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A Compendium of Sources of Fracture Toughness and Fatigue Crack Growth Data for Metallic Alloys - Part III

C. Michael Hudson and Sue K. Seward

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In references 1 and 2, the authors presented the first two parts of their compendium of sources of fracture toughness and fatigue crack growth data. Because of the many requests received for copies of these references, the authors have compiled Part III of the compendium. Part III concentrates on both technical reports and technical journals published in 1979 and 1980. The reports and journals published before 1979 were extensively reviewed for references 1 and 2. The reports and journals published after 1980 will hopefully be reviewed for subsequent parts of the compendium. The reader should note that none of the references cited in references 1 and 2 are included herein.

Table I lists the journals reviewed and the periods covered during this review. Table II lists the abbreviations used for the various references. Table III lists the materials for which data were located, and the corresponding references.

The reader is again cautioned not to use the data indiscriminately. The reader should ensure that all factors affecting fracture and/or fatigue crack growth behavior are adequately considered in using the data sources in Table III.

Where available, accession numbers have been included with the references. These accession numbers (which are listed in brackets at the ends of the references) are the code numbers for ordering these reports. The sources for ordering these reports are listed below:

Accession Number

Source

xxAxxxxx

American Institute for Aeronautics and Astronautics
555 West 57th Street (12th floor)
New York, NY 10019

AD-xxxxxxL

Defense Technical Information Center
Defense Logistics Agency
Cameron Station
Alexandria, VA 22314 USA

AD-xxxxxx

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161 USA

xxNxxxxx

NASA
Scientific and Technical Information Facility
P.O. Box 8757
B.W.I. Airport, MD 21240 USA

Table I. Journals Reviewed, Over Periods Shown

ASME - Journal of Engineering Materials and Technology	Oct. 1979 - Oct. 1980
ASME - Journal of Engineering for Industry	Feb. 1980 - Nov. 1980
ASME - Journal of Pressure Vessel Technology	Aug. 1979 - Nov. 1980
Cryogenics	Feb. 1980 - Dec. 1980
Engineering Fracture Mechanics	1980
Experimental Mechanics	Feb. 1980 - Dec. 1980
Fatigue of Engineering Materials and Structures	1980
International Journal of Fracture	Feb. 1980 - Dec. 1980
Journal of Material Science	Dec. 1979 - Dec. 1980
Metals Science	Jan. 1980 - Dec. 1980
Metallurgical Transactions A	Feb. 1980 - Dec. 1980

Nuclear Technology

Jan. 1980 - Dec. 1980

Welding Journal, Research Supplement

Feb. 1980 - Dec. 1980

Table II. Abbreviations

AFFDL Air Force Flight Dynamics Laboratory
Wright-Patterson Air Force Base, OH 45433 USA

AFML Air Force Materials Laboratory
Wright-Patterson Air Force Base, OH 45433 USA

AGARD Advisory Group for Aeronautical Research and Development
7 rue Ancelle, 92200 Neuilly Sur Seine, France

AIAA American Institute of Aeronautics and Astronautics
1290 Avenue of the Americas
New York, NY 10019 USA

AIME American Institute of Mining, Metallurgical and Petroleum Engineers
345 East 47th Street
New York, NY 10017 USA

AMMRC Army Materials and Mechanics Research Center
Watertown, MA 02172 USA

ASME American Society of Mechanical Engineering
345 East 47th Street
New York, NY 10017 USA

ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103 USA

CRYO Cryogenics

EFM Engineering Fracture Mechanics

EM Experimental Mechanics

FEMS Fatigue of Engineering Materials and Structures

IJF International Journal of Fracture

JEMT Journal of Engineering Materials and Technology

JMS Journal of Materials Science

JPVT Journal of Pressure Vessel Technology

MEQ Metals Engineering Quarterly

MS Metal Science

MT Metallurgical Transactions

NASA National Aeronautics and Space Administration
Scientific and Technical Information Office
Washington, DC 20546 USA

NRL Naval Research Laboratory
Washington, DC 20375 USA

SAE Society of Automotive Engineers
485 Lexington Avenue
New York, NY 10017 USA

WJ Welding Journal

TABLE III. Materials and References Cited for Fracture Toughness and Fatigue Crack Growth Data

A.1 Aluminum and Its Alloys; Fracture Toughness

A357-T6	3,4	AK4-TI	5
AZ5G-T6	6	AZ5GU-T6	6
AZ5GU-T73	6	AZ8GUZr-T6	6
AZ74.61-T7	7	CT-91-T7E70	8
D16T	5	D16-TI	5
DTD-5024-T6	7	RR58	9
V95-TI	5	VAD-23TI	5
ZK 141	10	2014-T6	5,11,12
2014-T651	10,13	2020-T6	5
2024-T3	5,14-16	2024-T6	5,17
2024-T8	18	2024-T86	5
2024-T351	19	2048-T851	17,20,21
2124-T851	17,22,23	2219-T87	10,11
2219-T851	24,25	2618-T6	21
2618-T651	26	6061-T651	20,27,28
7010-T73651	8,29	7049-T73511	30
7050-T736	7	7050-T73511	30
7050-T73651	22,31,32	7075-T0	5
7075-T6	5,14,15,18,24,33,34	7075-T73	33
7075-T7	35		
7075-T76	33		
7075-T651	5,25,35-38		
7075-T6351	19	7075-T7351	24
7075-T73511	30	7079-T6	5,7
7079-T651	21	7178-T6	18

7475-T76	39	7475-T761	16,34
7475-T7351	22,31		

A.2 Aluminum and It's Alloys; Fatigue Crack Growth

A357-T6	3,4,8	RR58	9,40
2017-T4	41	2024-T3	42-45
2024-T351	46	2048-T851	21
2124-T851	23,47		
2219-T851	47-53		
2618-T6	21	2618-T651	26
5083-0	54-56	5456-H343	57
7010-T73651	8,29	7049-T73	51
7049-T73511	30	7050-T73	29
7050-T73511	30		
7075-T6	41,44,46,51,58-61		
7075-T73	51,62	7075-T651	37,63
7075-T7351	64	7075-T73511	30
7075-T73651	65,66	7079-T651	21,48,67
7475-T761	40		

BI. Iron and Steel Excepting Stainless Steel; Fracture Toughness

ASTM A7	68	ASTM A36	68-70
ASTM A203	71	ASTM A216	19,72,73
ASTM A217	19,27	ASTM A242	68

ASTM A302	74-79	ASTM A353	71
ASTM A387	79-81	ASTM A440	68
ASTM A441	68	ASTM A453	27
ASTM A469	27	ASTM A470	19,22,27,82
ASTM A471	19,27,72,79,83,84		
ASTM A508	74,77,85-89	ASTM A516	87,90,91
ASTM A517	70,71,92		
ASTM A533	18,19,71,73-79,85,87,88,90,93-104		
ASTM A537	71,77	ASTM A540	27,77,87
ASTM A542	71	ASTM A543	90
ASTM A558	68	ASTM A572	70
ASTM A633	91	AISI 1018	105
AISI 1020	105	AISI 1035	68
AISI 1340	5	AISI 2340	5
AISI 3140	5	AISI 4140	24,106
AISI 4330	5	AISI 4330+2Si	107
AISI 4335	108		
AISI 4340	5,14,22,75,79,92,98,109-115		
AISI 4340 + 1.5Al + Si	107	AISI 5140	5
AISI 98B40	5	AISI 52100	116,117
AGCM-225	5	AGCX - 7	5
Airsteel X-200	5	AM 355	11
AMS 6434	5	BS 970	118
BS 1501-271	119	CMS-9	120
D6AC	5,22,32,121	En 8	122
En 25	123	En 30	124
ERNiCr-3	125	Fe 460	96,97

Fe 510	96,97	H-11	124
H-50	126	HF-1	22,112,127
HP-9-4-.20	128	HP-9-4-.25	24,73
HST-140	126	HY-80	129
HY-130	70,120,129,130	HY-180M	131
Iron, cast nodular	132,133	Iron,gray cast	132,134
JIS SPV 50	135	MBMC-1	5
Mellon X-2	5	N-11	5
Peerless 56	5	Steel, carbon	80
Steel, mild	136	Steel, mild-high S	75
Steel, tool	137	Steel, weld	74
St E47	97	STPT 49	87
Tenelon	138	Tricent	5
Unimach 11	5	Vascojet 1000	5
VKS-1	5	VL-ID	5
U8	5	X-70	139
Mn-Cr-Mo-V	5	Ni-Cr-Mo	31
2.25 Cr-Mo	19,79,125,140-142		
3.5 Ni	143	4Cr	144
4 Cr-C	145	4Ni-Cr-Mo-V	146
5 Ni	147	5 Mn	148
5 Mn-1 Ni	148	5 Mn-3 Ni	148
9 Ni	147-149	10 Ni	130
10 Cr-2.5 Mo	150	12 Ni	24
20	5	20 Mn	150
20 Cr-2.5 Mo-V	150	35 GS	5
35 NiCrMo 16	151	40KhN	5

3	5	17C	152
80C	152	300M	5,153,154
350M	154		

B2. Iron and Steel Excepting Stainless Steel; Fatigue Crack Growth

ASTM A106	155	ASTM A155	155
ASTM A302	156	ASTM A333	157,158
ASTM A387	159,160	ASTM A469	161
ASTM A470	162	ASTM A471	163
ASTM A508	157,164-167	ASTM A514	168
ASTM A516	157,165		
ASTM A533	46,65,66,99,100,103,156,157,164,169-173		
ASTM A542	159	ASTM A543	156
ASTM A633	91	AISI 1015	172,174
AISI 4140	175		
AISI 4340	47,65,66,110,115,176,177		
AF 1410	178	BS 15	9
BS 968	179	BS 970	179
BS 1719 cl.E6	179	BS 2901	179
BS 4360	47,180,181	BS 4461	182
D6AC	121	EN 24	65
FV 520	183	G40.11	171,172,174
HP-9-4-.20	183	HP-9-4-.30	51,184
HT-80	47,56	HY-80	175
HY-130	47,175,185,186	Iron, ductile	187
Iron, gray cast	187	JIS SM50B	41

SPCC	41	SM58Q	47,188
Steel, cast	187	Steel,mild	41,179,189-191
SA weld	157	WT60	192
X-65	47,193	X-70	47
Cr-Mo-V	194,195	Mn-Mo weld	157
2NiCrMoV	196	2 1/2 Cr-Mo-V	197
3 1/2 NiCrMoV	196	4Ni-Cr-Mo-V	146
9Ni	149,183	10Ni	47
10Ni-Cr-Mo-Co	183	12Ni	183
18Ni	183		
300M	46,47,51,62,65,66,159,184		

C1. Stainless Steel; Fracture Toughness

AISI 301	5,10	AISI 304	152,198-200
AISI 310	5	AISI 316	75,95,198,201-203
AISI 403	19,27	AISI 3105	27
AFC 77	18	Kromarc-58	27
Pyromet-538	27	Ph15-7Mo	5
Ph17-4	130	Ph17-7RN	5
Fe-21Cr-6Ni-9Mn	200	30CrNiMo 8	204

C2. Stainless Steel; Fatigue Crack Growth

AISI 304	100,156,158,164,165,170,183,191,205-209		
AISI 309	183	AISI 310	205
AISI 316	156,164,173,183,201,205,209-215		

AISI 321	183	AISI 403	183
Ph14-8Mo	183	Ph15-5	183
Ph15-7Mo	183	Ph17-4	40,183
Ph17-7	183	AM 350	183
AM 355	183	AM 367	183
FV535	197	22/13/5	183
24/20	183		

DI. Titanium and Its Alloys; Fracture Toughness

Ti-6Al-2Sn-4Zr-6Mo	216	Ti-3Al-8V-6Cr-4Zr-4Mo	153
Ti-5Al-2.5Sn	14,217		
Ti-6Al-4V	5,18,22,24,32,84,130,216-222		
Ti-6Al-4V-0.02Y	222	Ti-6Al-4V-0.05Y	222
Ti-6Al-4V-0.1Er	222	Ti-6Al-4V-2Mo	5
Ti-6Al-4V-2Sn	5,24	Ti-6Al-4Zr-2Mo	24
Ti-6Al-4Zr-2Sn-0.5Mo-0.5V	5,24	Ti-6Al-6V-2Sn	223
Ti-6Al-6V-2.5Sn	5	Ti-6.5Al-5Zr-1V	24
Ti-7Al-2Cb-1Ta	130	Ti-8Al-1Mo-1V	217,224
Ti-10V-2Fe-3Al	153	Ti-11Sn-4Mo-2.25Al-0.2Si	225
Ti-13V-11Cr-3Al	217	Ti-155A	5,226
Ti-38644	227	Corona 5	8,228
IMI 550	229,230	IMI 551	230
Titanium, pure	15,217	VT14	5

D2. Titanium and Its Alloys; Fatigue Crack Growth

Ti-6Al-2Cb-1Ta-0.8Mo	231		
Ti-6Al-2Nb-1Ta-0.8Mo	232		
Ti-6Al-2Sn-4Zr-6Mo	216		
Ti-6Al-4V	40,47,51,61,216,219-221,232-236		
Ti-6Al-6V-2Sn	237	Ti-7Al	238
Ti-8Al-1Mo-1V	47,234,235,238	Ti-27V	238
Ti-30V	238	Ti-40V	238

E1. Nickel and Nickel Alloys; Fracture Toughness

IN-792	8	Inco LEA	27
Inconel 706	27	Inconel 718	120
Inconel X-750	79,239		

E2. Nickel and Nickel Alloys; Fatigue Crack Growth

Astroloy	240,241	Hastelloy X	242-244
IN 100	60, 245-247	IN 600	248
Inconel 718	210,211,240,249-256		
Inconel 738	257-259	Inconel X750	211,260
Inconel 792	8	NASA II B-7	247
Nimonic 105	197	Nimonic 115	240
Rene 95	240	X40	257
Udimet 500	257,258	Udimet 700	210,211,261
Waspaloy	240,245-247,251,262		

F1. Copper and Copper Alloys; Fracture Toughness

No References

F2. Copper and Copper Alloys; Fatigue Crack Growth

Brass, alpha	263	Brass, 70:30	264
Bronze, ABS (Types 2, 4&5)	265		
Copper	191,264		

G. Magnesium and Magnesium Alloys

No References

H. Beryllium and Beryllium Alloys, Fracture Toughness

Beryllium, pure	266	Beryllium, P-O,P-I&P-I0	267,268
Beryllium S-200	73		

I. Molybdenum and Molybdenum Alloys

No References

J. Zirconium and Zirconium Alloys

No References

K. Cobalt and Cobalt Alloys; Fracture Toughness

X-40

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