0.5820	-0.0823
	Room	0.0625		0.1192	0.0913	0.2922	0.3404	-0.3012	-0.0392
	Temp.	0.1250		0.1207	0.1002	0.2134	0.2400	-0.2132	-0.0268
		0.2500		0.1219	0.1075	0.1478	0.1605	-0.1428	-0.0177
8-8 L		Break	0.125	0.1141	0.0682	0.5020	0.6975	-0.6065	-0.0910
		0.0625		0.1198	0.0917	0.2969	0.3517	-0.3093	-0.0424
		0.1250		0.1212	0.1007	0.2189	0.2463	-0.2159	-0.0304
		0.2500		0.1221	0.1076	0.1592	0.1728	-0.1496	-0.0232
		0.3750		0.1226	0.1110	0.1290	0.1381	-0.1189	-0.0192
	22.5°	0.5000		0.1229	0.1126	0.1143	0.1215	-0.1044	-0.0171
	Room								
8-8 S	Temp.	Break	0.125	0.1132	0.0663	0.5197	0.7326	-0.6340	-0.0986
		0.0625		0.1198	0.0910	0.3023	0.3601	-0.3177	-0.0424
		0.1250		0.1214	0.1014	0.2122	0.2384	-0.2090	-0.0294
		0.2500		0.1227	0.1095	0.1401	0.1506	-0.1325	-0.0181
		0.3750		0.1231	0.1122	0.1160	0.1227	-0.1076	-0.0151
		0.5000		0.1235	0.1141	0.0982	0.1025	-0.0904	-0.0121
8-27 L		Break	0.125	0.1169	0.0741	0.4456	0.5907	-0.5235	-0.0672
		0.0625		0.1216	0.0940	0.2684	0.3124	-0.2850	-0.0274
	RD	0.1250		0.1229	0.1026	0.1930	0.2144	-0.1973	-0.0171
	Room								
8-27 S	Temp.	Break	0.125	0.1162	0.0721	0.4638	0.6226	-0.5500	-0.0726
		0.0625		0.1210	0.0936	0.2752	0.3215	-0.2890	-0.0325
		0.1250		0.1226	0.1027	0.1942	0.2152	-0.1960	-0.0192
		0.2500		0.1235	0.1089	0.1392	0.1502	-0.1381	-0.0121

SCHEDULE 8 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
8-31 L		Break	0.125	0.1133	0.0714	0.4823	0.6576	-0.5595	-0.0981
		0.0625		0.1192	0.0918	0.2997	0.3563	-0.3092	-0.0471
		0.1250		0.1206	0.0997	0.2305	0.2613	-0.2257	-0.0356
	RD	0.2500		0.1220	0.1059	0.1731	0.1903	-0.1660	-0.0243
	Room	0.3750		0.1229	0.1098	0.1364	0.1466	-0.1295	-0.0171
	Temp.	0.5000		0.1235	0.1128	0.1084	0.1152	-0.1031	-0.0121
8-21 L		Break	0.125	0.1122	0.0634	0.5447	0.7869	-0.6788	-0.1080
		0.0625		0.1188	0.0821	0.3758	0.4712	-0.4204	-0.0509
		0.1250		0.1203	0.0900	0.3071	0.3668	-0.3285	-0.0383
		0.2500		0.1216	0.0978	0.2389	0.2730	-0.2454	-0.0276
		0.3750		0.1226	0.1031	0.1910	0.2120	-0.1926	-0.0194
	RD	0.5000		0.1233	0.1064	0.1604	0.1768	-0.1611	-0.0137
	302°F								
8-21 S		Break	0.125	0.1160	0.0672	0.5011	0.6954	-0.6206	-0.0747
		0.0625		0.1191	0.0836	0.3628	0.4506	-0.4023	-0.0484
		0.1250		0.1211	0.0914	0.2916	0.3448	-0.3131	-0.0317
		0.2500		0.1225	0.1009	0.2089	0.2344	-0.2142	-0.0202
		0.3750		0.1231	0.1055	0.1688	0.1849	-0.1696	-0.0153
		0.5000		0.1235	0.1087	0.1408	0.1518	-0.1397	-0.0121
8-13 L		Break	0.125	0.1056	0.0510	0.6553	1.0651	-0.8965	-0.1687
		0.0625		0.1165	0.0755	0.4371	0.5746	-0.5042	-0.0704
		0.1250		0.1190	0.0848	0.3542	0.4372	-0.3880	-0.0492
		0.2500		0.1210	0.0947	0.2666	0.3101	-0.2776	-0.0325
		0.3750		0.1222	0.1014	0.2070	0.2319	-0.2092	-0.0226
	RD	0.5000		0.1233	0.1070	0.1556	0.1692	-0.1555	-0.0137
	572°F								
8-13 S		Break	0.125	0.1072	0.0528	0.6378	1.0154	-0.8618	-0.1536
		0.0625		0.1172	0.0754	0.4344	0.5699	-0.5055	-0.0644
		0.1250		0.1198	0.0857	0.3429	0.4200	-0.3775	-0.0425

SCHEDULE 8 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1221	0.0973	0.2397	0.2740	-0.2505	-0.0235
		0.3750		0.1232	0.1044	0.1768	0.1946	-0.1801	-0.0145
		0.5000		0.1239	0.1097	0.1301	0.1394	-0.1306	-0.0088
8-15 L		Break	0.125	0.1073	0.0513	0.6477	1.0433	-0.8906	-0.1527
		0.0625		0.1176	0.0766	0.4235	0.5507	-0.4897	-0.0610
		0.1250		0.1202	0.0879	0.3238	0.3913	-0.3521	-0.0392
		0.2500		0.1221	0.0995	0.2225	0.2516	-0.2282	-0.0235
	RD	0.3750		0.1232	0.1061	0.1634	0.1784	-0.1639	-0.0145
	572°F	0.5000		0.1241	0.1108	0.1200	0.1278	-0.1206	-0.0072
8-15 S	RD	Break	0.125	0.1105	0.0561	0.6033	0.9245	-0.8012	-0.1233
	572°F	0.0625		0.1186	0.0781	0.4072	0.5229	-0.4703	-0.0526
		0.1250		0.1206	0.0873	0.3262	0.3948	-0.3590	-0.0358
		0.2500		0.1220	0.0952	0.2567	0.2966	-0.2723	-0.0243
		0.2750		0.1231	0.1012	0.2027	0.2265	-0.2112	-0.0153
		0.5000		0.1236	0.1060	0.1615	0.1761	-0.1649	-0.0113

SCHEDULE 9

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
9-17 L		Break	0.125	0.1172	0.0732	0.4509	0.6003	-0.5359	-0.0644
		0.0625		0.1215	0.0946	0.2644	0.3074	-0.2790	-0.0284
		0.1250		0.1224	0.1032	0.1916	0.2126	-0.1916	-0.0210
		0.2500		0.1232	0.1110	0.1248	0.1334	-0.1189	-0.0145
		0.3750		0.1234	0.1155	0.0878	0.0919	-0.0790	-0.0129
	TD Room Temp.	0.5000		0.1237	0.1165	0.0777	0.0808	-0.0704	-0.0104
9-17 S		Break	0.125	0.1159	0.0684	0.4926	0.6785	-0.6030	-0.0755
		0.0625		0.1213	0.0926	0.2811	0.3305	-0.3005	-0.0300
		0.1250		0.1226	0.1023	0.1973	0.2199	-0.2006	-0.0193
		0.2500		0.1237	0.1112	0.1196	0.1274	-0.1170	-0.0104
9-19 S		Break	0.125	0.1162	0.0685	0.4906	0.6749	-0.6020	-0.0729
	TD Room Temp.	0.0625		0.1213	0.0930	0.2780	0.3260	-0.2960	-0.0300
		0.1250		0.1229	0.1029	0.1906	0.2115	-0.1946	-0.0169
		0.2500		0.1241	0.1121	0.1097	0.1170	-0.1090	-0.0080
		0.3750		0.1241	0.1135	0.0985	0.1044	-0.0964	-0.0080
9-2 L		Break	0.125	0.1146	0.0730	0.4646	0.6249	-0.5381	-0.0868
		0.0625		0.1201	0.0926	0.2882	0.3405	-0.3005	-0.0400
		0.1250		0.1217	0.1010	0.2133	0.2399	-0.2132	-0.0267
		0.2500		0.1233	0.1093	0.1375	0.1481	-0.1344	-0.0137
		0.3750		0.1239	0.1126	0.1071	0.1140	-0.1045	-0.0095
	RD Room Temp.	0.5000		0.1240	0.1130	0.1032	0.1092	-0.1010	-0.0082
9-2 S		Break	0.125	0.1142	0.0712	0.4796	0.6541	-0.5638	-0.0903
		0.0625		0.1199	0.0920	0.2940	0.3485	-0.3069	-0.0416
		0.1250		0.1215	0.1005	0.2185	0.2466	-0.2182	-0.0284
		0.2500		0.1228	0.1082	0.1496	0.1631	-0.1454	-0.0177
		0.3750		0.1234	0.1110	0.1234	0.1318	-0.1189	-0.0129
		0.5000		0.1239	0.1132	0.1024	0.1086	-0.0991	-0.0095

SCHEDULE 9 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
9-10 L		Break	0.125	0.1146	0.0706	0.4822	0.6569	-0.5701	-0.0868
		0.0625		0.1202	0.0918	0.2938	0.3471	-0.3079	-0.0392
		0.1250		0.1217	0.1012	0.2118	0.2379	-0.2112	-0.0267
	RD	0.2500		0.1224	0.1058	0.1712	0.1880	-0.1670	-0.0210
	Room	0.3750		0.1228	0.1067	0.1614	0.1761	-0.1584	-0.0177
	Temp.	0.5000		0.1234	0.1105	0.1273	0.1364	-0.1235	-0.0129

SCHEDULE 10

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
10-7 S		Break	0.125	0.1042	0.0673	0.5512	0.8016	-0.6200	-0.1816
		0.0625		0.1152	0.0918	0.3232	0.3906	-0.2094	-0.0812
		0.1250		0.1190	0.1028	0.2171	0.2447	-0.1955	-0.0492
		0.2500		0.1215	0.1115	0.1330	0.1428	-0.1144	-0.0284
		0.3750		0.1220	0.1135	0.1138	0.1206	-0.0964	-0.0243
	TD	0.5000		0.1222	0.1138	0.1100	0.1156	-0.0934	-0.0222
	Room								
10-7 L	Temp.	Break	0.125	0.1071	0.0729	0.5003	0.6934	-0.5390	-0.1544
		0.0625		0.1160	0.0944	0.2992	0.3554	-0.2807	-0.0747
		0.1250		0.1184	0.1003	0.2400	0.2738	-0.2194	-0.0544
		0.2500		0.1207	0.1080	0.1657	0.1807	-0.1461	-0.0346
		0.3750		0.1225	0.1136	0.1094	0.1156	-0.0954	-0.0202
		0.5000		0.1232	0.1163	0.0830	0.0855	-0.0714	-0.0141
10-8 S		Break	0.124	0.1045	0.0728	0.5052	0.7048	-0.5333	-0.1715
		0.0625		0.1150	0.0962	0.2805	0.3289	-0.2537	-0.0752
		0.1250		0.1178	0.1038	0.2048	0.2293	-0.1780	-0.0513
		0.2500		0.1211	0.1121	0.1171	0.1248	-0.1010	-0.0238
		0.3750		0.1227	0.1167	0.0687	0.0713	-0.0608	-0.0105
	TD	0.5000		0.1227	0.1174	0.0632	0.0660	-0.0555	-0.0105
	Room								
10-8 L	Temp.	Break	0.124	0.1032	0.0705	0.5268	0.7484	-0.5650	-0.1834
		0.0625		0.1145	0.0951	0.2918	0.3449	-0.2653	-0.0796
		0.1250		0.1181	0.1041	0.2004	0.2236	-0.1744	-0.0492
		0.2500		0.1206	0.1115	0.1255	0.1344	-0.1065	-0.0279
		0.3750		0.1217	0.1139	0.0985	0.1048	-0.0855	-0.0193
		0.5000		0.1222	0.1154	0.0829	0.0876	-0.0725	-0.0151
10-1 L		Break	0.125	0.1009	0.0801	0.4828	0.6595	-0.4450	-0.2145
		0.0625		0.1122	0.0997	0.2841	0.3334	-0.2258	-0.1076

SCHEDULE 10 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1164	0.1071	0.2022	0.2259	-0.1544	-0.0715
	RD	0.2500		0.1191	0.1128	0.1402	0.1507	-0.1026	-0.0481
	Room	0.3750		0.1201	0.1144	0.1207	0.1282	-0.0890	-0.0392
	Temp.	0.5000		0.1208	0.1158	0.1047	0.1114	-0.0768	-0.0346
10-2 L		Break	0.125	0.0988	0.0791	0.4998	0.6921	-0.4575	-0.2346
		0.0625		0.1118	0.0985	0.2952	0.3498	-0.2383	-0.1115
		0.1250		0.1162	0.1067	0.2065	0.2305	-0.1579	-0.0726
	RD	0.2500		0.1188	0.1118	0.1500	0.1629	-0.1121	-0.0508
	Room	0.3750		0.1197	0.1131	0.1336	0.1432	-0.0998	-0.0434
	Temp.	0.5000		0.1196	0.1136	0.1305	0.1393	-0.0954	-0.0439
10-6 L		Break	0.123	0.0812	0.0598	0.6790	1.1365	-0.7212	-0.4153
		0.0625		0.1035	0.0882	0.3966	0.5052	-0.3326	-0.1726
		0.1250		0.1095	0.0985	0.2871	0.3384	-0.2221	-0.1163
		0.2500		0.1110	0.1011	0.2582	0.2987	-0.1961	-0.1026
		0.2750		0.1126	0.1051	0.2178	0.2456	-0.1573	-0.0883
	RD 572°F	0.5000		0.1151	0.1085	0.1745	0.1918	-0.1254	-0.0664
10-6 S		Break	0.123	0.0828	0.0610	0.6662	1.0971	-0.7013	-0.3958
		0.0625		0.1051	0.0896	0.3776	0.4741	-0.3168	-0.1573
		0.1250		0.1106	0.1006	0.2646	0.3073	-0.2010	-0.1063
		0.2500		0.1147	0.1067	0.1911	0.2120	-0.1422	-0.0699
10-9 L		Break	0.124	0.0925	0.0495	0.7022	1.2114	-0.9183	-0.2931
		0.0625		0.1093	0.0806	0.4271	0.5570	-0.4308	-0.1262
		0.1250		0.1145	0.0941	0.2993	0.3556	-0.2759	-0.0797
		0.2500		0.1170	0.1022	0.2223	0.2515	-0.1934	-0.0581
		0.3750		0.1188	0.1070	0.1733	0.1903	-0.1474	-0.0428
	TD 572°F	0.5000		0.1208	0.1116	0.1232	0.1315	-0.1054	-0.0262

SCHEDULE 10 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
10-9 S		Break	0.124	0.0910	0.0474	0.7195	1.2711	-0.9617	-0.3094
		0.0625		0.0905	0.0798	0.5303	0.7557	-0.4408	-0.3149
		0.1250		0.1143	0.0926	0.3116	0.3734	-0.2920	-0.0814
		0.2500		0.1183	0.1026	0.2106	0.2365	-0.1894	-0.0471
		0.3750		0.1177	0.1006	0.2299	0.2613	-0.2091	-0.0521
		0.5000		0.1201	0.1060	0.1720	0.1888	-0.1568	-0.0320
10-10 L		Break	0.125	0.0929	0.0498	0.7039	1.2171	-0.9203	-0.2968
		0.0625		0.1099	0.0823	0.4211	0.5467	-0.4179	-0.1287
		0.1250		0.1148	0.0931	0.3160	0.3798	-0.2946	-0.0851
		0.2500		0.1188	0.1037	0.2116	0.2377	-0.1868	-0.0509
		0.3750		0.1208	0.1089	0.1581	0.1721	-0.1379	-0.0342
	TD 572°F	0.5000		0.1224	0.1142	0.1054	0.1114	-0.0904	-0.0210
10-10 S		Break	0.125	0.0930	0.0490	0.7084	1.2322	-0.9365	-0.2957
		0.0625		0.1102	0.0821	0.4210	0.5464	-0.4204	-0.1260
		0.1250		0.1150	0.0938	0.3096	0.3705	-0.2872	-0.0834
		0.2500		0.1198	0.1052	0.1934	0.2149	-0.1724	-0.0425
		0.3750		0.1198	0.1054	0.1919	0.2130	-0.1706	-0.0425
		0.5000		0.1199	0.1056	0.1897	0.2103	-0.1687	-0.0417
10-4 L		Break	0.124	0.0930	0.0766	0.5367	0.7694	-0.4817	-0.2877
		0.0625		0.1072	0.0960	0.3307	0.4015	-0.2559	-0.1456
		0.1250		0.1117	0.1027	0.2539	0.2929	-0.1885	-0.1045
		0.2500		0.1164	0.1102	0.1658	0.1812	-0.1180	-0.0632
		0.3750		0.1185	0.1134	0.1260	0.1347	-0.0894	-0.0454
		0.5000		0.1194	0.1147	0.1093	0.1158	-0.0780	-0.0378
10-4 S	RD 302°F	Break	0.124	0.0938	0.0767	0.5321	0.7595	-0.4804	-0.2791
		0.0625		0.1075	0.0953	0.3337	0.4060	-0.2632	-0.1428
		0.1250		0.1162	0.1037	0.2163	0.2438	-0.1788	-0.0650
		0.2500		0.1166	0.1105	0.1620	0.1768	-0.1153	-0.0615
		0.3750		0.1184	0.1129	0.1306	0.1400	-0.0938	-0.0462
		0.5000		0.1195	0.1148	0.1078	0.1141	-0.0771	-0.0370

SCHEDULE 10 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
10-5 L		Break	0.124	0.0804	0.0592	0.6904	1.1726	-0.7394	-0.4333
		0.0625		0.1036	0.0886	0.4030	0.5159	-0.3362	-0.1797
		0.1250		0.1110	0.1103	0.2759	0.3229	-0.2121	-0.1108
		0.2500		0.1147	0.1071	0.2011	0.2245	-0.1465	-0.0780
	RD	0.3750		0.1172	0.1102	0.1600	0.1744	-0.1180	-0.0564
	572°F	0.5000		0.1188	0.1147	0.1138	0.1208	-0.0780	-0.0428
10-5 S	RD	Break	0.124	0.0797	0.0576	0.7104	1.2088	-0.7668	-0.4420
	572°F	0.0625		0.1027	0.0884	0.4096	0.5269	-0.3384	-0.1885
		0.1250		0.1092	0.0992	0.2961	0.3512	-0.2231	-0.1280
		0.2500		0.1127	0.1025	0.2487	0.2860	-0.1904	-0.0956
		0.3750		0.1153	0.1063	0.2029	0.2268	-0.1540	-0.0727
		0.5000		0.1181	0.1118	0.1413	0.1523	-0.1036	-0.0488

SCHEDULE 11

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
11-1 L		Break	0.124	0.0990	0.0792	0.4901	0.6735	-0.4483	-0.2252
		0.0625		0.1090	0.0948	0.3280	0.3974	-0.2685	-0.1289
		0.1250		0.1144	0.1042	0.2247	0.2546	-0.1740	-0.0806
		0.2500		0.1165	0.1073	0.1870	0.2070	-0.1446	-0.0624
		0.3750		0.1172	0.1091	0.1684	0.1844	-0.1280	-0.0564
	TD	0.5000		0.1183	0.1113	0.1437	0.1551	-0.1080	-0.0471
	Room								
11-1 S	Temp.	Break	0.125	0.0993	0.0795	0.4866	0.6667	-0.4445	-0.2221
		0.0625		0.1089	0.0941	0.3335	0.4058	-0.2759	-0.1298
		0.1250		0.1136	0.1015	0.2501	0.2878	-0.2002	-0.0876
		0.2500		0.1196	0.1127	0.1234	0.1317	-0.0956	-0.0361
		0.3750		0.1211	0.1163	0.0840	0.0878	-0.0641	-0.0237
		0.5000		0.1208	0.1165	0.0847	0.0885	-0.0624	-0.0262
11-2 L		Break	0.125	0.0982	0.0775	0.5050	0.7033	-0.4700	-0.2333
		0.0625		0.1097	0.0963	0.3130	0.3754	-0.2528	-0.1225
		0.1250		0.1131	0.1015	0.2534	0.2922	-0.2002	-0.0920
		0.2500		0.1168	0.1080	0.1796	0.1980	-0.1382	-0.0598
		0.3750		0.1192	0.1121	0.1310	0.1404	-0.1009	-0.0395
	TD	0.5000		0.1211	0.1163	0.0840	0.0878	-0.0641	-0.0237
	Room								
11-2 S	Temp.	Break	0.124	0.0980	0.0797	0.4920	0.6773	-0.4420	-0.2353
		0.0625		0.1103	0.0967	0.3063	0.3658	-0.2487	-0.1171
		0.1250		0.1143	0.1038	0.2284	0.2593	-0.1778	-0.0814
		0.2500		0.1165	0.1080	0.1817	0.2005	-0.1382	-0.0624
		0.3750		0.1193	0.1127	0.1256	0.1342	-0.0956	-0.0386
		0.5000		0.1211	0.1167	0.0809	0.0843	-0.0607	-0.0237
11-11 S		Break	0.124	0.0994	0.0868	0.4389	0.5778	-0.3567	-0.2211
		0.0625		0.1111	0.1043	0.2464	0.2829	-0.1730	-0.1098

SCHEDULE 11 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
	45°	0.1250		0.1158	0.1112	0.1625	0.1774	-0.1090	-0.0684
	Room	0.2500		0.1194	0.1159	0.1000	0.1054	-0.0676	-0.0378
	Temp.	0.3750		0.1208	0.1178	0.0745	0.0774	-0.0513	-0.0262
11-11 L	45°	Break	0.124	0.1008	0.0878	0.4244	0.5524	-0.3452	-0.2071
	Room	0.0625		0.1102	0.1035	0.2582	0.2987	-0.1807	-0.1180
	Temp.	0.1250		0.1130	0.1076	0.2992	0.2348	-0.1419	-0.0929
		0.2500		0.1147	0.1099	0.1802	0.1987	-0.1207	-0.0780
		0.3750		0.1167	0.1128	0.1439	0.1553	-0.0947	-0.0607
		0.5000		0.1184	0.1145	0.1183	0.1259	-0.0797	-0.0462
11-12 S		Break	0.122	0.0951	0.0839	0.4639	0.6235	-0.3744	-0.2491
		0.0625		0.1175	0.1039	0.1798	0.1982	-0.1606	-0.0376
		0.1250		0.1130	0.1082	0.1785	0.1967	-0.1200	-0.0766
		0.2500		0.1168	0.1134	0.1101	0.1167	-0.0731	-0.0436
	45°	0.3750		0.1175	0.1145	0.0961	0.1010	-0.0634	-0.0376
	Room								
11-12 L	Temp.	Break	0.122	0.0961	0.0855	0.4480	0.5941	-0.3555	-0.2386
		0.0625		0.1080	0.1006	0.2700	0.3148	-0.1929	-0.1219
		0.1250		0.1111	0.1052	0.2148	0.2418	-0.1482	-0.0936
		0.2500		0.1125	0.1071	0.1905	0.2113	-0.1303	-0.0811
		0.3750		0.1121	0.1061	0.2009	0.2243	-0.1396	-0.0846
		0.5000		0.1145	0.1103	0.1515	0.1643	-0.1008	-0.0634
11-6 S		Break	0.123	0.0942	0.0883	0.4502	0.5982	-0.3314	-0.2668
		0.0625		0.1067	0.1027	0.2757	0.3225	-0.1804	-0.1422
		0.1250		0.1104	0.1073	0.2170	0.2446	-0.1366	-0.1081
		0.2500		0.1135	0.1115	0.1635	0.1785	-0.0982	-0.0804
	RD	0.3750		0.1164	0.1142	0.1214	0.1294	-0.0742	-0.0552
	Room	0.5000		0.1177	0.1160	0.0976	0.1026	-0.0586	-0.0440
	Temp.								

SCHEDULE 11 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
11-6 L		Break	0.123	0.0938	0.0873	0.4587	0.6138	-0.3428	-0.2710
		0.0625		0.1067	0.1031	0.2729	0.3186	-0.1765	-0.1422
		0.1250		0.1118	0.1088	0.1960	0.2182	-0.1227	-0.0955
		0.2500		0.1148	0.1132	0.1410	0.1520	-0.0830	-0.0690
		0.3750		0.1170	0.1158	0.1045	0.1103	-0.0603	-0.0500
		0.5000		0.1185	0.1170	0.0836	0.0873	-0.0500	-0.0373
11-7 S		Break	0.124	0.0961	0.0925	0.4219	0.5480	-0.2931	-0.2549
		0.0625		0.1073	0.1061	0.2596	0.3006	-0.1559	-0.1446
		0.1250		0.1116	0.1102	0.2002	0.2234	-0.1180	-0.1054
		0.2500		0.1144	0.1132	0.1578	0.1717	-0.0911	-0.0806
		0.3750		0.1160	0.1155	0.1286	0.1377	-0.0710	-0.0667
	RD Room Temp.	0.5000		0.1158	0.1151	0.1332	0.1429	-0.0745	-0.0684
11-7 L		Break	0.124	0.0959	0.0937	0.4156	0.5372	-0.2802	-0.2570
		0.0625		0.1081	0.1075	0.2442	0.2800	-0.1428	-0.1372
		0.1250		0.1124	0.1112	0.1871	0.2072	-0.1090	-0.0982
		0.2500		0.1150	0.1131	0.1541	0.1674	-0.0920	-0.0754
		0.3750		0.1158	0.1152	0.1324	0.1420	-0.0736	-0.0684
		0.5000		0.1162	0.1155	0.1271	0.1360	-0.0710	-0.0650
11-3 L		Break	0.125	0.0910	0.0721	0.5801	0.8677	-0.5503	-0.3174
		0.0625		0.1028	0.0898	0.4092	0.5263	-0.3307	-0.1955
		0.1250		0.1084	0.0945	0.3444	0.4222	-0.2797	-0.1425
		0.2500		0.1144	0.1052	0.2298	0.2611	-0.1725	-0.0886
		0.3750		0.1163	0.1072	0.2021	0.2258	-0.1536	-0.0721
	TD 302°F	0.5000		0.1172	0.1095	0.1787	0.1968	-0.1324	-0.0644
11-3 S		Break	0.125	0.0928	0.0751	0.5540	0.8074	-0.5095	-0.2979
		0.0625		0.1041	0.0900	0.4004	0.5115	-0.3285	-0.1830
		0.1250		0.1087	0.0971	0.3245	0.3923	-0.2526	-0.1397

SCHEDULE 11 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1125	0.1022	0.2642	0.3067	-0.2014	-0.1054
		0.2750		0.1126	0.1018	0.2664	0.3098	-0.2053	-0.1045
		0.5000		0.1127	0.1024	0.2614	0.3030	-0.1994	-0.1036
11-4 L		Break	0.126	0.0971	0.0787	0.5187	0.7312	-0.4706	-0.2605
		0.0625		0.1068	0.0907	0.3898	0.4940	-0.3287	-0.1653
		0.1250		0.1089	0.0960	0.3415	0.4178	-0.2719	-0.1458
		0.2500		0.1145	0.1040	0.2499	0.2876	-0.1919	-0.0957
	TD	0.3750		0.1171	0.1079	0.2041	0.2283	-0.1551	-0.0732
	302°F	0.5000		0.1179	0.1103	0.1809	0.1995	-0.1331	-0.0665
11-4 S	TD	Break	0.126	0.0953	0.0771	0.5372	0.7704	-0.4912	-0.2792
	302°F	0.0625		0.1052	0.0906	0.3997	0.5102	-0.3298	-0.1804
		0.1250		0.1100	0.0968	0.3293	0.3994	-0.2636	-0.1358
		0.2500		0.1157	0.1062	0.2260	0.2562	-0.1710	-0.0853
		0.3750		0.1177	0.1079	0.2001	0.2232	-0.1551	-0.0681
		0.5000		0.1187	0.1103	0.1753	0.1928	-0.1331	-0.0597
11-8 S		Break	0.123	0.0886	0.0871	0.4899	0.6732	-0.3451	-0.3280
		0.0625		0.1023	0.1010	0.3170	0.3813	-0.1971	-0.1843
		0.1250		0.1078	0.1065	0.2412	0.2760	-0.1440	-0.1319
		0.2500		0.1109	0.1101	0.1929	0.2144	-0.1108	-0.1036
		0.3750		0.1139	0.1131	0.1485	0.1608	-0.0839	-0.0769
	RD	0.5000		0.1165	0.1159	0.1075	0.1138	-0.0595	-0.0543
	302°F								
11-8 L		Break	0.123	0.0870	0.0852	0.5100	0.7135	-0.3672	-0.3463
		0.0625		0.1020	0.1003	0.3238	0.3912	-0.2040	-0.1872
		0.1250		0.1073	0.1052	0.2539	0.2929	-0.1563	-0.1366
		0.2500		0.1080	0.1069	0.2369	0.2703	-0.1403	-0.1300
		0.3750		0.1103	0.1099	0.1988	0.2216	-0.1126	-0.1090
		0.5000		0.1127	0.1114	0.1702	0.1865	-0.0991	-0.0874

SCHEDULE 11 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
11-9 S		Break	0.123	0.0899	0.0873	0.4812	0.6563	-0.3428	-0.3135
		0.0625		0.1039	0.1010	0.3064	0.3658	-0.1971	-0.1688
		0.1250		0.1065	0.1047	0.2630	0.3051	-0.1611	-0.1440
		0.2500		0.1109	0.1099	0.1944	0.2162	-0.1126	-0.1036
		0.3750		0.1145	0.1133	0.1425	0.1538	-0.0822	-0.0716
	RD 302°F	0.5000		0.1167	0.1160	0.1052	0.1112	-0.0586	-0.0526
11-9 L		Break	0.123	0.0862	0.0846	0.5180	0.7298	-0.3742	-0.3555
		0.0625		0.0992	0.0986	0.3535	0.4362	-0.2211	-0.2150
		0.1250		0.1048	0.1025	0.2900	0.3424	-0.1823	-0.1601
		0.2500		0.1076	0.1066	0.2418	0.2769	-0.1431	-0.1338
		0.3750		0.1074	0.1053	0.2525	0.2910	-0.1554	-0.1356
		0.5000		0.1116	0.1102	0.1871	0.2072	-0.1099	-0.0973
11-5 L		Break	0.124	0.0835	0.0576	0.6872	1.1622	-0.7668	-0.3954
		0.0625		0.1051	0.0906	0.3807	0.4792	-0.3138	-0.1654
		0.1250		0.1137	0.1046	0.2265	0.2569	-0.1701	-0.0867
		0.2500		0.1165	0.1088	0.1756	0.1932	-0.1308	-0.0624
		0.3750		0.1180	0.1120	0.1405	0.1514	-0.1018	-0.0496
	TD 572°F	0.5000		0.1200	0.1136	0.1134	0.1204	-0.0876	-0.0328
11-5 S		Break	0.124	0.0875	0.0649	0.6307	0.9961	-0.6474	-0.3486
		0.0625		0.1055	0.0894	0.3866	0.4887	-0.3272	-0.1616
		0.1250		0.1128	0.1030	0.2444	0.2802	-0.1856	-0.0947
		0.2500		0.1168	0.1084	0.1766	0.1943	-0.1344	-0.0598
		0.3750		0.1186	0.1120	0.1361	0.1463	-0.1018	-0.0445
		0.5000		0.1175	0.1109	0.1525	0.1655	-0.1116	-0.0538
11-10 L		Break	0.124	0.0744	0.0703	0.6598	1.0783	-0.5675	-0.5108
		0.0625		0.0973	0.0956	0.3950	0.5026	-0.2601	-0.2425
		0.1250		0.1058	0.1047	0.2796	0.3279	-0.1692	-0.1587
		0.2500		0.1094	0.1079	0.2323	0.2644	-0.1391	-0.1253

SCHEDULE 11 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1129	0.1110	0.1850	0.2045	-0.1108	-0.0938
	RD	0.5000		0.1148	0.1136	0.1518	0.1647	-0.0876	-0.0771
	572°F								
11-10 S		Break	0.124	0.0778	0.0724	0.6337	1.0042	-0.5381	-0.4661
		0.0625		0.0999	0.0967	0.3717	0.4648	-0.2487	-0.2161
		0.1250		0.1083	0.1061	0.2527	0.2913	-0.1559	-0.1354
		0.2500		0.1129	0.1120	0.1776	0.1956	-0.1018	-0.0938
		0.3750		0.1159	0.1133	0.1460	0.1578	-0.0902	-0.0676
		0.5000		0.1173	0.1167	0.1097	0.1162	-0.0607	-0.0556

SCHEDULE 12

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
12-1 S		Break	0.124	0.1047	0.0788	0.4634	0.6226	-0.4534	-0.1692
		0.0625		0.1134	0.0976	0.2802	0.3288	-0.2394	-0.0894
		0.1250		0.1186	0.1054	0.1870	0.2070	-0.1625	-0.0445
		0.2500		0.1202	0.1131	0.1158	0.1231	-0.0920	-0.0311
		0.3750		0.1211	0.1152	0.0927	0.0973	-0.0736	-0.0237
	TD	0.5000		0.1208	0.1153	0.0942	0.0989	-0.0727	-0.0262
12-1 L	Room Temp.	Break	0.124	0.1036	0.0781	0.4738	0.6420	-0.4623	-0.1797
		0.0625		0.1134	0.0972	0.2831	0.3329	-0.2435	-0.0894
		0.1250		0.1168	0.1039	0.2108	0.2367	-0.1768	-0.0598
		0.2500		0.1193	0.1105	0.1426	0.1539	-0.1153	-0.0386
		0.3750		0.1214	0.1153	0.0897	0.0939	-0.0727	-0.0212
		0.5000		0.1225	0.1176	0.0631	0.0652	-0.0530	-0.0122
12-2 S		Break	0.124	0.1007	0.0750	0.5088	0.7109	-0.5028	-0.2081
		0.0625		0.1119	0.0948	0.3101	0.3712	-0.2685	-0.1029
		0.1250		0.1156	0.1026	0.2286	0.2596	-0.1894	-0.0702
		0.2500		0.1188	0.1106	0.1455	0.1572	-0.1144	-0.0428
		0.3750		0.1201	0.1139	0.1103	0.1169	-0.0850	-0.0320
	TD	0.5000		0.1187	0.1101	0.1500	0.1628	-0.1189	-0.0437
12-2 L	Room Temp.	Break	0.124	0.1003	0.0744	0.5147	0.7229	-0.5108	-0.2121
		0.0625		0.1118	0.0946	0.3122	0.3742	-0.2706	-0.1036
		0.1250		0.1159	0.1027	0.2259	0.2560	-0.1885	-0.0676
		0.2500		0.1197	0.1117	0.1304	0.1398	-0.1045	-0.0353
		0.3750		0.1208	0.1144	0.1012	0.1067	-0.0806	-0.0262
		0.5000		0.1208	0.1143	0.1020	0.1076	-0.0814	-0.0262
12-15 S		Break	0:125	0.1036	0.0835	0.4464	0.5912	-0.4035	-0.1878
		0.0625		0.1137	0.0997	0.2745	0.3209	-0.2262	-0.0948
		0.1250		0.1172	0.1072	0.1959	0.2180	-0.1536	-0.0644

SCHEDULE 12 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
	45°	0.2500		0.1207	0.1142	0.1178	0.1254	-0.0904	-0.0350
	Room	0.3750		0.1217	0.1168	0.0903	0.0946	-0.0678	-0.0268
	Temp.	0.5000		0.1226	0.1186	0.0694	0.0719	-0.0526	-0.0194
12-15 L	45°	Break	0.125	0.1028	0.0810	0.4671	0.6294	-0.4339	-0.1955
	Room	0.0625		0.1133	0.0995	0.2785	0.3264	-0.2882	-0.0983
	Temp.	0.1250		0.1169	0.1066	0.2025	0.2262	-0.1592	-0.0670
		0.2500		0.1190	0.1106	0.1577	0.1716	-0.1224	-0.0492
		0.3750		0.1201	0.1128	0.1330	0.1427	-0.1027	-0.0400
		0.5000		0.1207	0.1145	0.1155	0.1227	-0.0877	-0.0350
12-16 S		Break	0.125	0.1027	0.0806	0.4548	0.6065	-0.4388	-0.1677
		0.0625		0.1145	0.0974	0.2862	0.3372	-0.2495	-0.0877
		0.1250		0.1173	0.1041	0.2185	0.2465	-0.1830	-0.0636
	45°	0.2500		0.1192	0.1098	0.1624	0.1772	-0.1296	-0.0475
	Room								
12-16 L	Temp.	Break	0.125	0.1059	0.0798	0.4592	0.6146	-0.4488	-0.1658
		0.0625		0.1143	0.0979	0.2838	0.3338	-0.2444	-0.0895
		0.1250		0.1168	0.1046	0.2181	0.2460	-0.1782	-0.0678
		0.2500		0.1180	0.1088	0.1783	0.1964	-0.1388	-0.0576
		0.3750		0.1201	0.1115	0.1430	0.1543	-0.1143	-0.0400
		0.5000		0.1215	0.1145	0.1096	0.1161	-0.0877	-0.0284
12-8 S		Break	0.124	0.0965	0.0864	0.4578	0.6120	-0.3613	-0.2507
		0.0625		0.1088	0.1024	0.2754	0.3222	-0.1914	-0.1308
		0.1250		0.1125	0.1084	0.2069	0.2318	-0.1344	-0.0973
		0.2500		0.1157	0.1117	0.1587	0.1728	-0.1036	-0.0693
		0.3750		0.1175	0.1147	0.1235	0.1318	-0.0780	-0.0538
	RD	0.5000		0.1184	0.1152	0.1129	0.1198	-0.0736	-0.0462
	Room								
12-8 L	Temp.	Break	0.124	0.0976	0.0875	0.4446	0.5880	-0.3486	-0.2394
		0.0625		0.1097	0.1022	0.2708	0.3159	-0.1934	-0.1225

SCHEDULE 12 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1136	0.1078	0.2036	0.2276	-0.1400	-0.0876
		0.2500		0.1161	0.1113	0.1596	0.1739	-0.1080	-0.0658
		0.3750		0.1169	0.1129	0.1416	0.1527	-0.0938	-0.0590
		0.5000		0.1171	0.1132	0.1379	0.1484	-0.0911	-0.0572
12-9 S		Break	0.125	0.0985	0.0880	0.4452	0.5892	-0.3510	-0.2383
		0.0625		0.1111	0.1033	0.2655	0.3086	-0.1907	-0.1179
		0.1250		0.1153	0.1105	0.1846	0.2041	-0.1233	-0.0808
		0.2500		0.1186	0.1146	0.1301	0.1394	-0.0869	-0.0527
	RD	0.3750		0.1187	0.1150	0.1264	0.1351	-0.0834	-0.0517
12-9 L	Room Temp.	Break	0.125	0.0989	0.0873	0.4474	0.5932	-0.3590	-0.2342
		0.0625		0.1107	0.1037	0.2653	0.3083	-0.1868	-0.1215
		0.1250		0.1148	0.1085	0.2028	0.2267	-0.1416	-0.0851
		0.2500		0.1170	0.1130	0.1539	0.1671	-0.1009	-0.0661
		0.3750		0.1187	0.1148	0.1279	0.1368	-0.0851	-0.0517
		0.5000		0.1198	0.1166	0.1060	0.1120	-0.0696	-0.0425
12-3 S		Break	0.124	0.0947	0.0673	0.5855	0.8807	-0.6111	-0.2696
		0.0625		0.1086	0.0886	0.3742	0.4688	-0.3362	-0.1326
		0.1250		0.1126	0.0970	0.2897	0.3420	-0.2456	-0.0964
		0.2500		0.1158	0.1027	0.2265	0.2569	-0.1885	-0.0684
		0.3750		0.1174	0.1062	0.1891	0.2096	-0.1550	-0.0547
	TD	0.5000		0.1168	0.1058	0.1963	0.2186	-0.1587	-0.0598
12-3 L	302°F	Break	0.124	0.0978	0.0703	0.5528	0.8049	-0.5675	-0.2374
		0.0625		0.1090	0.0902	0.3606	0.4472	-0.3182	-0.1289
		0.1250		0.1136	0.0984	0.2730	0.3118	-0.2312	-0.0876
		0.2500		0.1171	0.1054	0.1973	0.2198	-0.1625	-0.0572
		0.3750		0.1192	0.1092	0.1534	0.1666	-0.1271	-0.0395
		0.5000		0.1202	0.1117	0.1268	0.1356	-0.1045	-0.0311

SCHEDULE 12 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
12-4 S		Break	0.124	0.1001	0.0738	0.5196	0.7330	-0.5189	-0.2141
		0.0625		0.1091	0.0901	0.3607	0.4474	-0.3194	-0.1280
		0.1250		0.1131	0.0977	0.2814	0.3304	-0.2384	-0.0920
		0.2500		0.1163	0.1037	0.2156	0.2429	-0.1788	-0.0641
	TD	0.3750		0.1194	0.1087	0.1559	0.1695	-0.1317	-0.0378
	302°F	0.5000		0.1200	0.1111	0.1329	0.1426	-0.1098	-0.0328
12-4 L	TD	Break	0.124	0.0976	0.0688	0.5633	0.8285	-0.5891	-0.2394
	302°F	0.0625		0.1087	0.0886	0.3736	0.4678	-0.3362	-0.1317
		0.1250		0.1117	0.0950	0.3098	0.3709	-0.2664	-0.1045
		0.2500		0.1146	0.1003	0.2524	0.2910	-0.2121	-0.0788
		0.3750		0.1177	0.1064	0.1855	0.2042	-0.1531	-0.0521
		0.5000		0.1198	0.1106	0.1383	0.1488	-0.1144	-0.0345
12-10 S		Break	0.125	0.0945	0.0815	0.5071	0.7074	-0.4277	-0.2797
		0.0625		0.1067	0.0978	0.3321	0.4037	-0.2454	-0.1583
		0.1250		0.1111	0.1050	0.2534	0.2922	-0.1744	-0.1179
		0.2500		0.1136	0.1069	0.2228	0.2520	-0.1564	-0.0956
		0.3750		0.1142	0.1073	0.2158	0.2430	-0.1527	-0.0904
	RD	0.5000		0.1154	0.1091	0.1942	0.2160	-0.1360	-0.0799
	302°F								
12-10 L		Break	0.125	0.0911	0.0786	0.5417	0.7803	-0.4639	-0.3164
		0.0625		0.1039	0.0961	0.3610	0.4478	-0.2629	-0.1849
		0.1250		0.1096	0.1017	0.2866	0.3378	-0.2063	-0.1315
		0.2500		0.1146	0.1087	0.2028	0.2266	-0.1297	-0.0869
		0.3750		0.1167	0.1114	0.1680	0.1839	-0.1152	-0.0687
		0.5000		0.1181	0.1131	0.1451	0.1568	-0.1000	-0.0568
12-11 S		Break	0.124	0.0906	0.0791	0.5339	0.7634	-0.4496	-0.3138
		0.0625		0.1044	0.0960	0.3482	0.4280	-0.2559	-0.1720
		0.1250		0.1101	0.1027	0.2646	0.3074	-0.1885	-0.1189

SCHEDULE 12 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1133	0.1074	0.2086	0.2340	-0.1437	-0.0902
	RD 302°F	0.3750		0.1148	0.1094	0.1832	0.2024	-0.1253	-0.0771
12-11 L		Break	0.124	0.0898	0.0788	0.5398	0.7761	-0.4534	-0.3227
		0.0625		0.1036	0.0957	0.3552	0.4388	-0.2591	-0.1797
		0.1250		0.1084	0.1028	0.2753	0.3220	-0.1875	-0.1344
		0.2500		0.1089	0.1028	0.2719	0.3174	-0.1875	-0.1298
		0.3750		0.1108	0.1047	0.2455	0.2817	-0.1692	-0.1126
		0.5000		0.1141	0.1103	0.1815	0.2003	-0.1171	-0.0832
12-5 L		Break	0.124	0.0898	0.0518	0.6975	1.1956	-0.8729	-0.3227
		0.0625		0.1083	0.0868	0.3893	0.4932	-0.3578	-0.1354
		0.1250		0.1144	0.0988	0.2649	0.3078	-0.2272	-0.0806
	TD	0.2500		0.1176	0.1067	0.1839	0.2032	-0.1503	-0.0530
	572°F	0.3750		0.1197	0.1109	0.1367	0.1470	-0.1116	-0.0353
		0.5000		0.1121	0.1137	0.1045	0.1104	-0.0867	-0.0237
12-5 S	TD	Break	0.124	0.0916	0.0556	0.6688	1.1050	-0.8021	-0.3028
	572°F	0.0625		0.1091	0.0877	0.3777	0.4744	-0.3464	-0.1280
		0.1250		0.1137	0.0984	0.2724	0.3180	-0.2312	-0.0867
		0.2500		0.1170	0.1059	0.1942	0.2159	-0.1478	-0.0581
		0.3750		0.1185	0.1090	0.1600	0.1743	-0.1289	-0.0454
12-6 L		Break	0.124	0.0898	0.0559	0.6735	1.1194	-0.7967	-0.3227
		0.0625		0.1066	0.0841	0.4169	0.5395	-0.3883	-0.1512
		0.1250		0.1125	0.0958	0.2991	0.3554	-0.2580	-0.0973
		0.2500		0.1169	0.1063	0.1918	0.2130	-0.1540	-0.0590
		0.3750		0.1199	0.1118	0.1282	0.1372	-0.1036	-0.0336
	TD 572°F	0.5000		0.1218	0.1166	0.0764	0.0794	-0.0615	-0.0179
12-6 S		Break	0.124	0.0921	0.0558	0.6658	1.0959	-0.7985	-0.2974
		0.0625		0.1078	0.0854	0.4013	0.5129	-0.3729	-0.1400

SCHEDULE 12 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1113	0.0930	0.3268	0.3957	-0.2877	-0.1080
		0.2500		0.1157	0.1023	0.2302	0.2616	-0.1924	-0.0693
		0.3750		0.1184	0.1081	0.1676	0.1834	-0.1372	-0.0462
		0.5000		0.1194	0.1108	0.1396	0.1504	-0.1126	-0.0378
12-12 L		Break	0.125	0.0774	0.0619	0.6934	1.1821	-0.7028	-0.4793
		0.0625		0.1009	0.0916	0.4085	0.5251	-0.3109	-0.2142
		0.1250		0.1075	0.0996	0.3148	0.3780	-0.2272	-0.1508
		0.2500		0.1135	0.1085	0.2119	0.2381	-0.1416	-0.0965
		0.3750		0.1173	0.1131	0.1509	0.1636	-0.1000	-0.0636
	RD 572°F	0.5000		0.1178	0.1131	0.1473	0.1594	-0.1000	-0.0593
12-12 S		Break	0.125	0.0788	0.0637	0.6788	1.1355	-0.6741	-0.4614
		0.0625		0.1025	0.0924	0.3939	0.5006	-0.3022	-0.1984
		0.1250		0.1096	0.1019	0.2852	0.3358	-0.2043	-0.1315
		0.2500		0.1150	0.1096	0.1933	0.2149	-0.1315	-0.0834
		0.3750		0.1170	0.1137	0.1486	0.1609	-0.0948	-0.0661
		0.5000		0.1176	0.1139	0.1427	0.1540	-0.0930	-0.0610
12-13 L		Break	0.124	0.0825	0.0630	0.6620	1.0846	-0.6772	-0.4075
		0.0625		0.1026	0.0882	0.4115	0.5301	-0.3407	-0.1894
		0.1250		0.1092	0.0984	0.3012	0.3583	-0.2312	-0.1271
		0.2500		0.1131	0.1049	0.2284	0.2593	-0.1673	-0.0920
		0.3750		0.1142	0.1061	0.2120	0.2382	-0.1559	-0.0823
	RD 572°F	0.5000		0.1155	0.1090	0.1812	0.1999	-0.1289	-0.0710
12-12 S		Break	0.124	0.0819	0.0648	0.6548	1.0638	-0.6490	-0.4148
		0.0625		0.1019	0.0909	0.3976	0.5068	-0.3105	-0.1963
		0.1250		0.1088	0.0994	0.2966	0.3519	-0.2211	-0.1308
		0.2500		0.1123	0.1048	0.2346	0.2673	-0.1682	-0.0991
		0.3750		0.1158	0.1104	0.1686	0.1846	-0.1162	-0.0684
		0.5000		0.1182	0.1141	0.1229	0.1311	-0.0832	-0.0479

SCHEDULE 13

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
13-1 S		Break	0.123	0.1041	0.0740	0.4908	0.6750	-0.5081	-0.1668
		0.0625		0.1134	0.0948	0.2894	0.3417	-0.2604	-0.0813
		0.1250		0.1165	0.1032	0.2053	0.2298	-0.1755	-0.0543
		0.2500		0.1193	0.1104	0.1294	0.1386	-0.1081	-0.0305
		0.3750		0.1201	0.1123	0.1085	0.1149	-0.0910	-0.0239
	TD	0.5000		0.1183	0.1119	0.1250	0.1335	-0.0946	-0.0390
13-1 L	Room Temp.	Break	0.123	0.1021	0.0708	0.5222	0.7386	-0.5523	-0.1862
		0.0625		0.1128	0.0935	0.3029	0.3608	-0.2742	-0.0866
		0.1250		0.1165	0.1023	0.2122	0.2386	-0.1843	-0.0543
		0.2500		0.1187	0.1090	0.1448	0.1564	-0.1208	-0.0356
		0.3750		0.1200	0.1130	0.1037	0.1095	-0.0848	-0.0247
		0.5000		0.1210	0.1153	0.0778	0.0810	-0.0646	-0.0164
13-2 S		Break	0.124	0.1032	0.0730	0.5100	0.7134	-0.5298	-0.1836
		0.0625		0.1142	0.0958	0.2885	0.3404	-0.2580	-0.0823
		0.1250		0.1183	0.1063	0.1822	0.2011	-0.1540	-0.0471
		0.2500		0.1197	0.1106	0.1390	0.1496	-0.1144	-0.0353
		0.3750		0.1204	0.1123	0.1206	0.1286	-0.0991	-0.0295
	TD	0.5000		0.1205	0.1125	0.1184	0.1260	-0.0973	-0.0286
13-2 L	Room Temp.	Break	0.124	0.1040	0.0744	0.4968	0.6867	-0.5108	-0.1759
		0.0625		0.1143	0.0964	0.2834	0.3332	-0.2518	-0.0814
		0.1250		0.1179	0.1055	0.1910	0.2120	-0.1616	-0.0504
		0.2500		0.1207	0.1125	0.1169	0.1243	-0.0973	-0.0270
		0.3750		0.1211	0.1139	0.1029	0.1086	-0.0850	-0.0237
		0.5000		0.1211	0.1139	0.1029	0.1086	-0.0850	-0.0237
13-13 S		Break	0.123	0.1052	0.0794	0.4479	0.5940	-0.4377	-0.1563
		0.0625		0.1149	0.0986	0.2512	0.2892	-0.2211	-0.0681
		0.1250		0.1180	0.1052	0.1795	0.1978	-0.1563	-0.0415

SCHEDULE 13 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1188	0.1079	0.1527	0.1657	-0.1310	-0.0347
		0.3750		0.1200	0.1101	0.1267	0.1355	-0.1108	-0.0247
13-13 L	45° Room Temp.	Break	0.123	0.1039	0.0777	0.4664	0.6281	-0.4593	-0.1688
		0.0625		0.1140	0.0968	0.2706	0.3155	-0.2395	-0.0760
		0.1250		0.1165	0.1033	0.2045	0.2288	-0.1746	-0.0543
		0.2500		0.1175	0.1054	0.1814	0.2002	-0.1544	-0.0458
		0.3750		0.1173	0.1060	0.1782	0.1962	-0.1488	-0.0474
		0.5000		0.1195	0.1110	0.1232	0.1315	-0.1026	-0.0289
13-14 S		Break	0.124	0.1035	0.0759	0.4891	0.6716	-0.4909	-0.1807
		0.0625		0.1136	0.0970	0.2834	0.3332	-0.2456	-0.0876
		0.1250		0.1170	0.1046	0.2041	0.2282	-0.1701	-0.0581
		0.2500		0.1207	0.1131	0.1122	0.1190	-0.0920	-0.0270
		0.3750		0.1220	0.1163	0.0772	0.0804	-0.0641	-0.0163
		0.5000		0.1232	0.1187	0.0489	0.0502	-0.0437	-0.0065
13-14 L	45° Room Temp.	Break	0.124	0.1047	0.0783	0.4668	0.6289	-0.4597	-0.1692
		0.0625		0.1143	0.0981	0.2708	0.3158	-0.2343	-0.0814
		0.1250		0.1170	0.1051	0.2003	0.2235	-0.1654	-0.0581
		0.2500		0.1177	0.1069	0.1817	0.2005	-0.1484	-0.0521
		0.3750		0.1150	0.1009	0.2454	0.2815	-0.2062	-0.0754
		0.5000		0.1168	0.1044	0.2070	0.2319	-0.1720	-0.0598
13-7 S		Break	0.125	0.1063	0.0770	0.4762	0.6466	-0.4845	-0.1620
		0.0625		0.1157	0.0978	0.2758	0.3227	-0.2454	-0.0773
		0.1250		0.1186	0.1050	0.2030	0.2269	-0.1744	-0.0526
		0.2500		0.1199	0.1089	0.1643	0.1795	-0.1379	-0.0417
		0.3750		0.1203	0.1098	0.1546	0.1680	-0.1297	-0.0383
		0.5000		0.1211	0.1116	0.1351	0.1451	-0.1134	-0.0317
13-7 L	RD Room Temp.	Break	0.125	0.1048	0.0756	0.4929	0.6791	-0.5029	-0.1763

SCHEDULE 13 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.0625		0.1149	0.0971	0.2860	0.3368	-0.2526	-0.0842
		0.1250		0.1183	0.1050	0.2050	0.2294	-0.1744	-0.0551
		0.2500		0.1201	0.1107	0.1491	0.1615	-0.1215	-0.0400
		0.3750		0.1211	0.1136	0.1196	0.1273	-0.0956	-0.0317
		0.5000		0.1219	0.1151	0.1020	0.1076	-0.0825	-0.0251
13-8 S	RD	Break	0.125	0.1026	0.0753	0.5056	0.7043	-0.5068	-0.1975
	Room	0.0625		0.1131	0.0956	0.3080	0.3682	-0.2681	-0.1000
	Temp.	0.1250		0.1165	0.1027	0.2343	0.2669	-0.1965	-0.0704
		0.2500		0.1188	0.1076	0.1819	0.2008	-0.1499	-0.0509
		0.3750		0.1201	0.1112	0.1446	0.1561	-0.1170	-0.0392
13-8 L	RD	Break	0.125	0.1024	0.0756	0.5046	0.7023	-0.5029	-0.1994
	Room	0.0625		0.1132	0.0958	0.3060	0.3652	-0.2660	-0.0992
	Temp.	0.1250		0.1171	0.1042	0.2191	0.2473	-0.1820	-0.0653
		0.2500		0.1198	0.1103	0.1543	0.1676	-0.1251	-0.0425
		0.3750		0.1212	0.1137	0.1180	0.1254	-0.0948	-0.0309
		0.5000		0.1222	0.1157	0.0951	0.1000	-0.0773	-0.0226
13-3 S		Break	0.124	0.0992	0.0669	0.5684	0.8402	-0.6171	-0.2231
		0.0625		0.1083	0.0829	0.4161	0.5380	-0.4026	-0.1354
		0.1250		0.1110	0.0895	0.3539	0.4368	-0.3260	-0.1108
		0.2500		0.1150	0.0980	0.2670	0.3107	-0.2353	-0.0754
		0.3750		0.1184	0.1062	0.1822	0.2012	-0.1550	-0.0462
	TD	0.5000		0.1195	0.1084	0.1575	0.1714	-0.1344	-0.0370
	302°F								
13-3 L		Break	0.124	0.0993	0.0658	0.5751	0.8558	-0.6337	-0.2221
		0.0625		0.1084	0.0828	0.4163	0.5383	-0.4038	-0.1344
		0.1250		0.1119	0.0899	0.3458	0.4243	-0.3216	-0.1027
		0.2500		0.1157	0.0989	0.2558	0.2954	-0.2262	-0.0693
		0.3750		0.1185	0.1053	0.1885	0.2088	-0.1635	-0.0454
		0.5000		0.1193	0.1076	0.1652	0.1805	-0.1419	-0.0386

SCHEDULE 13 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
13-4 S		Break	0.123	0.0981	0.0671	0.5649	0.8322	-0.6060	-0.2262
		0.0625		0.1079	0.0843	0.3988	0.5088	-0.3778	-0.1310
		0.1250		0.1118	0.0919	0.3209	0.3870	-0.2915	-0.0955
		0.2500		0.1178	0.1053	0.1801	0.1986	-0.1554	-0.0432
		0.3750		0.1203	0.1115	0.1134	0.1204	-0.0982	-0.0222
	TD	0.5000		0.1206	0.1126	0.1024	0.1080	-0.0883	-0.0197
	302°F								
13-4 L		Break	0.123	0.1142	0.0972	0.2663	0.3096	-0.2354	-0.0742
		0.0625		0.1151	0.0992	0.2453	0.2814	-0.2150	-0.0664
		0.1250		0.1155	0.1008	0.2305	0.2620	-0.1990	-0.0629
		0.2500		0.1168	0.1040	0.1971	0.2195	-0.1678	-0.0517
		0.3750		0.1192	0.1090	0.1412	0.1522	-0.1208	-0.0314
		0.5000		0.1199	0.1113	0.1179	0.1255	-0.1000	-0.0255
13-9 S		Break	0.126	0.0990	0.0692	0.5685	0.8404	-0.5993	-0.2412
		0.0625		0.1105	0.0888	0.3819	0.4812	-0.3499	-0.1313
		0.1250		0.1149	0.0977	0.2929	0.3466	-0.2544	-0.0922
		0.2500		0.1185	0.1054	0.2133	0.2399	-0.1785	-0.0614
		0.3750		0.1196	0.1080	0.1864	0.2063	-0.1542	-0.0521
	RD	0.5000		0.1209	0.1109	0.1555	0.1690	-0.1276	-0.0413
	302°F								
13-9 L		Break	0.126	0.1005	0.0723	0.5423	0.7816	-0.5555	-0.2261
		0.0625		0.1116	0.0906	0.3631	0.4512	-0.3298	-0.1214
		0.1250		0.1152	0.0981	0.2882	0.3399	-0.2503	-0.0896
		0.2500		0.1171	0.1035	0.2366	0.2700	-0.1967	-0.0732
		0.3750		0.1186	0.1061	0.2074	0.2324	-0.1719	-0.0605
		0.5000		0.1189	0.1078	0.1926	0.2140	-0.1560	-0.0580
13-10 S		Break	0.125	0.0984	0.0686	0.5680	0.8393	-0.6000	-0.2393
		0.0625		0.1103	0.0896	0.3675	0.4581	-0.3330	-0.1251
		0.1250		0.1140	0.0972	0.2908	0.3437	-0.2515	-0.0921
		0.2500		0.1165	0.1020	0.2395	0.2738	-0.2033	-0.0704

SCHEDULE 13 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1184	0.1062	0.1953	0.2172	-0.1630	-0.0542
	RD	0.5000		0.1198	0.1102	0.1551	0.1685	-0.1260	-0.0425
	302°F								
13-10 L		Break	0.125	0.1000	0.0716	0.5418	0.7804	-0.5572	-0.2231
		0.0625		0.1102	0.0893	0.3702	0.4623	-0.3363	-0.1260
		0.1250		0.1136	0.0958	0.3035	0.3617	-0.2660	-0.0956
		0.2500		0.1163	0.1022	0.2393	0.2735	-0.2014	-0.0721
		0.3750		0.1178	0.1062	0.1993	0.2223	-0.1630	-0.0593
		0.5000		0.1191	0.1092	0.1676	0.1835	-0.1351	-0.0484
13-5 L		Break	0.124	0.0938	0.0554	0.6620	1.0848	-0.8057	-0.2791
		0.0625		0.1093	0.0839	0.4036	0.5168	-0.3907	-0.1262
		0.1250		0.1135	0.0935	0.3098	0.3708	-0.2823	-0.0885
		0.2500		0.1158	0.0992	0.2529	0.2916	-0.2231	-0.0684
	TD	0.3750		0.1184	0.1055	0.1876	0.2078	-0.1616	-0.0462
	572°F	0.5000		0.1193	0.1073	0.1675	0.1833	-0.1446	-0.0386
13-5 S	TD	Break	0.124	0.0896	0.0485	0.7174	1.2636	-0.9387	-0.3249
	572°F	0.0625		0.1083	0.0808	0.4309	0.5637	-0.4283	-0.1354
		0.1250		0.1137	0.0933	0.3101	0.3712	-0.2845	-0.0867
		0.2500		0.1177	0.1033	0.2093	0.2348	-0.1826	-0.0521
		0.3750		0.1196	0.1086	0.1553	0.1687	-0.1326	-0.0361
		0.5000		0.1202	0.1110	0.1323	0.1419	-0.1108	-0.0311
13-6 L		Break	0.124	0.0912	0.0512	0.6963	1.1918	-0.8845	-0.3072
		0.0625		0.1081	0.0794	0.4418	0.5830	-0.4458	-0.1372
		0.1250		0.1122	0.0901	0.3425	0.4194	-0.3194	-0.1000
		0.2500		0.1162	0.0995	0.2481	0.2851	-0.2201	-0.0650
		0.3750		0.1185	0.1068	0.1769	0.1947	-0.1493	-0.0454
	TD	0.5000		0.1196	0.1106	0.1397	0.1505	-0.1144	-0.0361
	572°F								
13-6 S		Break	0.124	0.0920	0.0529	0.6835	1.1504	-0.8519	-0.2985

SCHEDULE 13 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.0625		0.1084	0.0814	0.4261	0.5554	-0.4209	-0.1344
		0.1250		0.1134	0.0939	0.3075	0.3674	-0.2780	-0.0894
		0.2500		0.1178	0.1046	0.1986	0.2214	-0.1701	-0.0513
		0.3750		0.1185	0.1060	0.1831	0.2022	-0.1568	-0.0454
		0.5000		0.1182	0.1056	0.1882	0.2085	-0.1606	-0.0479
13-11 L		Break	0.126	0.0902	0.0535	0.6960	1.1908	-0.8566	-0.3342
		0.0625		0.1092	0.0838	0.4236	0.5510	-0.4078	-0.1431
		0.1250		0.1145	0.0956	0.3105	0.3718	-0.2761	-0.0957
		0.2500		0.1170	0.1013	0.2535	0.2923	-0.2182	-0.0741
	TD	0.3750		0.1181	0.1040	0.2264	0.2566	-0.1919	-0.0648
	572°F	0.5000		0.1197	0.1082	0.1842	0.2036	-0.1523	-0.0513
13-11 S		Break	0.126	0.0900	0.0538	0.6950	1.1875	-0.8510	-0.3365
		0.0625		0.1098	0.0850	0.4121	0.5312	-0.3936	-0.1376
		0.1250		0.1155	0.0974	0.2914	0.3445	-0.2575	-0.0870
		0.2500		0.1178	0.1026	0.2387	0.2727	-0.2054	-0.0673
		0.3750		0.1183	0.1041	0.2243	0.2540	-0.1909	-0.0631
		0.5000		0.1191	0.1055	0.2086	0.2339	-0.1776	-0.0563
13-12 L		Break	0.124	0.0899	0.0548	0.6796	1.1382	-0.8166	-0.3216
		0.0625		0.1080	0.0833	0.4149	0.5360	-0.3978	-0.1382
		0.1250		0.1124	0.0942	0.3114	0.3731	-0.2749	-0.0982
		0.2500		0.1156	0.1007	0.2429	0.2783	-0.2081	-0.0702
		0.3750		0.1169	0.1036	0.2124	0.2387	-0.1797	-0.0590
		0.5000		0.1184	0.1078	0.1699	0.1862	-0.1400	-0.0462
13-12 S	RD 572°F	Break	0.124	0.0896	0.0539	0.6859	1.1581	-0.8332	-0.3249
		0.0625		0.1058	0.0796	0.4523	0.6020	-0.4433	-0.1587
		0.1250		0.1121	0.0926	0.3249	0.3929	-0.2920	-0.1009
		0.2500		0.1149	0.0990	0.2602	0.3014	-0.2252	-0.0762
		0.3750		0.1159	0.1011	0.2379	0.2717	-0.2042	-0.0676
		0.5000		0.1177	0.1069	0.1817	0.2005	-0.1484	-0.0521

SCHEDULE 14

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
14-1 S		Break	0.125	0.1063	0.0684	0.5347	0.7650	-0.6029	-0.1620
		0.0625		0.1162	0.0919	0.3166	0.3806	-0.3076	-0.0730
		0.1250		0.1201	0.1031	0.2075	0.2326	-0.1926	-0.0400
		0.2500		0.1218	0.1103	0.1402	0.1510	-0.1251	-0.0259
	TD	0.3750		0.1226	0.1129	0.1141	0.1212	-0.1018	-0.0194
	Room								
14-1 L	Temp.	Break	0.125	0.1092	0.0738	0.4842	0.6621	-0.5270	-0.1351
		0.0625		0.1171	0.0950	0.2880	0.3397	-0.2744	-0.0653
		0.1250		0.1197	0.1020	0.2186	0.2467	-0.2033	-0.0433
		0.2500		0.1211	0.1073	0.1684	0.1844	-0.1527	-0.0317
		0.3750		0.1219	0.1106	0.1371	0.1475	-0.1224	-0.0251
		0.5000		0.1224	0.1126	0.1179	0.1255	-0.1045	-0.0210
14-2 S		Break	0.125	0.1061	0.0680	0.5382	0.7727	-0.6088	-0.1639
		0.0625		0.1160	0.0909	0.3252	0.3933	-0.3186	-0.0747
		0.1250		0.1194	0.1009	0.2290	0.2600	-0.2142	-0.0458
		0.2500		0.1218	0.1086	0.1534	0.1666	-0.1406	-0.0259
	TD	0.3750		0.1226	0.1120	0.1212	0.1292	-0.1098	-0.0194
	Room								
14-2 L	Temp.	Break	0.125	0.1084	0.0770	0.4658	0.6270	-0.4845	-0.1425
		0.0625		0.1173	0.0947	0.2891	0.3412	-0.2776	-0.0636
		0.1250		0.1194	0.1021	0.2198	0.2482	-0.2024	-0.0458
		0.2500		0.1212	0.1076	0.1654	0.1808	-0.1499	-0.0309
		0.3750		0.1216	0.1103	0.1416	0.1527	-0.1251	-0.0276
		0.5000		0.1222	0.1123	0.1217	0.1298	-0.1071	-0.0226
14-13 S		Break	0.124	0.0973	0.0853	0.4602	0.6166	-0.3741	-0.2425
		0.0625		0.1096	0.1015	0.2765	0.3237	-0.2002	-0.1234
		0.1250		0.1142	0.1070	0.2053	0.2298	-0.1474	-0.0823
	45°	0.2500		0.1178	0.1134	0.1312	0.1406	-0.0894	-0.0513
	Room	0.3750		0.1204	0.1169	0.0846	0.0884	-0.0590	-0.0295
	Temp.	0.5000		0.1213	0.1186	0.0644	0.0665	-0.0445	-0.0220

SCHEDULE 14 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
14-13 L	45° Room Temp.	Break	0.124	0.0955	0.0823	0.4888	0.6711	-0.4099	-0.2612
		0.0625		0.1096	0.0998	0.2886	0.3406	-0.2171	-0.1234
		0.1250		0.1134	0.1067	0.2131	0.2396	-0.1503	-0.0894
		0.2500		0.1167	0.1116	0.1530	0.1660	-0.1054	-0.0607
		0.3750		0.1193	0.1150	0.1077	0.1140	-0.0754	-0.0386
		0.5000		0.1203	0.1171	0.0838	0.0876	-0.0572	-0.0303
14-14 S		Break	0.124	0.0962	0.0839	0.4751	0.6445	-0.3907	-0.2538
		0.0625		0.1086	0.1002	0.2923	0.3457	-0.2131	-0.1326
		0.1250		0.1114	0.1045	0.2429	0.2782	-0.1711	-0.1072
		0.2500		0.1148	0.1098	0.1802	0.1987	-0.1216	-0.0771
		0.3750		0.1170	0.1132	0.1386	0.1492	-0.0911	-0.0581
		0.5000		0.1180	0.1141	0.1244	0.1328	-0.0832	-0.0496
14-14 L	45° Room Temp.	Break	0.124	0.0985	0.0864	0.4465	0.5915	-0.3613	-0.2302
		0.0625		0.1103	0.1020	0.2683	0.3124	-0.1953	-0.1171
		0.1250		0.1138	0.1098	0.1874	0.2075	-0.1216	-0.0858
		0.2500		0.1179	0.1141	0.1251	0.1336	-0.0832	-0.0504
		0.3750		0.1199	0.1171	0.0869	0.0909	-0.0572	-0.0336
		0.5000		0.1211	0.1185	0.0667	0.0690	-0.0454	-0.0237
14-7 S		Break	0.125	0.0935	0.0889	0.4680	0.6312	-0.3408	-0.2904
		0.0625		0.1073	0.1034	0.2899	0.3424	-0.1897	-0.1527
		0.1250		0.1117	0.1087	0.2229	0.2522	-0.1397	-0.1125
		0.2500		0.1153	0.1123	0.1713	0.1879	-0.1071	-0.0808
		0.3750		0.1170	0.1148	0.1404	0.1513	-0.0851	-0.0661
		0.5000		0.1180	0.1152	0.1300	0.1393	-0.0816	-0.0576
14-7 L	RD Room Temp.	Break	0.125	0.0914	0.0856	0.4993	0.6917	-0.3786	-0.3131
		0.0625		0.1055	0.1011	0.3174	0.3818	-0.2122	-0.1696

SCHEDULE 14 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1108	0.1076	0.2370	0.2705	-0.1499	-0.1206
		0.2500		0.1147	0.1121	0.1771	0.1949	-0.1089	-0.0860
		0.3750		0.1171	0.1147	0.1404	0.1513	-0.0860	-0.0653
		0.5000		0.1188	0.1171	0.1097	0.1162	-0.0653	-0.0509
14-8 S	RD	Break	0.125	0.0938	0.0892	0.4645	0.6246	-0.3374	-0.2872
	Room	0.0625		0.1074	0.1057	0.2735	0.3194	-0.1677	-0.1518
	Temp.								
14-3 S		Break	0.125	0.1026	0.0681	0.5528	0.8048	-0.6073	-0.1975
		0.0625		0.1111	0.0846	0.3985	0.5083	-0.3904	-0.1179
		0.1250		0.1137	0.0898	0.3465	0.4255	-0.3307	-0.0948
		0.2500		0.1155	0.0942	0.3037	0.3619	-0.2829	-0.0790
		0.3750		0.1176	0.0992	0.2534	0.2922	-0.2312	-0.0610
	TD	0.5000		0.1195	0.1048	0.1985	0.2213	-0.1763	-0.0450
	302°F								
14-3 L		Break	0.125	0.1034	0.0692	0.5421	0.7810	-0.5913	-0.1897
		0.0625		0.1117	0.0853	0.3902	0.4946	-0.3821	-0.1125
		0.1250		0.1146	0.0923	0.3230	0.3901	-0.3033	-0.0869
		0.2500		0.1180	0.0991	0.2516	0.2898	-0.2322	-0.0576
		0.3750		0.1189	0.1015	0.2276	0.2583	-0.2082	-0.0500
		0.5000		0.1198	0.1033	0.2080	0.2332	-0.1907	-0.0425
14-4 S		Break	0.125	0.0981	0.0669	0.5800	0.8674	-0.6251	-0.2423
		0.0625		0.1084	0.0848	0.4117	0.5305	-0.3880	-0.1425
		0.1250		0.1124	0.0923	0.3360	0.4095	-0.3033	-0.1062
		0.2500		0.1150	0.0963	0.2912	0.3442	-0.2608	-0.0834
		0.3750		0.1148	0.0963	0.2925	0.3460	-0.2608	-0.0851
	TD	0.5000		0.1151	0.0973	0.2832	0.3330	-0.2505	-0.0825
	302°F								
14-4 L		Break	0.125	0.0960	0.0642	0.6056	0.9303	-0.6663	-0.2640
		0.0625		0.1066	0.0832	0.4324	0.5663	-0.4071	-0.1592

SCHEDULE 14 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.1250		0.1106	0.0900	0.3629	0.4509	-0.3285	-0.1224
		0.2500		0.1141	0.0973	0.2895	0.3418	-0.2505	-0.0912
		0.3750		0.1157	0.1012	0.2506	0.2885	-0.2112	-0.0773
		0.5000		0.1162	0.1027	0.2362	0.2695	-0.1965	-0.0730
14-9 S		Break	0.125	0.0900	0.0871	0.4983	0.6898	-0.3613	-0.3285
		0.0625		0.1036	0.1020	0.3237	0.3911	-0.2033	-0.1878
		0.1250		0.1092	0.1076	0.2480	0.2850	-0.1499	-0.1351
		0.2500		0.1139	0.1131	0.1756	0.1930	-0.1000	-0.0930
		0.3750		0.1156	0.1144	0.1536	0.1668	-0.0886	-0.0782
	RD 302°F	0.5000		0.1162	0.1149	0.1455	0.1572	-0.0842	-0.0730
14-9 L		Break	0.125	0.0931	0.0900	0.4637	0.6231	-0.3285	-0.2946
		0.0625		0.1026	0.1002	0.3420	0.4186	-0.2212	-0.1975
		0.1250		0.1063	0.1049	0.2863	0.3374	-0.1753	-0.1620
		0.2500		0.1103	0.1094	0.2277	0.2584	-0.1333	-0.1251
		0.3750		0.1135	0.1126	0.1821	0.2010	-0.1045	-0.0965
		0.5000		0.1141	0.1134	0.1719	0.1886	-0.0974	-0.0912
14-10 S		Break	0.125	0.0878	0.0865	0.5140	0.7214	-0.3682	-0.3532
		0.0625		0.1029	0.1001	0.3408	0.4167	-0.2221	-0.1946
		0.1250		0.1065	0.1051	0.2836	0.3336	-0.1734	-0.1602
		0.2500		0.1109	0.1094	0.2235	0.2530	-0.1333	-0.1197
		0.3750		0.1146	0.1136	0.1668	0.1825	-0.0956	-0.0869
	RD 302°F	0.5000		0.1162	0.1154	0.1418	0.1529	-0.0799	-0.0730
14-10 L		Break	0.125	0.0862	0.0848	0.5322	0.7597	-0.3880	-0.3716
		0.0625		0.1001	0.0997	0.3613	0.4483	-0.2262	-0.2221
		0.1250		0.1057	0.1051	0.2890	0.3411	-0.1734	-0.1677
		0.2500		0.1064	0.1046	0.2877	0.3393	-0.1782	-0.1611
		0.3750		0.1106	0.1086	0.2313	0.2630	-0.1406	-0.1224
		0.5000		0.1124	0.1108	0.2030	0.2268	-0.1206	-0.1062

SCHEDULE 14 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
14-5 L		Break	0.124	0.0909	0.0542	0.6796	1.1381	-0.8276	-0.3105
		0.0625		0.1084	0.0959	0.3239	0.3914	-0.2570	-0.1344
		0.1250		0.1130	0.0962	0.2930	0.3468	-0.2538	-0.0929
		0.2500		0.1168	0.1042	0.2085	0.2338	-0.1740	-0.0598
	TD	0.3750		0.1185	0.1083	0.1654	0.1808	-0.1354	-0.0454
	572°F	0.5000		0.1200	0.1114	0.1306	0.1399	-0.1072	-0.0328
14-5 S	TD	Break	0.124	0.0879	0.0490	0.7199	1.2725	-0.9284	-0.3441
	572°F	0.0625		0.1072	0.0938	0.3460	0.4247	-0.2791	-0.1456
		0.1250		0.1136	0.0969	0.2841	0.3342	-0.2466	-0.0876
		0.2500		0.1158	0.1011	0.2386	0.2726	-0.2042	-0.0684
		0.3750		0.1178	0.1041	0.2024	0.2262	-0.1749	-0.0513
		0.5000		0.1198	0.1090	0.1507	0.1634	-0.1289	-0.0345
14-6 L		Break	0.125	0.0881	0.0567	0.6803	1.1404	-0.7905	-0.3498
		0.0625		0.1060	0.0849	0.4240	0.5517	-0.3868	-0.1649
		0.1250		0.1119	0.0953	0.3175	0.3820	-0.2713	-0.1107
		0.2500		0.1137	0.0996	0.2752	0.3219	-0.2272	-0.0948
		0.3750		0.1153	0.1038	0.2340	0.2666	-0.1858	-0.0808
	TD	0.5000		0.1168	0.1049	0.2158	0.2432	-0.1753	-0.0678
	572°F								
14-6 S		Break	0.125	0.0870	0.0559	0.6888	1.1672	-0.8048	-0.3624
		0.0625		0.1054	0.0841	0.4327	0.5669	-0.3963	-0.1706
		0.1250		0.1117	0.0952	0.3194	0.3848	-0.2723	-0.1125
		0.2500		0.1176	0.1072	0.1932	0.2146	-0.1536	-0.0610
		0.3750		0.1194	0.1094	0.1640	0.1791	-0.1333	-0.0458
		0.5000		0.1203	0.1117	0.1400	0.1508	-0.1125	-0.0383
14-11 L		Break	0.124	0.0729	0.0718	0.6596	1.0776	-0.5464	-0.5312
		0.0625		0.0972	0.0957	0.3950	0.5026	-0.2591	-0.2435
		0.1250		0.1041	0.1021	0.3088	0.3693	-0.1943	-0.1749

SCHEDULE 14 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1088	0.1071	0.2422	0.2773	-0.1465	-0.1308
		0.2750		0.1076	0.1062	0.2568	0.2968	-0.1550	-0.1419
	RD 572°F	0.5000		0.1068	0.1053	0.2686	0.3128	-0.1635	-0.1493
14-11 S		Break	0.124	0.0734	0.0705	0.6635	1.0890	-0.5647	-0.5244
		0.0625		0.0962	0.0930	0.4182	0.5415	-0.2877	-0.2538
		0.1250		0.1055	0.1023	0.2981	0.3539	-0.1924	-0.1616
		0.2500		0.1137	0.1127	0.1666	0.1823	-0.0956	-0.0867
14-12 L		Break	0.124	0.0760	0.0743	0.6328	1.0017	-0.5122	-0.4896
		0.0625		0.0993	0.0980	0.3671	0.4574	-0.2353	-0.2221
		0.1250		0.1071	0.1059	0.2624	0.3043	-0.1578	-0.1465
		0.2500		0.1127	0.1103	0.1915	0.2126	-0.1171	-0.0956
		0.3750		0.1163	0.1146	0.1332	0.1429	-0.0788	-0.0641
	RD 572°F	0.5000		0.1179	0.1173	0.1006	0.1060	-0.0556	-0.0504
14-12 S		Break	0.124	0.0743	0.0701	0.6613	1.0825	-0.5704	-0.5122
		0.0625		0.0993	0.0971	0.3729	0.4667	-0.2445	-0.2221
		0.1250		0.1069	0.1054	0.2672	0.3109	-0.1625	-0.1484
		0.2500		0.1111	0.1105	0.2016	0.2251	-0.1153	-0.1098
		0.3750		0.1110	0.1100	0.2059	0.2306	-0.1198	-0.1108
		0.5000		0.1130	0.1124	0.1740	0.1911	-0.0982	-0.0929

SCHEDULE 15

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
15-1 S	TD	Break	0.125	0.1032	0.0830	0.4518	0.6011	-0.4095	-0.1916
	Room	0.0625		0.1147	0.1028	0.2454	0.2815	-0.1955	-0.0860
	Temp.	0.1250		0.1194	0.1115	0.1480	0.1601	-0.1143	-0.0458
		0.2500		0.1207	0.1148	0.1132	0.1201	-0.0851	-0.0350
		0.3750		0.1208	0.1148	0.1125	0.1193	-0.0851	-0.0342
		0.5000		0.1224	0.1181	0.0748	0.0778	-0.0568	-0.0210
15-1 L		Break		0.1014	0.0812	0.4730	0.6406	-0.4314	-0.2092
		0.0625		0.1136	0.1011	0.2650	0.3078	-0.2122	-0.0956
		0.1250		0.1175	0.1079	0.1886	0.2090	-0.1471	-0.0619
		0.2500		0.1202	0.1136	0.1261	0.1348	-0.0956	-0.0392
		0.3750		0.1200	0.1132	0.1306	0.1400	-0.0992	-0.0408
		0.5000		0.1192	0.1114	0.1502	0.1627	-0.1152	-0.0475
15-2 S	TD	Break	0.125	0.1021	0.0833	0.4557	0.6082	-0.4059	-0.2024
	Room	0.0625		0.1136	0.1029	0.2519	0.2902	-0.1946	-0.0956
	Temp.	0.1250		0.1172	0.1084	0.1869	0.2069	-0.1425	-0.0644
		0.2500		0.1179	0.1094	0.1745	0.1918	-0.1333	-0.0585
		0.3750		0.1194	0.1122	0.1426	0.1539	-0.1080	-0.0458
		0.5000		0.1212	0.1167	0.0948	0.0996	-0.0687	-0.0309
15-2 L		Break		0.1012	0.0822	0.4676	0.6304	-0.4192	-0.2112
		0.0625		0.1131	0.1014	0.2660	0.3093	-0.2092	-0.1000
		0.1250		0.1166	0.1069	0.2023	0.2260	-0.1564	-0.0696
		0.2500		0.1193	0.1123	0.1426	0.1538	-0.1071	-0.0467
		0.3750		0.1202	0.1139	0.1238	0.1322	-0.0930	-0.0392
		0.5000		0.1210	0.1152	0.1079	0.1142	-0.0816	-0.0325
15-13 S	45°	Break	0.125	0.1013	0.0840	0.4554	0.6077	-0.3975	-0.2102
	Room	0.0625		0.1128	0.1038	0.2506	0.2886	-0.1858	-0.1027
	Temp.	0.1250		0.1168	0.1108	0.1718	0.1884	-0.1206	-0.0678
		0.2500		0.1171	0.1136	0.1486	0.1609	-0.0956	-0.0653

SCHEDULE 15 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1189	0.1153	0.1226	0.1308	-0.0808	-0.0500
		0.5000		0.1200	0.1170	0.1014	0.1070	-0.0661	-0.0408
15-13 L		Break		0.0991	0.0862	0.4533	0.6038	-0.3716	-0.2322
		0.0625		0.1110	0.1031	0.2676	0.3114	-0.1926	-0.1188
		0.1250		0.1148	0.1086	0.2021	0.2258	-0.1406	-0.0851
		0.2500		0.1181	0.1141	0.1376	0.1480	-0.0912	-0.0568
		0.3750		0.1200	0.1169	0.1022	0.1078	-0.0670	-0.0408
		0.5000		0.1203	0.1170	0.0992	0.1045	-0.0661	-0.0383
15-14 S	45° Room Temp.	Break	0.125	0.0971	0.0844	0.4755	0.6453	-0.3928	-0.2526
		0.0625		0.1102	0.1034	0.2707	0.3157	-0.1897	-0.1260
		0.1250		0.1152	0.1095	0.1927	0.2140	-0.1324	-0.0816
		0.2500		0.1180	0.1137	0.1413	0.1524	-0.0948	-0.0576
		0.3750		0.1200	0.1169	0.1022	0.1078	-0.0670	-0.0408
		0.5000		0.1204	0.1171	0.0977	0.1028	-0.0653	-0.0375
15-14 L		Break		0.0969	0.0833	0.4834	0.6605	-0.4059	-0.2546
		0.0625		0.1104	0.1003	0.2913	0.3444	-0.2202	-0.1242
		0.1250		0.1152	0.1092	0.1949	0.2168	-0.1351	-0.0816
		0.2500		0.1186	0.1150	0.1271	0.1359	-0.0834	-0.0526
		0.3750		0.1195	0.1155	0.1167	0.1240	-0.0790	-0.0450
		0.5000		0.1202	0.1168	0.1015	0.1070	-0.0678	-0.0392
15-7 S	RD Room Temp.	Break	0.124	0.0956	0.0861	0.4647	0.6249	-0.3648	-0.2601
		0.0625		0.1097	0.1034	0.2623	0.3042	-0.1817	-0.1225
		0.1250		0.1144	0.1102	0.1801	0.1986	-0.1180	-0.0806
		0.2500		0.1172	0.1136	0.1341	0.1440	-0.0876	-0.0564
		0.3750		0.1191	0.1159	0.1023	0.1079	-0.0676	-0.0403
		0.5000		0.1196	0.1176	0.0853	0.0891	-0.0530	-0.0361

SCHEDULE 15 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
15-7 L		Break		0.0943	0.0848	0.4799	0.6538	-0.3800	-0.2738
		0.0625		0.1084	0.1028	0.2753	0.3220	-0.1875	-0.1344
		0.1250		0.1143	0.1106	0.1778	0.1958	-0.1144	-0.0814
		0.2500		0.1155	0.1149	0.1369	0.1472	-0.0762	-0.0710
		0.3750		0.1173	0.1140	0.1303	0.1396	-0.0841	-0.0556
		0.5000		0.1186	0.1162	0.1037	0.1095	-0.0650	-0.0445
15-8 S	RD Room Temp.	Break	0.124	0.0924	0.0862	0.4820	0.6578	-0.3636	-0.2942
		0.0625		0.1084	0.1044	0.2640	0.3065	-0.1720	-0.1344
		0.1250		0.1136	0.1101	0.1866	0.2065	-0.1189	-0.0876
		0.2500		0.1176	0.1156	0.1159	0.1231	-0.0702	-0.0530
		0.3750		0.1185	0.1170	0.0983	0.1035	-0.0581	-0.0454
		0.5000		0.1193	0.1175	0.0883	0.0925	-0.0538	-0.0386
15-8 L		Break		0.0946	0.0859	0.4715	0.6377	-0.3671	-0.2706
		0.0625		0.1100	0.1062	0.2402	0.2748	-0.1550	-0.1198
		0.1250		0.1157	0.1126	0.1527	0.1657	-0.0964	-0.0693
		0.2500		0.1177	0.1152	0.1182	0.1258	-0.0736	-0.0521
		0.3750		0.1189	0.1167	0.0976	0.1027	-0.0607	-0.0420
		0.5000		0.1191	0.1164	0.0984	0.1036	-0.0632	-0.0403
15-3 S	TD 302°F	Break	0.125	0.0914	0.0707	0.5864	0.8829	-0.5699	-0.3131
		0.0625		0.1075	0.0922	0.3657	0.4552	-0.3044	-0.1508
		0.1250		0.1143	0.1040	0.2392	0.2734	-0.1839	-0.0895
		0.2500		0.1163	0.1078	0.1976	0.2202	-0.1480	-0.0721
		0.3750		0.1170	0.1089	0.1846	0.2040	-0.1379	-0.0661
		0.5000		0.1193	0.1122	0.1433	0.1547	-0.1080	-0.0467
15-3 L		Break		0.0947	0.0731	0.5570	0.8141	-0.5365	-0.2776
		0.0625		0.1096	0.0961	0.3259	0.3944	-0.2629	-0.1315
		0.1250		0.1144	0.1039	0.2393	0.2735	-0.1849	-0.0886
		0.2500		0.1153	0.1064	0.2148	0.2419	-0.1611	-0.0808
		0.3750		0.1146	0.1035	0.2409	0.2756	-0.1887	-0.0869
		0.5000		0.1142	0.1047	0.2348	0.2676	-0.1772	-0.0904

SCHEDULE 15 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
15-4 S	TD 302°F	Break	0.125	0.0948	0.0725	0.5601	0.8213	-0.5447	-0.2765
		0.0625		0.1067	0.0904	0.3827	0.4824	-0.3241	-0.1583
		0.1250		0.1122	0.1000	0.2819	0.3312	-0.2231	-0.1080
		0.2500		0.1155	0.1061	0.2157	0.2430	-0.1639	-0.0790
		0.3750		0.1184	0.1106	0.1619	0.1766	-0.1224	-0.0542
		0.5000		0.1182	0.1098	0.1694	0.1856	-0.1296	-0.0559
15-4 L		Break		0.0935	0.0720	0.5692	0.8420	-0.5516	-0.2904
		0.0625		0.1076	0.0925	0.3630	0.4510	-0.3011	-0.1499
		0.1250		0.1119	0.0993	0.2888	0.3409	-0.2302	-0.1107
		0.2500		0.1155	0.1056	0.2194	0.2477	-0.1687	-0.0790
		0.3750		0.1155	0.1057	0.2187	0.2468	-0.1677	-0.0790
		0.5000		0.1151	0.1046	0.2295	0.2607	-0.1782	-0.0825
15-9 S	RD 302°F	Break	0.125	0.0889	0.0845	0.5192	0.7324	-0.3916	-0.3408
		0.0625		0.1024	0.1004	0.3420	0.4186	-0.2192	-0.1994
		0.1250		0.1081	0.1054	0.2708	0.3158	-0.1706	-0.1453
		0.2500		0.1114	0.1072	0.2357	0.2688	-0.1536	-0.1152
		0.3750		0.1130	0.1096	0.2074	0.2324	-0.1315	-0.1009
15-9 L		Break		0.0891	0.0865	0.5067	0.7067	-0.3682	-0.3386
		0.0625		0.1022	0.1007	0.3413	0.4176	-0.2162	-0.2014
		0.1250		0.1086	0.1058	0.2646	0.3074	-0.1668	-0.1406
		0.2500		0.1126	0.1105	0.2037	0.2278	-0.1233	-0.1045
		0.3750		0.1130	0.1110	0.1972	0.2197	-0.1188	-0.1009
		0.5000		0.1134	0.1084	0.2133	0.2399	-0.1425	-0.0974
15-10 S	RD 302°F	Break	0.124	0.0909	0.0877	0.4815	0.6569	-0.3464	-0.3105
		0.0625		0.1023	0.0979	0.3486	0.4287	-0.2363	-0.1924
		0.1250		0.1087	0.1063	0.2485	0.2857	-0.1540	-0.1317
		0.2500		0.1131	0.1137	0.1710	0.1876	-0.0956	-0.0920
		0.3750		0.1141	0.1111	0.1756	0.1931	-0.1098	-0.0832
		0.5000		0.1140	0.1124	0.1666	0.1823	-0.0982	-0.0841

SCHEDULE 15 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
15-10 L		Break		0.0899	0.0852	0.5018	0.6969	-0.3753	-0.3216
		0.0625		0.1004	0.0957	0.3751	0.4702	-0.2591	-0.2111
		0.1250		0.1055	0.1009	0.3077	0.3677	-0.2062	-0.1616
		0.2500		0.1036	0.0994	0.3303	0.4009	-0.2211	-0.1797
		0.3750		0.1105	0.1054	0.2425	0.2778	-0.1625	-0.1153
		0.5000		0.1159	0.1129	0.1490	0.1613	-0.0938	-0.0676
15-5 S	TD 572°F	Break	0.123	0.0867	0.0589	0.6625	1.0861	-0.7363	-0.3497
		0.0625		0.1058	0.0877	0.3867	0.4889	-0.3383	-0.1506
		0.1250		0.1093	0.0960	0.3064	0.3659	-0.3478	-0.1181
		0.2500		0.1135	0.1012	0.2408	0.2755	-0.1951	-0.0804
		0.3750		0.1182	0.1110	0.1328	0.1425	-0.1026	-0.0398
		0.5000		0.1192	0.1125	0.1136	0.1206	-0.0892	-0.0314
15-5 L		Break		0.0832	0.0531	0.7080	1.2309	-0.8400	-0.3909
		0.0625		0.1034	0.0855	0.4156	0.5372	-0.3637	-0.1736
		0.1250		0.1101	0.0966	0.2970	0.3524	-0.2416	-0.1108
		0.2500		0.1151	0.1060	0.1936	0.2151	-0.1488	-0.0664
		0.3750		0.1166	0.1087	0.1622	0.1770	-0.1236	-0.0534
		0.5000		0.1167	0.1089	0.1600	0.1743	-0.1218	-0.0526
15-6 S	TD 572°F	Break	0.125	0.0848	0.0586	0.6820	1.1456	-0.7576	-0.3880
		0.0625		0.1048	0.0878	0.4111	0.5295	-0.3532	-0.1763
		0.1250		0.1116	0.0989	0.2936	0.3476	-0.2342	-0.1134
		0.2500		0.1143	0.1037	0.2414	0.2763	-0.1868	-0.0895
		0.3750		0.1177	0.1089	0.1797	0.1981	-0.1379	-0.0602
		0.5000		0.1192	0.1122	0.1440	0.1555	-0.1080	-0.0475
15-6 L		Break		0.0839	0.0571	0.6934	1.1822	-0.7835	-0.3987
		0.0625		0.1043	0.0866	0.4219	0.5481	-0.3670	-0.1810
		0.1250		0.1119	0.0995	0.2874	0.3389	-0.2282	-0.1107

SCHEDULE 15 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1162	0.1072	0.2028	0.2266	-0.1536	-0.0730
		0.3750		0.1164	0.1092	0.1865	0.2064	-0.1351	-0.0713
		0.5000		0.1172	0.1093	0.1802	0.1986	-0.1342	-0.0644
15-11 S	RD 572°F	Break	0.125	0.0763	0.0694	0.6611	1.0821	-0.5884	-0.4936
		0.0625		0.1011	0.0952	0.3840	0.4845	-0.2723	-0.2122
		0.1250		0.1098	0.1066	0.2509	0.2889	-0.1592	-0.1296
		0.2500		0.1157	0.1134	0.1603	0.1747	-0.0974	-0.0773
		0.3750		0.1146	0.1109	0.1866	0.2066	-0.1197	-0.0869
		0.5000		0.1152	0.1125	0.1706	0.1870	-0.1054	-0.0816
15-11 L		Break		0.0737	0.0692	0.6736	1.1196	-0.5913	-0.5283
		0.0625		0.0970	0.0945	0.4133	0.5333	-0.2797	-0.2536
		0.1250		0.1047	0.1021	0.3158	0.3796	-0.2024	-0.1772
		0.2500		0.1039	0.0832	0.4468	0.5920	-0.4071	-0.1849
		0.3750		0.1108	0.1091	0.2264	0.2566	-0.1360	-0.1206
		0.5000		0.1165	0.1145	0.1463	0.1582	-0.0877	-0.0704
15-12 S	RD 572°F	Break	0.124	0.0735	0.0669	0.6802	1.1401	-0.6171	-0.5230
		0.0625		0.1015	0.0951	0.3722	0.4656	-0.2654	-0.2002
		0.1250		0.1107	0.1077	0.2246	0.2544	-0.1409	-0.1135
		0.2500		0.1161	0.1135	0.1430	0.1543	-0.0885	-0.0658
		0.3750		0.1171	0.1151	0.1234	0.1317	-0.0745	-0.0572
		0.5000		0.1171	0.1142	0.1303	0.1396	-0.0823	-0.0572
15-12 L		Break		0.0758	0.0692	0.6589	1.0755	-0.5833	-0.4922
		0.0625		0.1007	0.0966	0.3674	0.4578	-0.2497	-0.2081
		0.1250		0.1098	0.1072	0.2345	0.2672	-0.1456	-0.1216
		0.2500		0.1148	0.1119	0.1645	0.1798	-0.1027	-0.0771
		0.3750		0.1160	0.1129	0.1483	0.1605	-0.0938	-0.0667
		0.5000		0.1157	0.1137	0.1444	0.1560	-0.0867	-0.0693

SCHEDULE 16

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
16-1 S	TD	Break	0.123	0.0975	0.0711	0.5418	0.7804	-0.5481	-0.2323
	Room	0.0625		0.1095	0.0918	0.3356	0.4088	-0.2926	-0.1163
	Temp.	0.1250		0.1140	0.1008	0.2404	0.2750	-0.1990	-0.0760
		0.2500		0.1179	0.1082	0.1568	0.1706	-0.1282	-0.0424
		0.3750		0.1197	0.1119	0.1146	0.1218	-0.0946	-0.0272
		0.5000		0.1193	0.1126	0.1121	0.1189	-0.0883	-0.0305
16-1 L		Break		0.0995	0.0736	0.5160	0.7256	-0.5135	-0.2120
		0.0625		0.1101	0.0935	0.3196	0.3850	-0.2742	-0.1108
		0.1250		0.1132	0.0990	0.2592	0.3001	-0.2171	-0.0830
		0.2500		0.1162	0.1053	0.1912	0.2122	-0.1554	-0.0569
		0.3750		0.1174	0.1079	0.1627	0.1776	-0.1310	-0.0466
		0.5000		0.1185	0.1109	0.1314	0.1408	-0.1036	-0.0373
16-2 S	TD	Break	0.124	0.1016	0.0770	0.4912	0.6757	-0.4765	-0.1992
	Room	0.0625		0.1119	0.0952	0.3072	0.3670	-0.2643	-0.1027
	Temp.	0.1250		0.1153	0.1029	0.2284	0.2593	-0.1865	-0.0727
		0.2500		0.1192	0.1107	0.1418	0.1529	-0.1135	-0.0395
		0.3750		0.1206	0.1138	0.1074	0.1136	-0.0858	-0.0278
		0.5000		0.1205	0.1146	0.1019	0.1075	-0.0788	-0.0286
16-2 L		Break		0.1026	0.0787	0.4749	0.6441	-0.4546	-0.1894
		0.0625		0.1129	0.0971	0.2870	0.3383	-0.2445	-0.0938
		0.1250		0.1161	0.1041	0.2140	0.2408	-0.1749	-0.0658
		0.2500		0.1187	0.1097	0.1531	0.1662	-0.1225	-0.0437
		0.3750		0.1201	0.1131	0.1166	0.1240	-0.0920	-0.0320
		0.5000		0.1208	0.1151	0.0957	0.1006	-0.0745	-0.0262
16-13 S	45°	Break	0.124	0.1025	0.0830	0.4467	0.5919	-0.4014	-0.1904
	Room	0.0625		0.1120	0.0999	0.2723	0.3179	-0.2161	-0.1018
	Temp.	0.1250							

SCHEDULE 16 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1179	0.1112	0.1473	0.1594	-0.1090	-0.0504
		0.3750		0.1193	0.1134	0.1202	0.1280	-0.0894	-0.0386
		0.5000		0.1201	0.1151	0.1010	0.1064	-0.0745	-0.0320
16-13 L		Break		0.1038	0.0851	0.4255	0.5543	-0.3764	-0.1778
		0.0625		0.1132	0.1008	0.2579	0.2983	-0.2071	-0.0911
		0.1250		0.1166	0.1074	0.1856	0.2052	-0.1437	-0.0615
		0.2500		0.1198	0.1139	0.1126	0.1194	-0.0850	-0.0345
		0.3750		0.1211	0.1164	0.0832	0.0869	-0.0632	-0.0237
		0.5000		0.1217	0.1175	0.0700	0.0726	-0.0538	-0.0187
16-14 S	45° Room Temp.	Break	0.124	0.1027	0.0829	0.4463	0.5911	-0.4026	-0.1885
		0.0625		0.1123	0.0998	0.2711	0.3162	-0.2171	-0.0991
		0.1250		0.1154	0.1055	0.2082	0.2334	-0.1616	-0.0719
		0.2500		0.1187	0.1125	0.1315	0.1410	-0.0973	-0.0437
		0.3750		0.1186	0.1127	0.1307	0.1401	-0.0956	-0.0445
		0.5000		0.1180	0.1126	0.1359	0.1460	-0.0964	-0.0496
16-14 L		Break		0.1019	0.0813	0.4612	0.6184	-0.4221	-0.1963
		0.0625		0.1120	0.0983	0.2840	0.3340	-0.2323	-0.1018
		0.1250		0.1153	0.1046	0.2156	0.2429	-0.1701	-0.0727
		0.2500		0.1167	0.1072	0.1864	0.2063	-0.1456	-0.0607
		0.3750		0.1177	0.1092	0.1641	0.1792	-0.1271	-0.0521
		0.5000		0.1195	0.1126	0.1249	0.1334	-0.0964	-0.0370
16-7 S	RD Room Temp.	Break	0.124	0.0982	0.0833	0.4680	0.6311	-0.3978	-0.2333
		0.0625		0.1097	0.1006	0.2823	0.3317	-0.2091	-0.1225
		0.1250		0.1154	0.1085	0.1857	0.2054	-0.1335	-0.0719
		0.2500		0.1185	0.1136	0.1245	0.1330	-0.0876	-0.0454
		0.3750		0.1196	0.1153	0.1032	0.1089	-0.0727	-0.0361

SCHEDULE 16 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
16-7 L		Break		0.0989	0.0837	0.4616	0.6192	-0.3930	-0.2262
		0.0625		0.1102	0.1010	0.2761	0.3232	-0.2052	-0.1180
		0.1250		0.1138	0.1066	0.2110	0.2370	-0.1512	-0.0858
		0.2500		0.1151	0.1080	0.1916	0.2126	-0.1382	-0.0745
		0.3750		0.1142	0.1071	0.2046	0.2288	-0.1465	-0.0823
		0.5000		0.1142	0.1088	0.1919	0.2131	-0.1308	-0.0823
16-8 S	RD Room Temp.	Break	0.123	0.0992	0.0844	0.4466	0.5917	-0.3766	-0.2150
		0.0625		0.1108	0.1008	0.2618	0.3035	-0.1990	-0.1045
		0.1250		0.1155	0.1095	0.1640	0.1792	-0.1163	-0.0629
		0.2500		0.1187	0.1142	0.1040	0.1098	-0.0742	-0.0356
		0.3750		0.1199	0.1165	0.0767	0.0798	-0.0543	-0.0255
		0.5000		0.1201	0.1171	0.0704	0.0730	-0.0492	-0.0239
16-8 L		Break		0.0992	0.0825	0.4590	0.6144	-0.3994	-0.2150
		0.0625		0.1108	0.1010	0.2603	0.3015	-0.1971	-0.1045
		0.1250		0.1145	0.1079	0.1834	0.2026	-0.1310	-0.0716
		0.2500		0.1163	0.1115	0.1429	0.1542	-0.0982	-0.0560
		0.3750		0.1177	0.1139	0.1139	0.1209	-0.0769	-0.0440
		0.5000		0.1185	0.1151	0.0985	0.1036	-0.0664	-0.0373
16-3 S	TD 302°F	Break	0.124	0.0970	0.0688	0.5660	0.8346	-0.5891	-0.2456
		0.0625		0.1079	0.0882	0.3811	0.4798	-0.3407	-0.1391
		0.1250		0.1117	0.0964	0.2997	0.3562	-0.2518	-0.1045
		0.2500		0.1142	0.1001	0.2565	0.2964	-0.2141	-0.0823
		0.3750		0.1160	0.1034	0.2199	0.2484	-0.1817	-0.0667
		0.5000		0.1170	0.1046	0.2041	0.2282	-0.1701	-0.0581
16-3 L		Break		0.0962	0.0686	0.5708	0.8458	-0.5920	-0.2538
		0.0625		0.1085	0.0882	0.3776	0.4742	-0.3407	-0.1335
		0.1250		0.1116	0.0941	0.3170	0.3813	-0.2759	-0.1054

SCHEDULE 16 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1149	0.1009	0.2460	0.2824	-0.2062	-0.0762
		0.3750		0.1169	0.1050	0.2017	0.2253	-0.1663	-0.0590
		0.5000		0.1185	0.1082	0.1661	0.1817	-0.1363	-0.0454
16-4 S	TD 302°F	Break	0.124	0.0968	0.0694	0.5631	0.8280	-0.5804	-0.2476
		0.0625		0.1087	0.0884	0.3751	0.4701	-0.3384	-0.1317
		0.1250		0.1136	0.0968	0.2848	0.3352	-0.2476	-0.0876
		0.2500		0.1168	0.1031	0.2168	0.2444	-0.1846	-0.0598
		0.3750		0.1180	0.1061	0.1858	0.2055	-0.1559	-0.0496
16-4 L		Break		0.0971	0.0689	0.5649	0.8322	-0.5876	-0.2445
		0.0625		0.1083	0.0882	0.3788	0.4760	-0.3407	-0.1354
		0.1250		0.1111	0.0938	0.3222	0.3890	-0.2791	-0.1098
		0.2500		0.1120	0.0965	0.2971	0.3525	-0.2507	-0.1018
		0.3750		0.1144	0.1003	0.2538	0.2927	-0.2121	-0.0806
		0.5000		0.1159	0.1029	0.2244	0.2541	-0.1865	-0.0676
16-9 S	RD 302°F	Break	0.122	0.0951	0.0811	0.4818	0.6574	-0.4083	-0.2491
		0.0625		0.1051	0.0935	0.3398	0.4152	-0.2661	-0.1491
		0.1250		0.1098	0.0996	0.2652	0.3082	-0.2029	-0.1054
		0.2500		0.1132	0.1067	0.1885	0.2089	-0.1340	-0.0749
16-9 L		Break		0.0933	0.0793	0.5029	0.6990	-0.4308	-0.2682
		0.0625		0.1033	0.0940	0.3476	0.4271	-0.2607	-0.1664
		0.1250		0.1087	0.0999	0.2704	0.3153	-0.1998	-0.1154
		0.2500		0.1117	0.1030	0.2270	0.2575	-0.1693	-0.0882
		0.3750		0.1128	0.1056	0.1997	0.2228	-0.1444	-0.0784
		0.5000		0.1147	0.1088	0.1616	0.1762	-0.1145	-0.0617
16-10 S	RD 302°F	Break	0.124	0.0926	0.0801	0.5176	0.7290	-0.4370	-0.2920
		0.0625		0.1031	0.0924	0.3804	0.4787	-0.2942	-0.1846
		0.1250		0.1081	0.0989	0.3047	0.3634	-0.2262	-0.1372

SCHEDULE 16 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1107	0.1025	0.2620	0.3039	-0.1904	-0.1135
		0.3750		0.1132	0.1058	0.2211	0.2499	-0.1587	-0.0911
		0.5000		0.1141	0.1080	0.1986	0.2214	-0.1382	-0.0832
16-10 L		Break		0.0947	0.0816	0.4974	0.6880	-0.4184	-0.2696
		0.0625		0.1045	0.0913	0.3795	0.4772	-0.3061	-0.1711
		0.1250		0.1051	0.0939	0.3582	0.4434	-0.2780	-0.1654
		0.2500		0.1084	0.0972	0.3148	0.3780	-0.2435	-0.1344
		0.3750		0.1123	0.1031	0.2470	0.2847	-0.1846	-0.0991
		0.5000		0.1142	0.1057	0.2150	0.2420	-0.1597	-0.0823
16-5 S	TD 572°F	Break	0.114	0.0808	0.0487	0.6972	1.1947	-0.8505	-0.3442
		0.0625		0.0991	0.0776	0.4083	0.5247	-0.3846	-0.1401
		0.1250		0.1026	0.0866	0.3163	0.3803	-0.2749	-0.1054
		0.2500		0.1065	0.0943	0.2272	0.2578	-0.1897	-0.0680
		0.3750		0.1089	0.0994	0.1671	0.1828	-0.1370	-0.0458
		0.5000		0.1110	0.1036	0.1151	0.1223	-0.0957	-0.0267
16-5 L		Break		0.0811	0.0494	0.6917	1.1768	-0.8362	-0.3405
		0.0625		0.0995	0.0786	0.3982	0.5079	-0.3718	-0.1360
		0.1250		0.1046	0.0898	0.2772	0.3247	-0.2386	-0.0860
		0.2500		0.1056	0.0923	0.2500	0.2877	-0.2112	-0.0765
		0.3750		0.1066	0.0936	0.2322	0.2643	-0.1972	-0.0671
		0.5000		0.1090	0.1003	0.1588	0.1729	-0.1280	-0.0448

SCHEDULE 17

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
17-13 L	TD	Break	0.126	0.1066	0.0771	0.4823	0.6584	-0.4912	-0.1672
	Room	0.0625		0.1173	0.1012	0.2523	0.2907	-0.2192	-0.0716
	Temp.	0.1250		0.1208	0.1112	0.1539	0.1671	-0.1250	-0.0422
		0.2500		0.1214	0.1125	0.1397	0.1505	-0.1133	-0.0372
		0.3750		0.1217	0.1135	0.1300	0.1392	-0.1045	-0.0347
		0.5000		0.1222	0.1148	0.1164	0.1237	-0.0931	-0.0306
17-13 S		Break		0.1043	0.0787	0.4830	0.6596	-0.4706	-0.1890
		0.0625		0.1160	0.1010	0.2620	0.3038	-0.2212	-0.0827
		0.1250		0.1194	0.1096	0.1757	0.1932	-0.1394	-0.0538
		0.2500		0.1194	0.1092	0.1787	0.1969	-0.1431	-0.0538
		0.3750		0.1221	0.1173	0.0979	0.1030	-0.0716	-0.0314
17-14 L	TD	Break	0.125	0.1049	0.0738	0.5045	0.7023	-0.5270	-0.1753
	Room	0.0625		0.1158	0.0991	0.2656	0.3086	-0.2322	-0.0764
	Temp.	0.1250		0.1190	0.1077	0.1798	0.1982	-0.1490	-0.0492
		0.2500		0.1199	0.1109	0.1490	0.1613	-0.1197	-0.0417
		0.3750		0.1187	0.1070	0.1871	0.2072	-0.1555	-0.0517
		0.5000		0.1182	0.1052	0.2042	0.2284	-0.1724	-0.0559
17-14 S		Break		0.1010	0.0791	0.4887	0.6708	-0.4576	-0.2132
		0.0625		0.1135	0.1011	0.2656	0.3087	-0.2122	-0.0965
		0.1250		0.1178	0.1099	0.1714	0.1881	-0.1287	-0.0593
		0.2500		0.1194	0.1136	0.1391	0.1415	-0.0956	-0.0458
		0.3750		0.1197	0.1134	0.1313	0.1407	-0.0974	-0.0433
		0.5000		0.1202	0.1154	0.1122	0.1191	-0.0799	-0.0392
17-15 L	TD	Break	0.125	0.1059	0.0816	0.4470	0.5923	-0.4265	-0.1658
	Room	0.0625		0.1137	0.0979	0.2876	0.3391	-0.2444	-0.0948
	Temp.	0.1250		0.1156	0.1017	0.2476	0.2845	-0.2063	-0.0782

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1183	0.1079	0.1831	0.2022	-0.1471	-0.0551
		0.3750		0.1199	0.1124	0.1375	0.1479	-0.1062	-0.0417
		0.5000		0.1214	0.1159	0.0995	0.1048	-0.0756	-0.0292
17-16 L	TD	Break	0.125	0.1079	0.0699	0.5173	0.7284	-0.5812	-0.1471
	Room	0.0625		0.1126	0.0909	0.3449	0.4230	-0.3186	-0.1045
	Temp.	0.1250		0.1159	0.0993	0.2634	0.3058	-0.2302	-0.0756
		0.2500		0.1192	0.1082	0.1746	0.1918	-0.1443	-0.0475
		0.3750		0.1177	0.1037	0.2188	0.2470	-0.1868	-0.0602
		0.5000		0.1164	0.0999	0.2558	0.2954	-0.2241	-0.0713
17-16 S	TD	Break	0.125	0.1053	0.0766	0.4838	0.6612	-0.4897	-0.1715
	Room	0.0625		0.1146	0.0969	0.2893	0.3415	-0.2546	-0.0869
	Temp.	0.1250		0.1172	0.1026	0.2304	0.2619	-0.1975	-0.0644
		0.2500		0.1181	0.1044	0.2109	0.2369	-0.1801	-0.0568
		0.3750		0.1200	0.1092	0.1613	0.1760	-0.1351	-0.0408
		0.5000		0.1216	0.1161	0.0965	0.1014	-0.0739	-0.0276
17-17 L	TD	Break	0.126	0.1029	0.0703	0.5444	0.7860	-0.5835	-0.2025
	Room	0.0625		0.1135	0.0936	0.3308	0.4017	-0.2972	-0.1045
	Temp.	0.1250		0.1170	0.1013	0.2535	0.2923	-0.2182	-0.0741
		0.2500		0.1204	0.1106	0.1612	0.1758	-0.1304	-0.0455
		0.3750		0.1213	0.1132	0.1351	0.1451	-0.1071	-0.0380
		0.5000		0.1215	0.1131	0.1344	0.1444	-0.1080	-0.0364
17-17 S		Break		0.1006	0.0786	0.5019	0.6970	-0.4719	-0.2251
		0.0625		0.1121	0.0986	0.3038	0.3621	-0.2452	-0.1169
		0.1250		0.1160	0.1060	0.2255	0.2555	-0.1728	-0.0827
		0.2500		0.1166	0.1078	0.2083	0.2335	-0.1560	-0.0775
		0.3750		0.1180	0.1106	0.1780	0.1960	-0.1304	-0.0656

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
17-18 L	TD	Break	0.125	0.1005	0.0718	0.5382	0.7726	-0.5544	-0.2182
	Room	0.0625		0.1128	0.0951	0.3134	0.3761	-0.2734	-0.1027
	Temp.	0.1250		0.1169	0.1041	0.2212	0.2500	-0.1830	-0.0670
		0.2500		0.1206	0.1132	0.1263	0.1350	-0.0992	-0.0358
		0.3750		0.1211	0.1152	0.1072	0.1133	-0.0896	-0.0317
17-18 S		Break		0.1068	0.0773	0.4716	0.6380	-0.4806	-0.1574
		0.0625		0.1158	0.0983	0.2715	0.3167	-0.2403	-0.0764
		0.1250		0.1185	0.1047	0.2060	0.2306	-0.1772	-0.0534
		0.2500		0.1194	0.1073	0.1801	0.1985	-0.1527	-0.0458
		0.3750		0.1204	0.1100	0.1524	0.1653	-0.1278	-0.0375
		0.5000		0.1212	0.1133	0.1212	0.1292	-0.0983	-0.0309
17-1 L	RD	Break	0.126	0.0991	0.0860	0.4632	0.6221	-0.3819	-0.2402
	Room	0.0625		0.1101	0.1006	0.3023	0.3600	-0.2251	-0.1349
	Temp.	0.1250		0.1141	0.1073	0.2288	0.2599	-0.1606	-0.0992
		0.2500		0.1168	0.1119	0.1768	0.1945	-0.1187	-0.0758
		0.3750		0.1173	0.1129	0.1658	0.1813	-0.1098	-0.0716
		0.5000		0.1178	0.1134	0.1586	0.1726	-0.1054	-0.0673
17-2 S	RD	Break	0.126	0.1001	0.0847	0.4660	0.6273	-0.3972	-0.2301
	Room	0.0625		0.1113	0.1003	0.2968	0.3522	-0.2281	-0.1240
	Temp.	0.1250		0.1149	0.1066	0.2285	0.2594	-0.1672	-0.0922
		0.2500		0.1159	0.1083	0.2094	0.2349	-0.1514	-0.0836
		0.3750		0.1179	0.1121	0.1675	0.1833	-0.1169	-0.0664
17-3 L	RD	Break	0.125	0.0997	0.0865	0.4481	0.5943	-0.3682	-0.2262
	Room	0.0625		0.1099	0.1006	0.2924	0.3459	-0.2172	-0.1287
	Temp.	0.1250		0.1130	0.1052	0.2392	0.2734	-0.1724	-0.1009
		0.2500		0.1147	0.1077	0.2094	0.2350	-0.1490	-0.0860
		0.3750		0.1159	0.1093	0.1893	0.2098	-0.1342	-0.0756
		0.5000		0.1171	0.1119	0.1614	0.1760	-0.1107	-0.0653

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
17-3 S		Break		0.0995	0.0868	0.4473	0.5929	-0.3647	-0.2282
		0.0625		0.1093	0.1001	0.2998	0.3564	-0.2221	-0.1342
		0.1250		0.1127	0.1053	0.2405	0.2751	-0.1715	-0.1036
		0.2500		0.1156	0.1095	0.1899	0.2106	-0.1324	-0.0782
		0.3750		0.1161	0.1107	0.1774	0.1954	-0.1215	-0.0739
17-4 L	RD	Break	0.126	0.1022	0.0880	0.4335	0.5683	-0.3590	-0.2094
	Room	0.0625		0.1096	0.0981	0.3228	0.3897	-0.2503	-0.1394
	Temp.	0.1250		0.1152	0.1071	0.2229	0.2521	-0.1625	-0.0896
		0.2500		0.1169	0.1096	0.1930	0.2144	-0.1394	-0.0750
		0.3750		0.1181	0.1122	0.1654	0.1808	-0.1160	-0.0648
		0.5000		0.1187	0.1137	0.1499	0.1624	-0.1027	-0.0597
17-5 L	RD	Break	0.125	0.0986	0.0871	0.4504	0.5985	-0.3613	-0.2372
	Room	0.0625		0.1091	0.0998	0.3032	0.3612	-0.2252	-0.1360
	Temp.	0.1250		0.1126	0.1048	0.2448	0.2807	-0.1763	-0.1045
		0.2500		0.1155	0.1086	0.1972	0.2197	-0.1406	-0.0790
		0.3750		0.1169	0.1116	0.1650	0.1804	-0.1134	-0.0670
		0.5000		0.1175	0.1123	0.1555	0.1690	-0.1071	-0.0619
17-5 S		Break		0.0987	0.0860	0.4568	0.6102	-0.3740	-0.2362
		0.0625		0.1082	0.0992	0.3131	0.3755	-0.2312	-0.1443
		0.1250		0.1121	0.1038	0.2553	0.2948	-0.1858	-0.1089
		0.2500		0.1155	0.1086	0.1972	0.2197	-0.1406	-0.0790
		0.3750		0.1181	0.1135	0.1421	0.1533	-0.0965	-0.0568
17-6 L	RD	Break	0.126	0.0998	0.0899	0.4349	0.5707	-0.3376	-0.2331
	Room	0.0625		0.1101	0.1027	0.2878	0.3394	-0.2045	-0.1349
	Temp.	0.1250		0.1136	0.1075	0.2308	0.2624	-0.1588	-0.1036
		0.2500		0.1155	0.1102	0.1983	0.2210	-0.1340	-0.0870

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1166	0.1117	0.1796	0.1980	-0.1205	-0.0775
		0.5000		0.1177	0.1126	0.1652	0.1806	-0.1124	-0.0681
17-6 S		Break		0.1019	0.0879	0.4358	0.5724	-0.3601	-0.2123
		0.0625		0.1110	0.1012	0.2924	0.3459	-0.2192	-0.1268
		0.1250		0.1144	0.1069	0.2297	0.2610	-0.1644	-0.0966
		0.2500		0.1176	0.1116	0.1733	0.1904	-0.1214	-0.0690
17-19 L	TD 572°F	Break	0.126	0.0948	0.0517	0.6913	1.1753	-0.8908	-0.2845
		0.0625		0.1106	0.0852	0.4065	0.5216	-0.3913	-0.1304
		0.1250		0.1152	0.0703	0.4899	0.6731	-0.5835	-0.0896
		0.2500		0.1159	0.0979	0.2853	0.3359	-0.2523	-0.0836
		0.3750		0.1167	0.1003	0.2627	0.3048	-0.2281	-0.0767
		0.5000		0.1194	0.1081	0.1870	0.2070	-0.1532	-0.0538
17-19 S		Break		0.0820	0.0509	0.7371	1.3360	-0.9064	-0.4296
		0.0625		0.1082	0.0843	0.4255	0.5542	-0.4019	-0.1523
		0.1250		0.1142	0.0972	0.3008	0.3578	-0.2595	-0.0983
		0.2500		0.1174	0.1054	0.2206	0.2492	-0.1785	-0.0707
		0.3750		0.1182	0.1072	0.2019	0.2255	-0.1616	-0.0639
		0.5000		0.1198	0.1109	0.1632	0.1781	-0.1276	-0.0505
17-20 L	TD 572°F	Break	0.126	0.0939	0.0514	0.6960	1.1907	-0.8966	-0.2940
		0.0625		0.1106	0.0857	0.4030	0.5158	-0.3854	-0.1304
		0.1250		0.1154	0.0976	0.2906	0.3433	-0.2554	-0.0879
		0.2500		0.1171	0.1023	0.2454	0.2816	-0.2084	-0.0732
		0.3750		0.1171	0.1023	0.2454	0.2816	-0.2084	-0.0732
		0.5000		0.1179	0.1042	0.2262	0.2564	-0.1900	-0.0664

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
17-20 S		Break		0.0900	0.0673	0.6185	0.9636	-0.6271	-0.3365
		0.0625		0.1084	0.0815	0.4435	0.5861	-0.4357	-0.1504
		0.1250		0.1154	0.0978	0.2891	0.3412	-0.2534	-0.0879
		0.2500		0.1175	0.1040	0.2303	0.2617	-0.1919	-0.0698
17-21 L	TD 572°F	Break	0.126	0.0938	0.0541	0.6804	1.1406	-0.8454	-0.2951
		0.0625		0.1092	0.0834	0.4264	0.5557	-0.4126	-0.1431
		0.1250		0.1136	0.0942	0.3260	0.3945	-0.2909	-0.1036
		0.2500		0.1167	0.1028	0.2444	0.2802	-0.2035	-0.0767
		0.3750		0.1166	0.1023	0.2487	0.2859	-0.2084	-0.0775
		0.5000		0.1153	0.0991	0.2803	0.3289	-0.2402	-0.0887
17-21 S		Break		0.0926	0.0536	0.6874	1.1627	-0.8547	-0.3080
		0.0625		0.1087	0.0823	0.4365	0.5736	-0.4259	-0.1477
		0.1250		0.1133	0.0932	0.3349	0.4078	-0.3015	-0.1062
		0.2500		0.1177	0.1040	0.2290	0.2600	-0.1919	-0.0681
		0.3750		0.1188	0.1068	0.2008	0.2242	-0.1653	-0.0588
		0.5000		0.1208	0.1123	0.1455	0.1572	-0.1151	-0.0422
17-22 L	TD 572°F	Break	0.125	0.0978	0.0574	0.6407	1.0237	-0.7783	-0.2454
		0.0625		0.1109	0.0862	0.3882	0.4913	-0.3716	-0.1197
		0.1250		0.1153	0.0988	0.2709	0.3160	-0.2352	-0.0808
		0.2500		0.1165	0.1009	0.2477	0.2846	-0.2142	-0.0704
		0.3750		0.1161	0.0989	0.2651	0.3081	-0.2342	-0.0739
		0.5000		0.1181	0.1034	0.2185	0.2465	-0.1897	-0.0568
17-22 S		Break		0.0952	0.0527	0.6789	1.1360	-0.8637	-0.2723
		0.0625		0.1108	0.0842	0.4029	0.5157	-0.3951	-0.1206
		0.1250		0.1153	0.0970	0.2842	0.3344	-0.2536	-0.0808
		0.2500		0.1164	0.0988	0.2640	0.3065	-0.2352	-0.0713

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1186	0.1051	0.2022	0.2260	-0.1734	-0.0526
		0.5000		0.1205	0.1103	0.1494	0.1618	-0.1251	-0.0367
17-23 L	TD 572°F	Break	0.126	0.0921	0.0467	0.7291	1.3059	-0.9925	-0.3134
		0.0625		0.1091	0.0826	0.4324	0.5663	-0.4223	-0.1440
		0.1250		0.1146	0.0960	0.3070	0.3668	-0.2719	-0.0948
		0.2500		0.1172	0.1030	0.2396	0.2740	-0.2016	-0.0724
		0.3750		0.1167	0.1008	0.2590	0.2998	-0.2231	-0.0767
		0.5000		0.1172	0.1024	0.2441	0.2798	-0.2074	-0.0724
17-23 S		Break		0.0946	0.0519	0.6907	1.1736	-0.8870	-0.2866
		0.0625		0.1104	0.0857	0.4040	0.5176	-0.3854	-0.1322
		0.1250		0.1159	0.0999	0.2707	0.3157	-0.2321	-0.0836
		0.2500		0.1187	0.1084	0.1895	0.2101	-0.1504	-0.0597
		0.3750		0.1177	0.1102	0.1830	0.2021	-0.1340	-0.0681
		0.5000		0.1207	0.1119	0.1493	0.1616	-0.1187	-0.0430
17-24 L	TD 572°F	Break	0.125	0.0887	0.0464	0.7366	1.3341	-0.9910	-0.3430
		0.0625		0.1071	0.0849	0.4181	0.5414	-0.3868	-0.1546
		0.1250		0.1132	0.0982	0.2886	0.3405	-0.2413	-0.0992
		0.2500		0.1191	0.1017	0.2248	0.2546	-0.2063	-0.0484
		0.3750		0.1157	0.1026	0.2403	0.2748	-0.1975	-0.0773
		0.5000		0.1172	0.1061	0.2042	0.2284	-0.1639	-0.0644
17-24 S		Break		0.0951	0.0508	0.6908	1.1738	-0.9004	-0.2734
		0.0625		0.1111	0.0861	0.3878	0.4907	-0.3728	-0.1179
		0.1250		0.1166	0.1006	0.2493	0.2867	-0.2172	-0.0696
		0.2500		0.1193	0.1081	0.1746	0.1919	-0.1453	-0.0467
		0.3750		0.1194	0.1087	0.1694	0.1856	-0.1397	-0.0458
		0.5000		0.1204	0.1111	0.1439	0.1554	-0.1179	-0.0375

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
17-7 L	RD	Break	0.126	0.0835	0.0622	0.6729	1.1174	-0.7059	-0.4114
	572°F	0.0625		0.1042	0.0885	0.4191	0.5432	-0.3533	-0.1900
		0.1250		0.1110	0.0985	0.3113	0.3730	-0.2462	-0.1268
		0.2500		0.1152	0.1063	0.2287	0.2596	-0.1700	-0.0896
		0.3750		0.1161	0.1083	0.2080	0.2332	-0.1514	-0.0818
		0.5000		0.1164	0.1096	0.1964	0.2187	-0.1394	-0.0792
17-7 S		Break		0.0817	0.0632	0.6748	1.1232	-0.6900	-0.4332
		0.0625		0.1039	0.0896	0.4136	0.5338	-0.3409	-0.1928
		0.1250		0.1103	0.1001	0.3046	0.3632	-0.2301	-0.1331
		0.2500		0.1146	0.1075	0.2240	0.2536	-0.1588	-0.0948
		0.3750		0.1165	0.1100	0.1928	0.2142	-0.1358	-0.0784
		0.5000		0.1172	0.1114	0.1776	0.1956	-0.1232	-0.0724
17-8 L	RD	Break	0.126	0.0837	0.0671	0.6462	1.0391	-0.6301	-0.4090
	572°F	0.0625		0.1033	0.0913	0.4059	0.5208	-0.3221	-0.1986
		0.1250		0.1100	0.1003	0.3050	0.3639	-0.2281	-0.1358
		0.2500		0.1134	0.1052	0.2486	0.2858	-0.1804	-0.1054
		0.2750		0.1140	0.1055	0.2424	0.2776	-0.1776	-0.1001
		0.5000		0.1154	0.1075	0.2186	0.2467	-0.1588	-0.0879
17-8 S		Break		0.0832	0.0621	0.6746	1.1226	-0.7075	-0.4150
		0.0625		0.1041	0.0880	0.4230	0.5499	-0.3590	-0.1909
		0.1250		0.1104	0.0859	0.4027	0.5153	-0.3831	-0.1322
		0.2500		0.1135	0.1029	0.2644	0.3070	-0.2025	-0.1045
		0.3750		0.1154	0.1073	0.2200	0.2485	-0.1606	-0.0879
		0.5000		0.1169	0.1102	0.1886	0.2090	-0.1340	-0.0750
17-9 L	RD	Break	0.126	0.0844	0.0663	0.6475	1.0428	-0.6421	-0.4007
	572°F	0.0625		0.1049	0.0914	0.3961	0.5043	-0.3210	-0.1833
		0.1250		0.1109	0.0995	0.3050	0.3638	-0.2361	-0.1276

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1143	0.1051	0.2433	0.2788	-0.1814	-0.0975
		0.3750		0.1172	0.1094	0.1924	0.2137	-0.1413	-0.0724
		0.5000		0.1185	0.1121	0.1633	0.1783	-0.1169	-0.0614
17-10 L	RD 572°F	Break	0.125	0.0808	0.0626	0.6763	1.1279	-0.6916	-0.4363
		0.0625		0.1035	0.0896	0.4065	0.5217	-0.3330	-0.1887
		0.1250		0.1101	0.0996	0.2982	0.3541	-0.2272	-0.1269
		0.2500		0.1142	0.1066	0.2209	0.2496	-0.1592	-0.0904
		0.3750		0.1154	0.1093	0.1928	0.2141	-0.1342	-0.0799
		0.5000		0.1164	0.1115	0.1694	0.1856	-0.1143	-0.0713
17-10 S		Break		0.0810	0.0650	0.6630	1.0878	-0.6539	-0.4339
		0.0625		0.1022	0.0910	0.4048	0.5188	-0.3174	-0.2014
		0.1250		0.1084	0.0987	0.3153	0.3787	-0.2362	-0.1425
		0.2500		0.1115	0.1029	0.2657	0.3088	-0.1946	-0.1143
		0.3750		0.1144	0.1086	0.2049	0.2292	-0.1406	-0.0886
		0.5000		0.1152	0.1100	0.1890	0.2095	-0.1278	-0.0816
17-11 L	RD 572°F	Break	0.126	0.0820	0.0632	0.6736	1.1195	-0.6900	-0.4296
		0.0625		0.1037	0.0900	0.4121	0.5312	-0.3365	-0.1948
		0.1250		0.1106	0.0987	0.3124	0.3746	-0.2442	-0.1304
		0.2500		0.1143	0.1045	0.2476	0.2846	-0.1871	-0.0975
		0.3750		0.1161	0.1085	0.2066	0.2314	-0.1495	-0.0818
		0.5000		0.1173	0.1101	0.1865	0.2064	-0.1349	-0.0716
17-11 S		Break		0.0830	0.0643	0.6638	1.0902	-0.6727	-0.4174
		0.0625		0.1042	0.0894	0.4132	0.5331	-0.3432	-0.1900
		0.1250		0.1110	0.0994	0.3050	0.3639	-0.2371	-0.1268
		0.2500		0.1148	0.1061	0.2328	0.2650	-0.1719	-0.0931
		0.3750		0.1162	0.1094	0.1993	0.2222	-0.1413	-0.0810
		0.5000		0.1173	0.1102	0.1858	0.2055	-0.1340	-0.0716

SCHEDULE 17 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	$2a$[d] (in.)	$2b$[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
17-12 L	RD	Break	0.126	0.0846	0.0637	0.6606	1.0804	-0.6821	-0.3984
	572°F	0.0625		0.1046	0.0892	0.4123	0.5315	-0.3454	-0.1861
		0.1250		0.1112	0.0988	0.3080	0.3681	-0.2432	-0.1250
		0.2500		0.1157	0.1069	0.2209	0.2497	-0.1644	-0.0853
		0.3750		0.1171	0.1097	0.1909	0.2118	-0.1385	-0.0732
		0.5000		0.1182	0.1117	0.1684	0.1844	-0.1205	-0.0639
17-12 S		Break		0.0838	0.0638	0.6632	1.0884	-0.6805	-0.4078
		0.0625		0.1047	0.0887	0.4150	0.5362	-0.3510	-0.1852
		0.1250		0.1116	0.0995	0.3006	0.3575	-0.2361	-0.1214
		0.2500		0.1169	0.1093	0.1952	0.2172	-0.1422	-0.0750
		0.3750		0.1179	0.1125	0.1645	0.1798	-0.1133	-0.0664
		0.5000		0.1186	0.1141	0.1476	0.1597	-0.0992	-0.0605

SCHEDULE 18

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
18-1 L	TD	Break	0.125	0.1013	0.0758	0.5086	0.7104	-0.5002	-0.2102
	Room	0.0625		0.1151	0.1015	0.2523	0.2908	-0.2082	-0.0825
	Temp.	0.1250		0.1198	0.1114	0.1459	0.1577	-0.1152	-0.0425
		0.2500		0.1213	0.1152	0.1057	0.1117	-0.0816	-0.0300
		0.3750		0.1217	0.1169	0.0895	0.0938	-0.0670	-0.0268
		0.5000		0.1217	0.1158	0.0981	0.1032	-0.0764	-0.0268
18-1 S		Break		0.1028	0.0807	0.4691	0.6331	-0.4376	-0.1955
		0.0625		0.1149	0.1018	0.2514	0.2896	-0.2053	-0.0842
		0.1250		0.1183	0.1081	0.1816	0.2004	-0.1453	-0.0551
		0.2500		0.1196	0.1111	0.1496	0.1620	-0.1179	-0.0442
		0.3750		0.1194	0.1111	0.1510	0.1637	-0.1179	-0.0458
		0.5000		0.1203	0.1131	0.1292	0.1384	-0.1004	-0.0383
18-2 L	TD	Break	0.125	0.0991	0.0730	0.5370	0.7700	-0.5378	-0.2322
	Room	0.0625		0.1108	0.0923	0.3455	0.4239	-0.3033	-0.1206
	Temp.	0.1250		0.1129	0.0968	0.3006	0.3575	-0.2557	-0.1018
		0.2500		0.1173	0.1043	0.2170	0.2446	-0.1810	-0.0636
		0.3750		0.1206	0.1129	0.1286	0.1376	-0.1018	-0.0358
		0.5000		0.1213	0.1147	0.1096	0.1160	-0.0860	-0.0300
18-2 S		Break		0.1002	0.0816	0.4767	0.6476	-0.4265	-0.2212
		0.0625		0.1106	0.0975	0.3099	0.3709	-0.2485	-0.1224
		0.1250		0.1145	0.1038	0.2394	0.2736	-0.1858	-0.0877
		0.2500		0.1171	0.1087	0.1854	0.2050	-0.1397	-0.0653
		0.3750		0.1180	0.1100	0.1693	0.1855	-0.1278	-0.0576
		0.5000		0.1203	0.1145	0.1184	0.1261	-0.0877	-0.0383
18-3 L	TD	Break	0.125	0.0929	0.0721	0.5713	0.8470	-0.5503	-0.2968
		0.0625		0.1063	0.0940	0.3605	0.4471	-0.2850	-0.1620
		0.1250		0.1111	0.1016	0.2776	0.3252	-0.2073	-0.1179
		0.2500		0.1142	0.1062	0.2238	0.2534	-0.1630	-0.0904

SCHEDULE 18 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1150	0.1080	0.2051	0.2296	-0.1462	-0.0834
		0.5000		0.1138	0.1057	0.2302	0.2616	-0.1677	-0.0939
18-3 S		Break		0.0956	0.0711	0.5650	0.8324	-0.5642	-0.2681
		0.0625		0.1092	0.0929	0.3507	0.4319	-0.2968	-0.1351
		0.1250		0.1143	0.1013	0.2590	0.2997	-0.2102	-0.0895
		0.2500		0.1168	0.1058	0.2091	0.2346	-0.1668	-0.0678
		0.3750		0.1163	0.1058	0.2125	0.2389	-0.1668	-0.0721
		0.5000		0.1164	0.1067	0.2051	0.2296	-0.1583	-0.0713
18-4 S	TD 302°F	Break	0.125	0.0956	0.0684	0.5815	0.8711	-0.6029	-0.2681
		0.0625		0.1091	0.0905	0.3681	0.4590	-0.3230	-0.1360
		0.1250		0.1131	0.0992	0.2820	0.3312	-0.2312	-0.1000
		0.2500		0.1146	0.1022	0.2504	0.2882	-0.2014	-0.0869
		0.3750		0.1164	0.1042	0.2238	0.2533	-0.1820	-0.0713
		0.5000		0.1178	0.1069	0.1941	0.2158	-0.1564	-0.0593
18-4 L		Break		0.0953	0.0696	0.5755	0.8568	-0.5856	-0.2713
		0.0625		0.1081	0.0929	0.3573	0.4420	-0.2968	-0.1453
		0.1250		0.1117	0.0977	0.3016	0.3589	-0.2464	-0.1125
		0.2500		0.1122	0.0981	0.2956	0.3504	-0.2423	-0.1080
		0.3750		0.1141	0.1017	0.2574	0.2975	-0.2063	-0.0912
		0.5000		0.1152	0.1044	0.2303	0.2617	-0.1801	-0.0816
18-5 S	TD 572°F	Break	0.125	0.0859	0.0527	0.7103	1.2388	-0.8637	-0.3751
		0.0625		0.1061	0.0859	0.4167	0.5391	-0.3751	-0.1639
		0.1250		0.1120	0.0973	0.3026	0.3603	-0.2505	-0.1098
		0.2500		0.1146	0.1037	0.2394	0.2737	-0.1868	-0.0869
		0.3750		0.1150	0.1036	0.2375	0.2712	-0.1878	-0.0834
		0.5000		0.1161	0.1064	0.2094	0.2350	-0.1611	-0.0739

SCHEDULE 18 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
18-5 L		Break		0.0902	0.0623	0.6404	1.0226	-0.6964	-0.3263
		0.0625		0.1068	0.0885	0.3951	0.5027	-0.3453	-0.1574
		0.1250		0.1121	0.0975	0.3005	0.3574	-0.2485	-0.1089
		0.2500		0.1148	0.1036	0.2388	0.2729	-0.1878	-0.0851
		0.3750		0.1165	0.1071	0.2015	0.2250	-0.1546	-0.0704
		0.5000		0.1180	0.1108	0.1632	0.1782	-0.1206	-0.0576
18-6 S	TD 572°F	Break	0.125	0.0873	0.0507	0.7167	1.2614	-0.9024	-0.3590
		0.0625		0.1054	0.0815	0.4502	0.5983	-0.4277	-0.1706
		0.1250		0.1113	0.0934	0.3347	0.4075	-0.2914	-0.1161
		0.2500		0.1145	0.1011	0.2591	0.2999	-0.2122	-0.0877
		0.3750		0.1162	0.1036	0.2296	0.2608	-0.1878	-0.0730
		0.5000		0.1164	0.1040	0.2252	0.2552	-0.1839	-0.0713
18-6 L		Break		0.0885	0.0521	0.7049	1.2205	-0.8752	-0.3453
		0.0625		0.1059	0.0815	0.4476	0.5935	-0.4277	-0.1658
		0.1250		0.1110	0.0929	0.3400	0.4156	-0.2968	-0.1188
		0.2500		0.1147	0.1016	0.2542	0.2933	-0.2073	-0.0860
		0.3750		0.1163	0.1042	0.2244	0.2541	-0.1820	-0.0721
		0.5000		0.1173	0.1072	0.1952	0.2172	-0.1536	-0.0636
18-7 S	RD Room Temp.	Break	0.125	0.0950	0.0919	0.4412	0.5820	-0.3076	-0.2744
		0.0625		0.1067	0.1043	0.2878	0.3393	-0.1810	-0.1583
		0.1250		0.1116	0.1095	0.2179	0.2458	-0.1324	-0.1134
		0.2500		0.1144	0.1136	0.1683	0.1842	-0.0956	-0.0886
		0.3750		0.1153	0.1140	0.1588	0.1729	-0.0921	-0.0808
		0.5000		0.1158	0.1146	0.1507	0.1633	-0.0869	-0.0764
18-7 L		Break		0.0961	0.0919	0.4348	0.5705	-0.3076	-0.2629
		0.0625		0.1077	0.1044	0.2804	0.3290	-0.1801	-0.1490
		0.1250		0.1123	0.1096	0.2123	0.2386	-0.1315	-0.1071

SCHEDULE 18 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1157	0.1129	0.1640	0.1791	-0.1018	-0.0773
		0.3750		0.1173	0.1140	0.1442	0.1557	-0.0921	-0.0636
		0.5000		0.1171	0.1152	0.1366	0.1469	-0.0816	-0.0653
18-8 S	RD	Break	0.126	0.0979	0.0949	0.4148	0.5358	-0.2835	-0.2523
	Room	0.0625		0.1082	0.1046	0.2871	0.3384	-0.1861	-0.1523
	Temp.	0.1250		0.1126	0.1089	0.2276	0.2583	-0.1458	-0.1124
		0.2500		0.1145	0.1123	0.1901	0.2108	-0.1151	-0.0957
		0.3750		0.1161	0.1138	0.1678	0.1837	-0.1018	-0.0818
18-8 L		Break		0.0971	0.0935	0.4281	0.5589	-0.2983	-0.2605
		0.0625		0.1085	0.1051	0.2817	0.3309	-0.1814	-0.1495
		0.1250		0.1115	0.1094	0.2317	0.2635	-0.1413	-0.1223
		0.2500		0.1138	0.1120	0.1972	0.2196	-0.1178	-0.1018
		0.3750		0.1156	0.1141	0.1692	0.1854	-0.0992	-0.0862
		0.5000		0.1166	0.1156	0.1510	0.1637	-0.0862	-0.0775
18-9 L	RD	Break	0.125	0.0881	0.0868	0.5106	0.7146	-0.3647	-0.3498
	302°F	0.0625		0.1015	0.0998	0.3517	0.4334	-0.2252	-0.2082
		0.1250		0.1080	0.1062	0.2660	0.3092	-0.1630	-0.1462
		0.2500		0.1119	0.1101	0.2115	0.2376	-0.1269	-0.1107
		0.3750		0.1138	0.1122	0.1828	0.2019	-0.1080	-0.0939
		0.5000		0.1156	0.1132	0.1625	0.1773	-0.0992	-0.0782
18-9 S		Break		0.0897	0.0874	0.4982	0.6897	-0.3578	-0.3318
		0.0625		0.1032	0.1010	0.3329	0.4048	-0.2132	-0.1916
		0.1250		0.1078	0.1064	0.2659	0.3091	-0.1611	-0.1480
		0.2500		0.1107	0.1086	0.2306	0.2621	-0.1406	-0.1215
		0.3750		0.1115	0.1101	0.2143	0.2412	-0.1269	-0.1143
		0.5000		0.1140	0.1128	0.1770	0.1948	-0.1027	-0.0921

SCHEDULE 18 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	$2a$[d] (in.)	$2b$[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
18-10 L	RD Room Temp.	Break	0.126	0.0918	0.0859	0.5033	0.6998	-0.3831	-0.3167
		0.0625		0.1034	0.0971	0.3676	0.4582	-0.2605	-0.1977
		0.1250		0.1086	0.1049	0.2824	0.3319	-0.1833	-0.1486
		0.2500		0.1131	0.1098	0.2178	0.2456	-0.1376	-0.1080
		0.3750		0.1163	0.1138	0.1664	0.1820	-0.1018	-0.0801
		0.5000		0.1166	0.1152	0.1539	0.1671	-0.0896	-0.0775
18-10 S		Break		0.0931	0.0882	0.4828	0.6593	-0.3567	-0.3026
		0.0625		0.1042	0.1009	0.3384	0.4131	-0.2231	-0.1900
		0.1250		0.1081	0.1051	0.2844	0.3346	-0.1814	-0.1532
		0.2500		0.1128	0.1102	0.2170	0.2446	-0.1340	-0.1107
		0.3750		0.1160	0.1133	0.1722	0.1889	-0.1062	-0.0827
		0.5000		0.1168	0.1145	0.1576	0.1715	-0.0957	-0.0758
18-11 L	RD 572°F	Break	0.126	0.0777	0.0731	0.6422	1.0279	-0.5444	-0.4834
		0.0625		0.0987	0.0755	0.5306	0.7564	-0.5122	-0.2442
		0.1250		0.1060	0.1031	0.3116	0.3734	-0.2006	-0.1728
		0.2500		0.1065	0.1019	0.3164	0.3804	-0.2123	-0.1681
		0.3750		0.1078	0.1032	0.2993	0.3556	-0.1996	-0.1560
		0.5000		0.1144	0.1094	0.2117	0.2378	-0.1413	-0.0966
18-11 S		Break		0.0800	0.0759	0.6175	0.9611	-0.5069	-0.4543
		0.0625		0.1009	0.0972	0.3822	0.4817	-0.2595	-0.2222
		0.1250		0.1076	0.1043	0.2931	0.3469	-0.1890	-0.1579
		0.2500		0.1127	0.1105	0.2156	0.2428	-0.1313	-0.1116
		0.3750		0.1150	0.1129	0.1822	0.2011	-0.1098	-0.0914
		0.5000		0.1159	0.1146	0.1634	0.1784	-0.0948	-0.0836
18-12 L	RD 572°F	Break	0.126	0.0775	0.0688	0.6642	1.0911	-0.6051	-0.4860
		0.0625		0.1005	0.0936	0.4075	0.5234	-0.2972	-0.2261
		0.1250		0.1076	0.1018	0.3100	0.3711	-0.2133	-0.1579
		0.2500		0.1133	0.1081	0.2285	0.2595	-0.1532	-0.1062

SCHEDULE 18 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.3750		0.1156	0.1117	0.1867	0.2066	-0.1205	-0.0862
		0.5000		0.1172	0.1137	0.1606	0.1751	-0.1027	-0.0724
18-12 S		Break		0.0770	0.0698	0.6615	1.0831	-0.5906	-0.4925
		0.0625		0.0992	0.0942	0.4114	0.5300	-0.2909	-0.2391
		0.1250		0.1066	0.1030	0.3084	0.3688	-0.2016	-0.1672
		0.2500		0.1108	0.1083	0.2442	0.2799	-0.1514	-0.1286
		0.3750		0.1124	0.1111	0.2134	0.2401	-0.1258	-0.1142
		0.5000		0.1148	0.1133	0.1807	0.1993	-0.1062	-0.0931
18-13 L	TD	Break	0.250	0.2051	0.1583	0.4805	0.6549	-0.4570	-0.1980
	Room	0.0625		0.2183	0.1832	0.3601	0.4465	-0.3109	-0.1356
	Temp.	0.1250		0.2288	0.1997	0.2689	0.3133	-0.2246	-0.0886
		0.2500		0.2359	0.2140	0.1923	0.2135	-0.1555	-0.0580
		0.3750		0.2393	0.2190	0.1615	0.1761	-0.1324	-0.0437
		0.5000		0.2419	0.2255	0.1272	0.1361	-0.1031	-0.0329
18-13 S		Break		0.2016	0.1623	0.4765	0.6472	-0.4320	-0.2152
		0.0625		0.2161	0.1855	0.3586	0.4441	-0.2984	-0.1457
		0.1250		0.2252	0.2010	0.2758	0.3226	-0.2182	-0.1045
		0.2500		0.2346	0.2144	0.1952	0.2172	-0.1536	-0.0636
		0.3750		0.2388	0.2239	0.1445	0.1561	-0.1103	-0.0458
		0.5000		0.2439	0.2327	0.0919	0.0964	-0.0717	-0.0247
18-14 L	TD	Break	0.250	0.2022	0.1612	0.4785	0.6510	-0.4388	-0.2122
	Room	0.0625		0.2155	0.1841	0.3652	0.4545	-0.3060	-0.1485
	Temp.	0.1250		0.2244	0.1990	0.2855	0.3362	-0.2282	-0.1080
		0.2500		0.2329	0.2121	0.2096	0.2352	-0.1644	-0.0708
		0.3750		0.2349	0.2165	0.1863	0.2062	-0.1439	-0.0623
		0.5000		0.2363	0.2196	0.1697	0.1860	-0.1296	-0.0564

SCHEDULE 18 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
18-14 S		Break		0.2027	0.1619	0.4749	0.6442	-0.4345	-0.2097
		0.0625		0.2167	0.1835	0.3638	0.4522	-0.3092	-0.1430
		0.1250		0.2260	0.2013	0.2721	0.3176	-0.2167	-0.1009
		0.2500		0.2367	0.2190	0.1706	0.1871	-0.1324	-0.0547
		0.3750		0.2443	0.2346	0.0830	0.0866	-0.0636	-0.0231
18-15 L	RD Room Temp.	Break	0.250	0.1954	0.1921	0.3994	0.5099	-0.2634	-0.2464
		0.0625		0.2087	0.2050	0.3155	0.3790	-0.1984	-0.1806
		0.1250		0.2189	0.2155	0.2452	0.2814	-0.1485	-0.1328
		0.2500		0.2275	0.2235	0.1865	0.2064	-0.1120	-0.0943
		0.3750		0.2307	0.2275	0.1602	0.1746	-0.0943	-0.0803
		0.5000		0.2335	0.2299	0.1411	0.1521	-0.0838	-0.0683
18-15 S		Break		0.2005	0.1914	0.3860	0.4877	-0.2671	-0.2206
		0.0625		0.2130	0.2047	0.3024	0.3601	-0.1999	-0.1602
		0.1250		0.2219	0.2151	0.2363	0.2696	-0.1504	-0.1192
		0.2500		0.2305	0.2247	0.1713	0.1879	-0.1067	-0.0812
		0.3750		0.2348	0.2312	0.1314	0.1409	-0.0782	-0.0627
		0.5000		0.2410	0.2392	0.0776	0.0808	-0.0442	-0.0367
18-16 L	RD Room Temp.	Break	0.250	0.1971	0.1885	0.4056	0.5201	-0.2824	-0.2378
		0.0625		0.2076	0.2015	0.3307	0.4015	-0.2157	-0.1858
		0.1250		0.2155	0.2104	0.2745	0.3210	-0.1724	-0.1485
		0.2500		0.2230	0.2180	0.2222	0.2513	-0.1370	-0.1143
		0.3750		0.2254	0.2201	0.2062	0.2310	-0.1274	-0.1036
		0.5000		0.2274	0.2216	0.1937	0.2153	-0.1206	-0.0948
18-16 S		Break		0.1989	0.1914	0.3909	0.4958	-0.2671	-0.2287
		0.0625		0.2095	0.2034	0.3182	0.3830	-0.2063	-0.1767
		0.1250		0.2170	0.2140	0.2570	0.2970	-0.1555	-0.1416
		0.2500		0.2248	0.2226	0.1994	0.2223	-0.1161	-0.1062
		0.3750		0.2291	0.2277	0.1653	0.1807	-0.0934	-0.0873
		0.5000		0.2322	0.2296	0.1470	0.1590	-0.0851	-0.0739

SCHEDULE 62

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o [c] (in.)	2 a [d] (in.)	2 b [e] (in.)	Reduction in Area	$\bar{\epsilon}_1$ [f]	$\bar{\epsilon}_2$ [g]	$\bar{\epsilon}_3$ [h]
62-1 L	TD	Break	0.125	0.1056	0.0842	0.4309	0.5654	-0.3974	-0.1680
	Room	0.0625		0.1137	0.0992	0.2781	0.3251	-0.2308	-0.0943
	Temp.	0.1250		0.1167	0.1046	0.2188	0.2456	-0.1774	-0.0682
		0.2500		0.1197	0.1103	0.1550	0.1684	-0.1250	-0.0434
		0.3750		0.1215	0.1149	0.1065	0.1129	-0.0845	-0.0284
		0.5000		0.1219	0.1154	0.0997	0.1054	-0.0801	-0.0253
62-1 S		Break		0.1053	0.0838	0.4353	0.5725	-0.4005	-0.1720
		0.0625		0.1145	0.0999	0.2679	0.3122	-0.2245	-0.0877
		0.1250		0.1181	0.1073	0.1890	0.2080	-0.1520	-0.0560
		0.2500		0.1210	0.1132	0.1234	0.1312	-0.0987	-0.0325
		0.3750		0.1203	0.1114	0.1423	0.1537	-0.1155	-0.0382
62-2 S	TD	Break	0.125	0.1052	0.0840	0.4344	0.5694	-0.3974	-0.1720
	Room	0.0625		0.1134	0.0987	0.2837	0.3341	-0.2365	-0.0976
	Temp.	0.1250		0.1166	0.1046	0.2194	0.2472	-0.1779	-0.0693
		0.2500		0.1188	0.1094	0.1682	0.1849	-0.1336	-0.0513
		0.3750		0.1210	0.1145	0.1133	0.1202	-0.0877	-0.0325
		0.5000		0.1215	0.1158	0.0995	0.1037	-0.0763	-0.0274
62-2 L		Break		0.1049	0.0826	0.4455	0.5905	-0.4150	-0.1755
		0.0625		0.1144	0.1004	0.2649	0.3083	-0.2195	-0.0888
		0.1250		0.1175	0.1064	0.1999	0.2232	-0.1614	-0.0618
		0.2500		0.1198	0.1108	0.1505	0.1640	-0.1211	-0.0429
		0.3750		0.1203	0.1119	0.1385	0.1487	-0.1110	-0.0377
		0.5000		0.1209	0.1137	0.1202	0.1382	-0.0943	-0.0439
62-5 L	RD	Break	0.125	0.0977	0.0871	0.4554	0.6070	-0.3611	-0.2459
	Room	0.0625		0.1089	0.1043	0.2731	0.3197	-0.1815	-0.1382
	Temp.	0.1250		0.1132	0.1097	0.2052	0.2293	-0.1307	-0.0986

SCHEDULE 62 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1156	0.1126	0.1669	0.1829	-0.1044	-0.0785
		0.3750		0.1175	0.1149	0.1360	0.1462	-0.0844	-0.0618
		0.5000		0.1189	0.1168	0.1112	0.1184	-0.0682	-0.0502
62-6 S	RD	Break	0.125	0.0980	0.0891	0.4412	0.5815	-0.3382	-0.2433
	Room	0.0625		0.1110	0.1045	0.2576	0.2980	-0.1792	-0.1188
	Temp.	0.1250		0.1153	0.1107	0.1831	0.2023	-0.1211	-0.0812
		0.2500		0.1186	0.1157	0.1218	0.1302	-0.0779	-0.0523
		0.3750		0.1198	0.1170	0.1029	0.1090	-0.0661	-0.0429
		0.5000		0.1200	0.1172	0.0999	0.1053	-0.0645	-0.0408
62-6 L	RD	Break	0.125	0.0994	0.0889	0.4344	0.5708	-0.3412	-0.2296
	Room	0.0625		0.1108	0.1042	0.2611	0.3020	-0.1815	-0.1205
	Temp.	0.1250		0.1140	0.1088	0.2062	0.2313	-0.1392	-0.0921
		0.2500		0.1171	0.1130	0.1531	0.1660	-0.1010	-0.0650
		0.3750		0.1191	0.1159	0.1166	0.1244	-0.0763	-0.0481
		0.5000		0.1192	0.1160	0.1151	0.1218	-0.0747	-0.0471
62-7 L	RD	Break	0.125	0.0921	0.0829	0.5114	0.7161	-0.4107	-0.3054
	302°F	0.0625		0.1044	0.0976	0.3479	0.4275	-0.2474	-0.1801
		0.1250		0.1090	0.1035	0.2780	0.3257	-0.1887	-0.1370
		0.2500		0.1130	0.1087	0.2139	0.2406	-0.1397	-0.1009
		0.3750		0.1152	0.1108	0.1831	0.2022	-0.1206	-0.0816
		0.5000		0.1171	0.1137	0.1479	0.1600	-0.0948	-0.0653
62-7 S		Break		0.0934	0.0851	0.4913	0.6759	-0.3845	-0.2914
		0.0625		0.1059	0.0990	0.3290	0.3990	-0.2332	-0.1658
		0.1250		0.1103	0.1052	0.2574	0.2976	-0.1724	-0.1251
		0.2500		0.1152	0.1105	0.1853	0.2049	-0.1233	-0.0816
		0.3750		0.1174	0.1143	0.1412	0.1522	-0.0895	-0.0627

SCHEDULE 62 (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o [c] (in.)	2 a [d] (in.)	2 b [e] (in.)	Reduction in Area	$\bar{\epsilon}_1$ [f]	$\bar{\epsilon}_2$ [g]	$\bar{\epsilon}_3$ [h]
62-8 L	RD	Break	0.125	0.0921	0.0811	0.5220	0.7381	-0.4326	-0.3054
	302°F	0.0625		0.1056	0.0978	0.3390	0.4140	-0.2454	-0.1687
		0.1250		0.1105	0.1051	0.2567	0.2967	-0.1734	-0.1233
		0.2500		0.1147	0.1101	0.1918	0.2129	-0.1269	-0.0860
		0.3750		0.1170	0.1136	0.1494	0.1618	-0.0956	-0.0661
		0.5000		0.1188	0.1158	0.1196	0.1273	-0.0764	-0.0509
62-8 S		Break		0.0946	0.0839	0.4920	0.6773	-0.3987	-0.2787
		0.0625		0.1066	0.0987	0.3266	0.3955	-0.2362	-0.1592
		0.1250		0.1107	0.1042	0.2618	0.3035	-0.1820	-0.1215
		0.2500		0.1136	0.1073	0.2199	0.2483	-0.1527	-0.0956
		0.3750		0.1150	0.1099	0.1911	0.2121	-0.1287	-0.0834

SCHEDULE J

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
J-7 L	TD	Break	0.125	0.0980	0.0883	0.4462	0.5915	-0.3475	-0.2440
	Room	0.0625		0.1092	0.1020	0.2871	0.3381	-0.2034	-0.1347
	Temp.	0.1250		0.1127	0.1062	0.2340	0.2660	-0.1625	-0.1035
		0.2500		0.1154	0.1098	0.1891	0.2102	-0.1296	-0.0806
		0.3750		0.1169	0.1121	0.1613	0.1760	-0.1088	-0.0672
		0.5000		0.1191	0.1144	0.1280	0.1369	-0.0888	-0.0481
J-8 L	TD	Break	0.125	0.0968	0.0885	0.4491	0.5969	-0.3434	-0.2535
	Room	0.0625		0.1092	0.1031	0.2760	0.3230	-0.1900	-0.1330
	Temp.	0.1250		0.1127	0.1076	0.2202	0.2489	-0.1474	-0.1015
		0.2500		0.1150	0.1098	0.1880	0.2091	-0.1279	-0.0812
		0.3750		0.1177	0.1136	0.1402	0.1508	-0.0926	-0.0582
		0.5000		0.1191	0.1151	0.1184	0.1256	-0.0801	-0.0455
J-27 L	67.5°	Break	0.124	0.1020	0.0888	0.4119	0.5308	-0.3347	-0.1961
	Room	0.0625		0.1126	0.1052	0.2308	0.2625	-0.1652	-0.0972
	Temp.	0.1250		0.1172	0.1108	0.1568	0.1706	-0.1134	-0.0572
		0.2500		0.1192	0.1145	0.1138	0.1208	-0.0805	-0.0403
		0.3750		0.1212	0.1180	0.0714	0.0740	-0.0504	-0.0236
		0.5000		0.1230	0.1206	0.0368	0.0375	-0.0286	-0.0089
J-27 S	67.5°	Break	0.124	0.1002	0.0861	0.4398	0.5795	-0.3656	-0.2139
	Room	0.0625		0.1122	0.1036	0.2452	0.2814	-0.1806	-0.1008
	Temp.	0.1250		0.1173	0.1110	0.1546	0.1679	-0.1116	-0.0564
		0.2500		0.1220	0.1188	0.0589	0.0607	-0.0436	-0.0171
		0.3750		0.1234	0.1211	0.0297	0.0301	-0.0245	-0.0057
J-28 S	67.5°	Break	0.124	0.0987	0.0848	0.4539	0.6050	-0.3784	-0.2266
	Room	0.0625		0.1103	0.1011	0.2724	0.3180	-0.2026	-0.1155
	Temp.	0.1250		0.1146	0.1082	0.1910	0.2119	-0.1347	-0.0772

SCHEDULE J (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1189	0.1145	0.1117	0.1185	-0.0781	-0.0404
		0.3750		0.1210	0.1181	0.0676	0.0700	-0.0471	-0.0229
J-28 L	67.5°	Break	0.124	0.0989	0.0846	0.4541	0.6053	-0.3807	-0.2246
	Room	0.0625		0.1107	0.1017	0.2654	0.3085	-0.1966	-0.1118
	Temp.	0.1250		0.1147	0.1076	0.1947	0.2166	-0.1402	-0.0764
		0.2500		0.1171	0.1120	0.1443	0.1558	-0.1002	-0.0556
		0.3750		0.1186	0.1149	0.1109	0.1175	-0.0746	-0.0429
		0.5000		0.1204	0.1168	0.0824	0.0860	-0.0582	-0.0278
J-30 S	45°	Break	0.124	0.0954	0.0893	0.4477	0.5937	-0.3299	-0.2638
	Room	0.0625		0.1111	0.1058	0.2380	0.2718	-0.1603	-0.1115
	Temp.	0.1250		0.1169	0.1138	0.1376	0.1480	-0.0874	-0.0606
		0.2500		0.1202	0.1180	0.0805	0.0839	-0.0512	-0.0327
		0.3750		0.1220	0.1198	0.0525	0.0539	-0.0361	-0.0179
		0.5000		0.1230	0.1211	0.0344	0.0350	-0.0253	-0.0097
J-30 L		Break	0.124	0.1009	0.0946	0.3812	0.4800	-0.2722	-0.2078
		0.0625		0.1128	0.1087	0.2051	0.2296	-0.1333	-0.0963
		0.1250		0.1167	0.1136	0.1406	0.1515	-0.0892	-0.0623
		0.2500		0.1199	0.1179	0.0836	0.0873	-0.0521	-0.0352
		0.3750		0.1214	0.1192	0.0619	0.0639	-0.0411	-0.0228
		0.5000		0.1228	0.1212	0.0352	0.0358	-0.0244	-0.0113
J-32 S	45°	Break	0.124	0.0978	0.0924	0.4142	0.5347	-0.2958	-0.2390
	Room	0.0625		0.1105	0.1062	0.2392	0.2734	-0.1566	-0.1169
	Temp.	0.1250		0.1146	0.1112	0.1739	0.1910	-0.1106	-0.0804
		0.2500		0.1186	0.1160	0.1081	0.1144	-0.0683	-0.0461
		0.3750		0.1196	0.1180	0.0851	0.0890	-0.0512	-0.0377
		0.5000		0.1219	0.1207	0.0463	0.0473	-0.0286	-0.0187

SCHEDULE J (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
J-32 L		Break	0.124	0.0968	0.0927	0.4183	0.5418	-0.2925	-0.2492
		0.0625		0.1101	0.1063	0.2413	0.2761	-0.1556	-0.1205
		0.1250		0.1147	0.1112	0.1732	0.1901	-0.1106	-0.0796
		0.2500		0.1176	0.1150	0.1233	0.1316	-0.0770	-0.0546
		0.3750		0.1200	0.1182	0.0805	0.0839	-0.0495	-0.0344
		0.5000		0.1217	0.1200	0.0533	0.0547	-0.0344	-0.0203
J-35 S	22.5° Room Temp.	Break	0.125	0.1061	0.0935	0.3661	0.4559	-0.2912	-0.1647
		0.0625		0.1142	0.1067	0.2214	0.2502	-0.1591	-0.0912
		0.1250		0.1181	0.1133	0.1450	0.1567	-0.0991	-0.0576
		0.2500		0.1202	0.1177	0.0960	0.1009	-0.0610	-0.0400
		0.3750		0.1217	0.1193	0.0723	0.0750	-0.0475	-0.0276
		0.5000		0.1224	0.1202	0.0599	0.0618	-0.0400	-0.0218
J-35 L		Break		0.1072	0.0936	0.3589	0.4445	-0.2901	-0.1544
		0.0625		0.1149	0.1080	0.2071	0.2320	-0.1470	-0.0850
		0.1250		0.1172	0.1134	0.1508	0.1634	-0.0982	-0.0652
		0.2500		0.1194	0.1164	0.1119	0.1187	-0.0721	-0.0466
		0.3750		0.1218	0.1189	0.0746	0.0776	-0.0508	-0.0267
		0.5000		0.1232	0.1210	0.0475	0.0486	-0.0333	-0.0153
J-1 S	RD Room Temp.	Break	0.125	0.0908	0.1089	0.3672	0.4585	-0.1381	-0.3204
		0.0625		0.1014	0.1141	0.2595	0.3000	-0.0910	-0.2090
		0.1250		0.1063	0.1158	0.2122	0.2388	-0.0768	-0.1620
J-1 L		Break		0.0925	0.1094	0.3524	0.4356	-0.1336	-0.3020
		0.0625		0.1021	0.1147	0.2505	0.2870	-0.0855	-0.2015
		0.1250		0.1049	0.1162	0.2199	0.2481	-0.0725	-0.1756
		0.2500		0.1084	0.1175	0.1848	0.2046	-0.0618	-0.1428
		0.3750		0.1123	0.1191	0.1440	0.1551	-0.0481	-0.1070
		0.5000		0.1143	0.1201	0.1214	0.1292	-0.0398	-0.0894

SCHEDULE J (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
J-2 S	RD	Break	0.125	0.0985	0.1126	0.2924	0.3450	-0.1054	-0.2396
	Room	0.0625		0.1064	0.1164	0.2099	0.2340	-0.0726	-0.1614
	Temp.	0.1250		0.1108	0.1185	0.1624	0.1771	-0.0550	-0.1221
		0.2500		0.1161	0.1215	0.1001	0.1046	-0.0299	-0.0747
		0.3750		0.1163	0.1218	0.0963	0.1010	-0.0274	-0.0736
J-2 L		Break		0.0948	0.1105	0.3317	0.4101	-0.1251	-0.2850
		0.0625		0.1047	0.1160	0.2252	0.2548	-0.0763	-0.1785
		0.1250		0.1092	0.1182	0.1766	0.1935	-0.0571	-0.1364
		0.2500		0.1149	0.1206	0.1160	0.1228	-0.0372	-0.0856
		0.3750		0.1171	0.1216	0.0916	0.0955	-0.0289	-0.0666
		0.5000		0.1183	0.1218	0.0808	0.0845	-0.0274	-0.0571
J-9 L	TD	Break	0.124	0.0892	0.0849	0.5083	0.7098	-0.3796	-0.3302
	302°F	0.0625		0.1014	0.0976	0.3574	0.4422	-0.2402	-0.2020
		0.1250		0.1038	0.1002	0.3247	0.3925	-0.2139	-0.1786
		0.2500		0.1064	0.1021	0.2946	0.3490	-0.1951	-0.1539
		0.3750		0.1105	0.1076	0.2280	0.2587	-0.1427	-0.1161
		0.5000		0.1143	0.1101	0.1829	0.2020	-0.1197	-0.0823
J-9 S		Break		0.0887	0.0839	0.5168	0.7273	-0.3915	-0.3358
		0.0625		0.1026	0.0988	0.3418	0.4182	-0.2280	-0.1902
		0.1250		0.1067	0.1025	0.2899	0.3423	-0.1912	-0.1511
		0.2500		0.1119	0.1076	0.2182	0.2462	-0.1427	-0.1035
		0.3750		0.1140	0.1097	0.1880	0.2082	-0.1233	-0.0849
		0.5000		0.1171	0.1141	0.1324	0.1421	-0.0840	-0.0581
J-3 L	RD	Break	0.125	0.0918	0.1095	0.3597	0.4459	-0.1348	-0.3111
	302°F	0.0625		0.1021	0.1157	0.2476	0.2845	-0.0797	-0.2048
		0.1250		0.1072	0.1167	0.2032	0.2271	-0.0711	-0.1560

SCHEDULE J (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
		0.2500		0.1097	0.1178	0.1769	0.1947	-0.0617	-0.1330
		0.3750		0.1111	0.1188	0.1593	0.1736	-0.0533	-0.1203
		0.5000		0.1148	0.1207	0.1174	0.1249	-0.0374	-0.0875
J-3 S		Break		0.0844	0.1081	0.4189	0.5428	-0.1476	-0.3951
		0.0625		0.0982	0.1155	0.2776	0.3251	-0.0814	-0.2437
		0.1250		0.1045	0.1182	0.2133	0.2399	-0.0583	-0.1815
		0.2500		0.1084	0.1181	0.1846	0.2041	-0.0592	-0.1449
		0.3750		0.1128	0.1188	0.1465	0.1584	-0.0533	-0.1051
J-4 L	RD 302°F	Break	0.124	0.0908	0.1103	0.3444	0.4222	-0.1138	-0.3084
		0.0625		0.1005	0.1148	0.2448	0.2808	-0.0739	-0.2069
		0.1250		0.1045	0.1162	0.2052	0.2296	-0.0617	-0.1679
		0.2500		0.1114	0.1186	0.1352	0.1452	-0.0413	-0.1039
		0.3750		0.1161	0.1209	0.0812	0.0847	-0.0221	-0.0626
		0.5000		0.1190	0.1229	0.0427	0.0436	-0.0057	-0.0379
J-4 S		Break		0.0910	0.1105	0.3418	0.4182	-0.1120	-0.3062
		0.0625		0.1016	0.1144	0.2392	0.2734	-0.0774	-0.1960
		0.1250		0.1050	0.1160	0.2027	0.2266	-0.0635	-0.1631
		0.2500		0.1077	0.1174	0.1724	0.1892	-0.0515	-0.1377
		0.3750		0.1137	0.1208	0.1009	0.1064	-0.0229	-0.0835
J-12 L	TD 572°F	Break	0.124	0.0816	0.0637	0.6636	1.0894	-0.6685	-0.4209
		0.0625		0.1020	0.0947	0.3748	0.4697	-0.2720	-0.1977
		0.1250		0.1087	0.1023	0.2803	0.3289	-0.1948	-0.1341
		0.2500		0.1133	0.1071	0.2146	0.2416	-0.1489	-0.0927
		0.3750		0.1166	0.1118	0.1563	0.1699	-0.1060	-0.0640
		0.5000		0.1182	0.1133	0.1332	0.1430	-0.0927	-0.0503

SCHEDULE J (continued)

Specimen Number[a]	Tensile Axis and Test Temperature[b]	Distance from Break (in.)	D_o[c] (in.)	2 a[d] (in.)	2 b[e] (in.)	Reduction in Area	$\bar{\epsilon}_1$[f]	$\bar{\epsilon}_2$[g]	$\bar{\epsilon}_3$[h]
J-12 S		Break		0.0817	0.0663	0.6494	1.0482	-0.6285	-0.4196
		0.0625		0.1030	0.0954	0.3640	0.4526	-0.2646	-0.1880
		0.1250		0.1110	0.1052	0.2442	0.2800	-0.1668	-0.1132
		0.2500		0.1150	0.1101	0.1805	0.1991	-0.1213	-0.0778
		0.3750		0.1161	0.1114	0.1629	0.1778	-0.1096	-0.0682
J-5 L	RD 572°F	Break	0.124	0.0720	0.0946	0.5606	0.8223	-0.2746	-0.5476
		0.0625		0.0956	0.1092	0.3265	0.3953	-0.1311	-0.2641
		0.1250		0.1040	0.1138	0.2364	0.2698	-0.0899	-0.1799
		0.2500		0.1089	0.1179	0.1717	0.1883	-0.0545	-0.1339
		0.3750		0.1131	0.1199	0.1251	0.1337	-0.0376	-0.0960
		0.5000		0.1166	0.1222	0.0808	0.0842	-0.0186	-0.0656
J-5 S		Break		0.0688	0.0923	0.5903	0.8924	-0.2993	-0.5931
		0.0625		0.0935	0.1089	0.3431	0.4202	-0.1339	-0.2863
		0.1250		0.1032	0.1148	0.2357	0.2688	-0.0811	-0.1876
		0.2500		0.1112	0.1189	0.1470	0.1590	-0.0460	-0.1130
		0.3750		0.1151	0.1206	0.1045	0.1103	-0.0318	-0.0785
		0.5000		0.1188	0.1231	0.0565	0.0582	-0.0113	-0.0469
J-6 L	RD 572°F	Break	0.124	0.0714	0.0968	0.5541	0.8077	-0.2517	-0.5560
		0.0625		0.0916	0.1085	0.3588	0.4444	-0.1376	-0.3069
		0.1250		0.1009	0.1137	0.2599	0.3009	-0.0907	-0.2102
		0.2500		0.1100	0.1182	0.1612	0.1758	-0.0519	-0.1238
		0.3750		0.1137	0.1192	0.1256	0.1342	-0.0435	-0.0907
		0.5000		0.1175	0.1225	0.0714	0.0741	-0.0162	-0.0579
J-6 S		Break		0.0702	0.0967	0.5620	0.8256	-0.2527	-0.5730
		0.0625		0.0916	0.1030	0.3913	0.4964	-0.1896	-0.3069
		0.1250		0.1004	0.1155	0.2519	0.2902	-0.0750	-0.2151
		0.2500		0.1081	0.1187	0.1722	0.1890	-0.0477	-0.1412
		0.3750		0.1110	0.1202	0.1392	0.1499	-0.0352	-0.1148

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