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Fatigue Crack Growth Behavior of Railroad Tank Car Steel TC-128B Subjected to Various Environments Volume II–Appendices

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13. ABSTRACT (Maximum 200 words)
This is Volume II-Appendices of Fatigue Crack Growth Behavior of Railroad Tank Car Steel TC-128B Subjected to Various Environments. This document contains miscellaneous supporting documentation, fatigue crack growth laboratory data, and analyses.

14. SUBJECT TERMS
Fatigue crack growth, damage tolerance, tank cars, baseline material behavior, environmental effects, steel alloy, TC-128B steel

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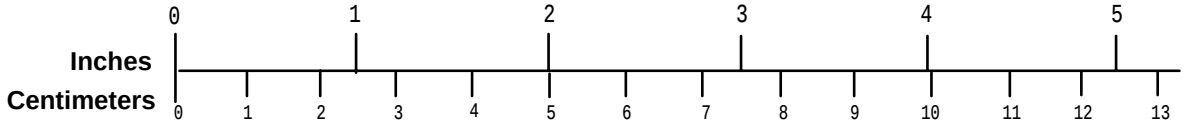
METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC	METRIC TO ENGLISH
LENGTH (APPROXIMATE)	**LENGTH (APPROXIMATE)**
1 inch (in) = 2.5 centimeters (cm)	1 millimeter (mm) = 0.04 inch (in)
1 foot (ft) = 30 centimeters (cm)	1 centimeter (cm) = 0.4 inch (in)
1 yard (yd) = 0.9 meter (m)	1 meter (m) = 3.3 feet (ft)
1 mile (mi) = 1.6 kilometers (km)	1 meter (m) = 1.1 yards (yd)
	1 kilometer (km) = 0.6 mile (mi)
AREA (APPROXIMATE)	**AREA (APPROXIMATE)**
1 square inch (sq in, in^2) = 6.5 square centimeters (cm^2)	1 square centimeter (cm^2) = 0.16 square inch (sq in, in^2)
1 square foot (sq ft, ft^2) = 0.09 square meter (m^2)	1 square meter (m^2) = 1.2 square yards (sq yd, yd^2)
1 square yard (sq yd, yd^2) = 0.8 square meter (m^2)	1 square kilometer (km^2) = 0.4 square mile (sq mi, mi^2)
1 square mile (sq mi, mi^2) = 2.6 square kilometers (km^2)	10,000 square meters (m^2) = 1 hectare (ha) = 2.5 acres
1 acre = 0.4 hectare (he) = 4,000 square meters (m^2)	
MASS - WEIGHT (APPROXIMATE)	**MASS - WEIGHT (APPROXIMATE)**
1 ounce (oz) = 28 grams (gm)	1 gram (gm) = 0.036 ounce (oz)
1 pound (lb) = 0.45 kilogram (kg)	1 kilogram (kg) = 2.2 pounds (lb)
1 short ton = 2,000 pounds (lb) = 0.9 tonne (t)	1 tonne (t) = 1,000 kilograms (kg)
	= 1.1 short tons
VOLUME (APPROXIMATE)	**VOLUME (APPROXIMATE)**
1 teaspoon (tsp) = 5 milliliters (ml)	1 milliliter (ml) = 0.03 fluid ounce (fl oz)
1 tablespoon (tbsp) = 15 milliliters (ml)	1 liter (l) = 2.1 pints (pt)
1 fluid ounce (fl oz) = 30 milliliters (ml)	1 liter (l) = 1.06 quarts (qt)
1 cup (c) = 0.24 liter (l)	1 liter (l) = 0.26 gallon (gal)
1 pint (pt) = 0.47 liter (l)	
1 quart (qt) = 0.96 liter (l)	
1 gallon (gal) = 3.8 liters (l)	
1 cubic foot (cu ft, ft^3) = 0.03 cubic meter (m^3)	1 cubic meter (m^3) = 36 cubic feet (cu ft, ft^3)
1 cubic yard (cu yd, yd^3) = 0.76 cubic meter (m^3)	1 cubic meter (m^3) = 1.3 cubic yards (cu yd, yd^3)
TEMPERATURE (EXACT)	**TEMPERATURE (EXACT)**
[(x-32)(5/9)] °F = y °C	[(9/5) y + 32] °C = x °F

QUICK INCH - CENTIMETER LENGTH CONVERSION



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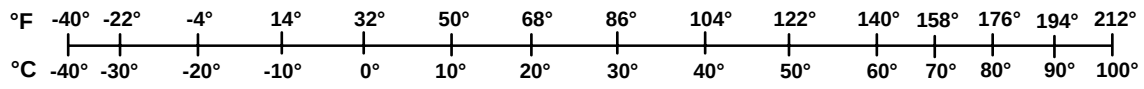

For more exact and or other conversion factors, see NIST Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50 SD Catalog No. C13 10286

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Phase A–Fatigue Crack Growth Rate Laboratory Data

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-1A	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	74	Modulus	27.2
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.609
Width	3.005	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	960.0	Stress ratio (R)	0.10
Final a (in)	0.692	Kmax	11.44

Test Parameters

Initial a (in)	0.692	Initial K	11.50
K-gradient	-2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
19.63	0.684	0.692	0.007	0.988
24.50	0.887	0.877	-.010	1.000
26.79	0.966	0.955	-.011	1.005
29.08	1.036	1.043	0.007	1.009
29.24	1.041	1.048	0.008	1.010

Comments

Date of test: 11-21-2000

Specimen Id. TC-A-1A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	19.63	0.6843	6				
926	19.51	0.6789	16437	0.0215	52571	4.086E-07	9.97
917	20.08	0.7058	52577	0.0393	98801	3.978E-07	9.90
860	20.35	0.7182	115238	0.0320	150461	2.124E-07	9.49
828	20.78	0.7378	203038	0.0352	174470	2.015E-07	9.25
788	21.14	0.7534	289708	0.0319	168085	1.900E-07	8.95
757	21.51	0.7697	371123	0.0299	153067	1.956E-07	8.72
723	21.83	0.7833	442775	0.0308	156171	1.974E-07	8.45
695	22.25	0.8005	527293	0.0329	196131	1.679E-07	8.23
664	22.64	0.8163	638906	0.0321	228330	1.407E-07	7.97
637	23.05	0.8327	755623	0.0308	238945	1.290E-07	7.76
609	23.42	0.8471	877851	0.0316	270812	1.166E-07	7.52
583	23.88	0.8642	1026436	0.0342	328002	1.043E-07	7.30
563	24.34	0.8813	1205853	0.0263	398971	6.585E-08	7.13
533	24.59	0.8905	1425406	0.0315	528869	5.951E-08	6.87
518	25.22	0.9128	1734722	0.0350	645883	5.420E-08	6.73
490	25.58	0.9255	2071290	0.0316	579047	5.459E-08	6.48
473	26.14	0.9444	2313770	0.0317	657973	4.811E-08	6.33
449	26.53	0.9572	2729262	0.0316	971962	3.248E-08	6.11
432	27.11	0.9759	3285731	0.0352	1105076	3.181E-08	5.95
414	27.62	0.9923	3834339	0.0290	1975880	1.466E-08	5.78
395	28.03	1.0049	5261611	0.0311	2971607	1.047E-08	5.59
381	28.64	1.0234	6805945	0.0317	3011101	1.053E-08	5.46
366	29.09	1.0366	8272712	0.0247	2854973	8.638E-09	5.31
	29.50	1.0481	9660918				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-1AB	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	27.4
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.609
Width	3.005	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	960.0	Stress ratio (R)	0.10
Final a (in)	0.692	Kmax	11.44

Test Parameters

Initial a (in)	1.053	Initial K	6.50
K-gradient	2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
30.14	1.028	1.053	0.025	0.963
32.88	1.103	1.120	0.018	0.969
34.90	1.153	1.143	-.009	0.973
39.19	1.248	1.247	-.001	0.981
44.30	1.345	1.336	-.009	0.989
49.20	1.425	1.413	-.011	0.995
54.79	1.503	1.486	-.017	1.001
69.21	1.663	1.646	-.017	1.014
89.15	1.817	1.825	0.008	1.026
118.84	1.972	1.979	0.007	1.039
166.11	2.126	2.129	0.002	1.052
187.49	2.176	2.178	0.002	1.056

Comments

Date of test: 12-06-2000

Specimen Id. TC-A-1AB

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5
	30.14	1.0277	8				
403	29.95	1.0224	431461	0.0148	989914	1.496E-08	5.85
406	30.66	1.0425	989922	0.0396	836428	4.734E-08	5.93
414	31.36	1.0620	1267889	0.0360	541288	6.647E-08	6.14
422	31.97	1.0785	1531209	0.0325	457381	7.116E-08	6.35
429	32.57	1.0946	1725270	0.0324	373480	8.689E-08	6.55
436	33.20	1.1109	1904689	0.0298	312881	9.529E-08	6.74
447	33.74	1.1244	2038151	0.0419	173198	2.422E-07	7.04
450	34.90	1.1529	2077887	0.0296	174786	1.696E-07	7.13
462	34.95	1.1540	2212937	0.0233	342812	6.788E-08	7.49
467	35.89	1.1761	2420699	0.0394	346284	1.137E-07	7.62
476	36.65	1.1934	2559221	0.0336	245805	1.367E-07	7.91
484	37.38	1.2097	2666504	0.0328	189936	1.729E-07	8.17
492	38.14	1.2262	2749157	0.0315	152041	2.069E-07	8.42
500	38.85	1.2412	2818545	0.0279	147888	1.885E-07	8.66
509	39.48	1.2541	2897045	0.0324	147140	2.202E-07	8.95
516	40.45	1.2736	2965685	0.0346	128139	2.701E-07	9.20
525	41.23	1.2887	3025184	0.0310	124922	2.479E-07	9.51
534	42.06	1.3046	3090607	0.0334	115312	2.898E-07	9.82
543	43.01	1.3222	3140496	0.0332	93993	3.530E-07	10.12
551	43.88	1.3377	3184600	0.0272	96525	2.821E-07	10.41
560	44.55	1.3494	3237021	0.0299	98616	3.036E-07	10.75
568	45.62	1.3677	3283215	0.0352	79844	4.409E-07	11.06
578	46.64	1.3846	3316865	0.0349	67521	5.164E-07	11.45
588	47.76	1.4025	3350736	0.0338	65895	5.135E-07	11.82
597	48.78	1.4184	3382760	0.0287	63405	4.525E-07	12.18
607	49.63	1.4312	3414141	0.0318	58335	5.446E-07	12.60
615	50.91	1.4502	3441095	0.0344	49624	6.934E-07	12.95
625	52.00	1.4657	3463765	0.0308	45312	6.791E-07	13.38
634	53.11	1.4810	3486407	0.0316	42051	7.522E-07	13.80
642	54.32	1.4973	3505816	0.0256	44374	5.770E-07	14.14
654	55.03	1.5066	3530781	0.0336	47770	7.028E-07	14.71
661	56.95	1.5309	3553586	0.0384	35314	1.086E-06	15.05
673	58.11	1.5449	3566095	0.0291	24772	1.176E-06	15.64
682	59.38	1.5600	3578358	0.0319	23477	1.358E-06	16.12
691	60.85	1.5768	3589572	0.0319	22889	1.392E-06	16.60
701	62.20	1.5918	3601247	0.0304	23714	1.283E-06	17.13
710	63.64	1.6073	3613286	0.0313	22738	1.377E-06	17.66
720	65.17	1.6231	3623985	0.0323	20066	1.609E-06	18.22
730	66.81	1.6396	3633352	0.0320	16953	1.887E-06	18.79
738	68.42	1.6551	3640938	0.0278	15805	1.757E-06	19.33
749	69.72	1.6673	3649156	0.0318	16073	1.976E-06	20.01
758	71.88	1.6869	3657011	0.0352	13925	2.530E-06	20.57
768	73.68	1.7026	3663081	0.0305	11490	2.657E-06	21.28
777	75.45	1.7174	3668501	0.0304	11005	2.767E-06	21.95
786	77.37	1.7330	3674086	0.0314	10913	2.881E-06	22.63
796	79.40	1.7489	3679414	0.0319	9727	3.283E-06	23.35
805	81.54	1.7649	3683813	0.0317	8171	3.874E-06	24.09
814	83.70	1.7805	3687584	0.0309	6821	4.528E-06	24.85

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5
823	85.89	1.7958	3690634	0.0299	5616	5.333E-06	25.61
831	88.08	1.8105	3693200	0.0294	4889	6.012E-06	26.39
840	90.36	1.8252	3695523	0.0310	4360	7.118E-06	27.21
849	92.99	1.8415	3697561	0.0323	3924	8.226E-06	28.06
857	95.68	1.8575	3699446	0.0312	3562	8.746E-06	28.96
866	98.34	1.8727	3701123	0.0308	3214	9.578E-06	29.89
874	101.19	1.8883	3702660	0.0311	3005	1.034E-05	30.82
881	104.15	1.9037	3704128	0.0305	2869	1.062E-05	31.78
889	107.13	1.9187	3705529	0.0315	2660	1.185E-05	32.82
897	110.58	1.9353	3706788	0.0321	2371	1.353E-05	33.84
904	113.97	1.9508	3707900	0.0304	2110	1.443E-05	34.93
912	117.36	1.9657	3708897	0.0316	1744	1.813E-05	36.09
918	121.36	1.9824	3709644	0.0300	1453	2.066E-05	37.13
924	124.69	1.9957	3710350	0.0286	1548	1.850E-05	38.35
930	128.70	2.0111	3711192	0.0309	1592	1.942E-05	39.49
936	132.97	2.0267	3711942	0.0312	1416	2.203E-05	40.75
942	137.48	2.0423	3712608	0.0310	1277	2.426E-05	42.04
947	142.14	2.0577	3713220	0.0307	1168	2.625E-05	43.38
952	147.01	2.0730	3713776	0.0301	1056	2.846E-05	44.73
956	151.96	2.0877	3714276	0.0304	974	3.121E-05	46.16
960	157.49	2.1034	3714751	0.0312	904	3.448E-05	47.61
964	163.27	2.1189	3715180	0.0305	803	3.803E-05	49.12
967	169.18	2.1339	3715554	0.0306	694	4.404E-05	50.70
970	175.64	2.1494	3715874	0.0305	596	5.118E-05	52.28
	182.23	2.1644	3716150				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-1A	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	27.1
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.607
Width	3.003	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	960.0	Stress ratio (R)	0.10
Final a (in)	0.693	Kmax	11.49

Test Parameters

Initial a (in)	0.693	Initial K	11.50
K-gradient	-2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
19.56	0.684	0.693	0.009	0.991
23.22	0.832	0.818	-.013	0.989
26.57	0.944	0.929	-.014	0.987
27.95	0.985	0.977	-.008	0.987
27.95	0.985	1.010	0.025	0.987

Comments

Date of test: 11-21-2000

Specimen Id. TC-B-1A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	19.56	0.6838	2				
928	19.60	0.6858	265	0.0252	1209	2.087E-05	10.03
916	20.13	0.7090	1211	0.0298	15398	1.937E-06	9.94
858	20.28	0.7156	15662	0.0273	71554	3.815E-07	9.51
833	20.77	0.7363	72765	0.0345	144805	2.382E-07	9.31
791	21.11	0.7501	160467	0.0282	178624	1.579E-07	8.99
758	21.46	0.7645	251389	0.0293	198598	1.475E-07	8.73
726	21.84	0.7794	359065	0.0305	230543	1.322E-07	8.47
695	22.24	0.7950	481932	0.0302	265106	1.137E-07	8.22
666	22.62	0.8096	624171	0.0291	317256	9.168E-08	7.97
639	23.01	0.8241	799188	0.0283	384987	7.348E-08	7.75
610	23.39	0.8379	1009158	0.0309	387322	7.974E-08	7.50
585	23.87	0.8550	1186510	0.0317	403192	7.868E-08	7.29
558	24.30	0.8696	1412349	0.0300	471309	6.361E-08	7.05
535	24.75	0.8849	1657819	0.0309	399859	7.722E-08	6.84
512	25.21	0.9005	1812208	0.0303	497458	6.093E-08	6.64
492	25.67	0.9152	2155277	0.0269	953398	2.826E-08	6.45
471	26.05	0.9274	2765606	0.0276	1208152	2.286E-08	6.26
454	26.54	0.9429	3363429	0.0289	1387108	2.083E-08	6.10
436	26.98	0.9563	4152713	0.0260	2175628	1.194E-08	5.93
417	27.40	0.9688	5539057	0.0299	3807535	7.860E-09	5.74
395	27.99	0.9862	7960248	0.0418	3993768	1.046E-08	5.53
	28.84	1.0106	9532825				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-1AC	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	26.4
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.607
Width	3.003	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	960.0	Stress ratio (R)	0.10
Final a (in)	0.693	Kmax	11.49

Test Parameters

Initial a (in)	1.010	Initial K	7.40
K-gradient	6.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
28.46	0.986	1.010	0.024	0.970
30.05	1.043	1.038	-.004	0.985
32.90	1.134	1.106	-.028	1.010
36.24	1.228	1.233	0.005	1.035
40.48	1.331	1.324	-.006	1.063
48.02	1.479	1.487	0.009	1.103

Comments

Date of test: 12-05-2000

Specimen Id. TC-B-1AC

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	28.36	0.9832	99				
492	28.39	0.9841	536925	0.0317	1153295	2.744E-08	6.94
507	29.25	1.0148	1153394	0.0448	716304	6.253E-08	7.21
552	29.65	1.0289	1253229	0.0254	184597	1.375E-07	7.98
607	29.97	1.0402	1337991	0.0445	159864	2.783E-07	8.96
648	30.96	1.0734	1413093	0.0533	117464	4.539E-07	9.68
717	31.58	1.0935	1455455	0.0376	78947	4.760E-07	10.95
776	32.13	1.1109	1492040	0.0364	90538	4.015E-07	12.06
835	32.75	1.1299	1545994	0.0378	97134	3.888E-07	13.18
902	33.38	1.1487	1589174	0.0379	63968	5.919E-07	14.48
975	34.03	1.1677	1609962	0.0380	38140	9.965E-07	15.91
1058	34.70	1.1867	1627314	0.0396	30837	1.285E-06	17.57
1140	35.45	1.2074	1640799	0.0378	21928	1.722E-06	19.22
1240	36.09	1.2245	1649242	0.0372	14199	2.619E-06	21.29
1327	36.86	1.2445	1654998	0.0358	9757	3.674E-06	23.13
1443	37.49	1.2603	1658999	0.0358	7601	4.710E-06	25.60
1581	38.30	1.2803	1662599	0.0477	5983	7.972E-06	28.61
1730	39.47	1.3080	1664982	0.0506	3405	1.487E-05	31.93
1867	40.48	1.3310	1666004	0.0320	1515	2.114E-05	35.04
2012	40.89	1.3401	1666497	0.0219	1350	1.621E-05	38.39
2125	41.48	1.3529	1667354	0.0294	1697	1.734E-05	41.04
2272	42.27	1.3695	1668194	0.0353	1600	2.208E-05	44.54
2451	43.18	1.3882	1668954	0.0377	1272	2.964E-05	48.86
2646	44.13	1.4072	1669466	0.0363	834	4.354E-05	53.67
2871	45.03	1.4245	1669788	0.0365	557	6.558E-05	59.32
3093	46.06	1.4437	1670023	0.0367	408	8.998E-05	65.01
	47.03	1.4612	1670196				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-18A	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	27.5
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.605
Width	3.005	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	936.0	Stress ratio (R)	0.10
Final a (in)	0.723	Kmax	11.52

Test Parameters

Initial a (in)	0.723	Initial K	11.50
K-gradient	-2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
20.26	0.712	0.723	0.011	0.988
21.65	0.757	0.748	-.009	0.972
23.22	0.803	0.796	-.007	0.956
24.10	0.828	0.827	-.000	0.948
26.80	0.897	0.897	0.001	0.925
27.86	0.922	0.927	0.005	0.917

Comments

Date of test: 12-13-2000

Specimen Id. TC-A-1BA

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	20.26	0.7124	47				
905	20.49	0.7201	8108	0.0169	30149	5.593E-07	10.00
871	20.77	0.7292	30196	0.0212	60291	3.511E-07	9.71
836	21.15	0.7413	68399	0.0243	93821	2.593E-07	9.42
801	21.54	0.7536	124016	0.0231	116082	1.993E-07	9.11
765	21.90	0.7644	184481	0.0227	122497	1.850E-07	8.81
734	22.29	0.7762	246513	0.0233	141620	1.646E-07	8.53
703	22.68	0.7877	326101	0.0227	209053	1.084E-07	8.25
672	23.07	0.7989	455566	0.0237	274910	8.607E-08	7.98
645	23.51	0.8114	601011	0.0233	286126	8.132E-08	7.73
618	23.90	0.8222	741692	0.0214	312228	6.849E-08	7.48
592	24.29	0.8328	913239	0.0235	371152	6.344E-08	7.24
567	24.77	0.8457	1112843	0.0252	413779	6.099E-08	7.01
543	25.24	0.8580	1327018	0.0231	456626	5.060E-08	6.78
519	25.67	0.8688	1569469	0.0229	594273	3.846E-08	6.55
498	26.15	0.8809	1921291	0.0237	754721	3.141E-08	6.35
477	26.62	0.8925	2324190	0.0235	849545	2.768E-08	6.14
458	27.12	0.9044	2770836	0.0226	1141801	1.983E-08	5.95
	27.58	0.9152	3465991				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-1BB	Geometry	CT
Contract #	18-03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	72	Modulus	25.5
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.605
Width	3.005	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	936.0	Stress ratio (R)	0.10
Final a (in)	0.723	Kmax	11.52

Test Parameters

Initial a (in)	0.927	Initial K	6.70
K-gradient	6.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
25.70	0.905	0.927	0.022	0.974
27.79	0.991	0.993	0.003	0.999
29.99	1.072	1.060	-.012	1.023
32.38	1.151	1.120	-.031	1.046
36.84	1.277	1.286	0.009	1.084
43.04	1.419	1.428	0.009	1.128

Comments

Date of test: 12-18-2000

Specimen Id. TC-A-18B

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	25.70	0.9048	46				
467	25.80	0.9093	38069	0.0121	236230	5.128E-08	6.11
484	25.98	0.9169	236276	0.0212	475069	4.452E-08	6.37
503	26.29	0.9304	513137	0.0261	482668	5.400E-08	6.68
528	26.59	0.9430	718944	0.0241	352726	6.836E-08	7.09
555	26.88	0.9546	865864	0.0247	292843	8.438E-08	7.53
582	27.20	0.9677	1011786	0.0268	259797	1.031E-07	8.00
610	27.54	0.9813	1125661	0.0246	202026	1.220E-07	8.47
640	27.82	0.9923	1213812	0.0220	178280	1.233E-07	8.98
672	28.11	1.0033	1303941	0.0249	151974	1.641E-07	9.53
702	28.48	1.0173	1365786	0.0247	111619	2.211E-07	10.04
740	28.77	1.0280	1415560	0.0236	87269	2.709E-07	10.70
772	29.12	1.0409	1453055	0.0238	70577	3.366E-07	11.27
814	29.42	1.0518	1486137	0.0249	64952	3.835E-07	12.02
851	29.81	1.0658	1518007	0.0253	52821	4.792E-07	12.68
894	30.14	1.0771	1538957	0.0222	35962	6.180E-07	13.47
935	30.46	1.0880	1553969	0.0224	32166	6.949E-07	14.23
980	30.79	1.0994	1571123	0.0241	30911	7.781E-07	15.07
1026	31.18	1.1121	1584880	0.0241	23455	1.025E-06	15.93
1076	31.52	1.1235	1594578	0.0226	18813	1.204E-06	16.88
1125	31.87	1.1347	1603693	0.0219	16987	1.291E-06	17.81
1166	32.21	1.1454	1611565	0.0174	16283	1.070E-06	18.61
1230	32.43	1.1522	1619976	0.0224	15572	1.440E-06	19.86
1278	32.94	1.1678	1627137	0.0277	12121	2.287E-06	20.80
1352	33.34	1.1799	1632096	0.0243	9637	2.517E-06	22.28
1421	33.75	1.1921	1636774	0.0246	8368	2.943E-06	23.67
1490	34.18	1.2045	1640465	0.0234	6231	3.763E-06	25.07
1526	34.57	1.2155	1643005	0.0103	8147	1.269E-06	25.80
1635	34.54	1.2149	1648611	0.0220	10865	2.021E-06	28.06
1679	35.36	1.2375	1653870	0.0360	6737	5.348E-06	28.98
1798	35.85	1.2509	1655349	0.0245	2390	1.023E-05	31.51
1889	36.27	1.2619	1656260	0.0215	1616	1.333E-05	33.45
1967	36.67	1.2724	1656964	0.0191	1463	1.308E-05	35.15
2064	37.00	1.2811	1657723	0.0214	1341	1.595E-05	37.27
2147	37.51	1.2938	1658305	0.0232	1034	2.243E-05	39.11
2256	37.93	1.3043	1658757	0.0215	879	2.446E-05	41.54
2359	38.38	1.3153	1659184	0.0219	816	2.690E-05	43.86
2468	38.83	1.3262	1659573	0.0216	712	3.037E-05	46.35
2581	39.29	1.3369	1659896	0.0212	603	3.511E-05	48.95
2702	39.74	1.3474	1660176	0.0217	531	4.075E-05	51.78
2827	40.23	1.3586	1660428	0.0224	460	4.863E-05	54.73
2960	40.73	1.3698	1660636	0.0218	380	5.730E-05	57.89
3104	41.22	1.3804	1660807	0.0219	316	6.946E-05	61.35
3246	41.74	1.3917	1660952	0.0221	255	8.637E-05	64.83
3406	42.25	1.4024	1661063	0.0221	199	1.112E-04	68.76
3611	42.80	1.4138	1661150	0.0258	158	1.631E-04	73.78
3730	43.62	1.4282	1661221	0.0177	125	1.422E-04	76.77
	43.83	1.4315	1661275				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-1BA	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	25.4
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.612
Width	3.008	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	941.0	Stress ratio (R)	0.10
Final a (in)	0.725	Kmax	11.58

Test Parameters

Initial a (in)	0.725	Initial K	11.60
K-gradient	-2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	0	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
20.30	0.728	0.725	-.003	1.003
21.66	0.785	0.788	0.003	1.003
23.24	0.846	0.849	0.003	1.003
23.72	0.863	0.864	0.001	1.003
26.82	0.967	0.959	-.008	1.004
28.83	1.026	1.030	0.004	1.004

Comments

Date of test: 12-14-2000

Specimen Id. TC-B-1BA

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	20.30	0.7285	17				
912	20.47	0.7359	30542	0.0217	103564	2.094E-07	10.23
882	20.81	0.7501	103581	0.0291	160512	1.813E-07	10.00
846	21.16	0.7649	191054	0.0300	181692	1.652E-07	9.71
810	21.53	0.7802	285273	0.0302	194695	1.549E-07	9.42
775	21.91	0.7951	385749	0.0303	207038	1.463E-07	9.14
742	22.30	0.8104	492311	0.0304	218248	1.394E-07	8.87
711	22.69	0.8255	603997	0.0290	233399	1.243E-07	8.62
679	23.06	0.8394	725710	0.0314	366711	8.561E-08	8.34
653	23.54	0.8569	970708	0.0306	615002	4.975E-08	8.12
623	23.91	0.8700	1340712	0.0283	693464	4.085E-08	7.86
598	24.34	0.8853	1664172	0.0306	559728	5.469E-08	7.63
572	24.79	0.9006	1900440	0.0311	433746	7.180E-08	7.40
548	25.26	0.9164	2097918	0.0310	391422	7.919E-08	7.18
524	25.72	0.9316	2291862	0.0304	413362	7.365E-08	6.96
501	26.19	0.9468	2511280	0.0320	444432	7.193E-08	6.74
481	26.73	0.9636	2736294	0.0292	507380	5.759E-08	6.56
460	27.13	0.9761	3018660	0.0269	692758	3.876E-08	6.36
442	27.61	0.9905	3429052	0.0304	965316	3.150E-08	6.18
	28.16	1.0065	3983975				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-1BC	Geometry	CT
Contract #	18.3630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	29.8
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.612
Width	3.008	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	941.0	Stress ratio (R)	0.10
Final a (in)	0.725	Kmax	11.58

Test Parameters

Initial a (in)	1.032	Initial K	6.90
K-gradient	2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
29.32	1.028	1.032	0.004	0.989
32.90	1.118	1.110	-.009	0.987
34.58	1.157	1.156	-.001	0.986
40.04	1.268	1.269	0.001	0.984
54.81	1.490	1.490	0.000	0.979
89.28	1.790	1.791	0.001	0.972
101.48	1.859	1.868	0.009	0.970
174.20	2.112	2.106	-.006	0.965

Comments

Date of test: 01-01-2001

Specimen Id. TC-8-18C

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	29.32	1.0277	14						
436	29.20	1.0244	689871	0.0163	1913978	8.514E-09	6.32	.413	4.12
439	29.93	1.0440	1913992	0.0348	1503710	2.313E-08	6.40	.354	4.60
447	30.51	1.0592	2193581	0.0292	490178	5.955E-08	6.62	.334	4.90
455	31.05	1.0732	2404169	0.0269	392452	6.861E-08	6.81	.320	5.15
463	31.57	1.0861	2586033	0.0290	381295	7.606E-08	7.02	.313	5.36
471	32.22	1.1022	2785464	0.0324	406195	7.987E-08	7.23	.301	5.62
479	32.91	1.1186	2992227	0.0323	372583	8.670E-08	7.47	.279	5.98
488	33.59	1.1345	3158047	0.0310	299409	1.036E-07	7.71	.270	6.26
497	34.25	1.1496	3291636	0.0299	247633	1.207E-07	7.95	.263	6.52
506	34.92	1.1644	3405680	0.0306	222927	1.371E-07	8.20	.251	6.83
515	35.64	1.1802	3514563	0.0325	208505	1.557E-07	8.47	.233	7.22
524	36.44	1.1969	3614184	0.0310	180160	1.722E-07	8.73	.219	7.57
533	37.13	1.2112	3694723	0.0280	148883	1.884E-07	9.00	.215	7.85
541	37.81	1.2249	3763067	0.0271	135711	1.995E-07	9.25	.212	8.11
550	38.49	1.2383	3830433	0.0283	135007	2.097E-07	9.52	.209	8.37
559	39.27	1.2532	3898074	0.0305	126001	2.418E-07	9.81	.203	8.69
568	40.10	1.2687	3956434	0.0298	112479	2.650E-07	10.10	.190	9.09
579	40.89	1.2830	4010554	0.0314	110651	2.837E-07	10.43	.175	9.56
588	41.85	1.3001	4067085	0.0316	99443	3.174E-07	10.74	.171	9.89
598	42.69	1.3146	4109997	0.0287	85860	3.343E-07	11.08	.171	10.21
607	43.54	1.3288	4152945	0.0283	80170	3.533E-07	11.40	.171	10.50
616	44.39	1.3429	4190166	0.0276	70149	3.934E-07	11.73	.172	10.79
626	45.24	1.3564	4223093	0.0288	67285	4.274E-07	12.08	.172	11.11
636	46.22	1.3717	4257452	0.0313	65853	4.760E-07	12.44	.172	11.45
646	47.28	1.3878	4288947	0.0310	58696	5.280E-07	12.82	.173	11.78
657	48.29	1.4027	4316147	0.0297	50388	5.897E-07	13.23	.172	12.17
667	49.33	1.4175	4339335	0.0299	44478	6.729E-07	13.63	.173	12.52
678	50.41	1.4326	4360625	0.0306	42349	7.224E-07	14.05	.173	12.91
688	51.56	1.4481	4381684	0.0295	39371	7.482E-07	14.46	.173	13.29
699	52.62	1.4621	4399996	0.0291	35351	8.222E-07	14.91	.173	13.70
709	53.81	1.4772	4417035	0.0307	33172	9.245E-07	15.36	.173	14.11
719	55.07	1.4927	4433168	0.0298	30066	9.906E-07	15.81	.174	14.51
730	56.25	1.5069	4447101	0.0297	26986	1.102E-06	16.31	.173	14.99
741	57.58	1.5225	4460155	0.0305	24790	1.229E-06	16.79	.174	15.41
752	58.90	1.5374	4471891	0.0302	22178	1.362E-06	17.32	.174	15.89
762	60.29	1.5527	4482333	0.0299	20296	1.474E-06	17.84	.174	16.37
773	61.67	1.5673	4492186	0.0295	18299	1.613E-06	18.38	.174	16.87
783	63.12	1.5822	4500632	0.0295	15956	1.848E-06	18.92	.174	17.37
794	64.58	1.5968	4508142	0.0291	14646	1.987E-06	19.49	.174	17.88
804	66.08	1.6113	4515278	0.0295	13519	2.181E-06	20.07	.174	18.42
815	67.68	1.6263	4521660	0.0304	12082	2.514E-06	20.67	.175	18.95
826	69.38	1.6417	4527360	0.0309	10800	2.859E-06	21.31	.174	19.56
836	71.16	1.6572	4532460	0.0302	9660	3.130E-06	21.96	.175	20.13
847	72.90	1.6719	4537020	0.0298	8640	3.447E-06	22.64	.175	20.75
857	74.75	1.6869	4541100	0.0302	7728	3.909E-06	23.32	.175	21.38
868	76.67	1.7021	4544748	0.0303	6911	4.381E-06	24.03	.175	22.03
878	78.66	1.7172	4548011	0.0299	6181	4.844E-06	24.75	.175	22.69
888	80.68	1.7320	4550929	0.0295	5537	5.335E-06	25.50	.175	23.37

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
899	82.76	1.7468	4553547	0.0301	5090	5.919E-06	26.27	.175	24.08
909	85.02	1.7622	4556019	0.0306	4697	6.516E-06	27.06	.175	24.81
919	87.33	1.7774	4558244	0.0303	4244	7.128E-06	27.89	.175	25.57
928	89.72	1.7924	4560263	0.0294	3868	7.613E-06	28.72	.176	26.30
938	92.08	1.8068	4562112	0.0296	3653	8.106E-06	29.60	.176	27.10
947	94.68	1.8220	4563916	0.0302	3444	8.767E-06	30.47	.176	27.90
956	97.34	1.8370	4565556	0.0301	3104	9.682E-06	31.40	.176	28.75
965	100.13	1.8521	4567020	0.0304	2851	1.065E-05	32.35	.176	29.62
974	103.08	1.8674	4568407	0.0302	2641	1.145E-05	33.33	.176	30.51
983	106.08	1.8823	4569661	0.0294	2378	1.236E-05	34.32	.176	31.42
991	109.10	1.8968	4570785	0.0295	2184	1.353E-05	35.36	.176	32.37
999	112.40	1.9119	4571845	0.0306	2067	1.481E-05	36.42	.176	33.34
1007	115.94	1.9274	4572852	0.0306	1904	1.606E-05	37.52	.176	34.35
1015	119.53	1.9424	4573749	0.0298	1695	1.759E-05	38.66	.176	35.39
1022	123.20	1.9572	4574547	0.0300	1550	1.935E-05	39.83	.176	36.47
1029	127.17	1.9724	4575299	0.0302	1432	2.112E-05	41.02	.176	37.55
1036	131.26	1.9874	4575979	0.0304	1310	2.322E-05	42.28	.176	38.71
1042	135.67	2.0028	4576609	0.0307	1224	2.510E-05	43.56	.176	39.88
1048	140.27	2.0182	4577203	0.0309	1134	2.722E-05	44.91	.176	41.12
1054	145.18	2.0337	4577743	0.0307	1026	2.994E-05	46.28	.175	42.42
1059	150.20	2.0489	4578229	0.0301	900	3.340E-05	47.69	.176	43.66
1063	155.39	2.0638	4578643	0.0302	792	3.812E-05	49.14	.176	44.99
1068	160.99	2.0791	4579021	0.0307	721	4.255E-05	50.63	.176	46.35
	166.94	2.0944	4579364						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-2AA	Geometry	CT
Contract #	18-03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	74	Modulus	28.0
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.610
Width	3.006	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	1176.0	Stress ratio (R)	0.60
Final a (in)	0.734	Kmax	14.58

Test Parameters

Initial a (in)	0.734	Initial K	14.60
K-gradient	-2.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
20.44	0.726	0.734	0.008	0.994
23.34	0.824	0.803	-.021	0.974
24.94	0.872	0.882	0.009	0.965
27.27	0.937	0.940	0.003	0.953

Comments

Date of test: 12-26-2000

Specimen Id. TC-A-2AA Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	20.57	0.7305	27						
1140	20.59	0.7311	84598	0.0140	257426	5.454E-08	5.67	.676	4.59
1115	20.96	0.7446	257453	0.0260	365580	7.099E-08	5.58	.676	4.52
1064	21.31	0.7571	450178	0.0266	418764	6.342E-08	5.39	.675	4.38
1021	21.72	0.7711	676217	0.0260	468234	5.550E-08	5.23	.676	4.24
975	22.08	0.7830	918412	0.0248	502132	4.936E-08	5.06	.675	4.11
935	22.46	0.7959	1178349	0.0261	580015	4.500E-08	4.90	.675	3.98
891	22.87	0.8091	1498427	0.0289	636322	4.539E-08	4.73	.675	3.84
856	23.36	0.8248	1814670	0.0266	598922	4.449E-08	4.59	.674	3.74
815	23.72	0.8358	2097349	0.0244	577239	4.232E-08	4.43	.675	3.60
784	24.16	0.8492	2391910	0.0256	677177	3.781E-08	4.31	.675	3.50
751	24.57	0.8614	2774527	0.0245	858048	2.852E-08	4.17	.675	3.39
721	24.99	0.8737	3249958	0.0246	818473	3.004E-08	4.05	.674	3.30
699	25.41	0.8860	3592999	0.0190	655115	2.898E-08	3.96	.675	3.21
675	25.65	0.8927	3905073	0.0154	713918	2.162E-08	3.86	.675	3.13
659	25.96	0.9014	4306917	0.0164	791594	2.075E-08	3.79	.674	3.09
641	26.24	0.9091	4696667	0.0165	723385	2.274E-08	3.71	.677	3.00
625	26.57	0.9179	5030302	0.0160	823394	1.939E-08	3.64	.679	2.93
	26.83	0.9251	5520061						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-2AB	Geometry	CT
Contract #	18-03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	74	Modulus	28.0
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.610
Width	3.006	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	1176.0	Stress ratio (R)	0.60
Final a (in)	0.734	Kmax	14.58

Test Parameters

Initial a (in)	0.940	Initial K	8.70
K-gradient	2.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
26.18	0.945	0.940	-.005	1.003
29.96	1.066	1.067	0.001	1.016
36.23	1.229	1.232	0.004	1.034
54.90	1.549	1.551	0.002	1.068
69.18	1.704	1.705	0.001	1.085
113.94	1.987	1.985	-.002	1.117

Comments

Date of test: 01-03-2001

Specimen Id. TC-A-2A8 Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	26.18	0.9452	49						
589	26.08	0.9420	264159	0.0060	911608	6.534E-09	3.53	.674	2.87
592	26.36	0.9512	911656	0.0198	1359234	1.457E-08	3.55	.675	2.89
598	26.67	0.9619	1623392	0.0211	1293552	1.630E-08	3.62	.675	2.94
604	26.97	0.9723	2205208	0.0197	1126404	1.747E-08	3.69	.674	3.01
611	27.25	0.9815	2749796	0.0192	1128604	1.702E-08	3.76	.674	3.06
617	27.55	0.9915	3333812	0.0205	1092562	1.877E-08	3.83	.674	3.12
623	27.88	1.0020	3842358	0.0202	873199	2.309E-08	3.90	.675	3.17
630	28.18	1.0116	4207012	0.0203	783161	2.590E-08	3.98	.675	3.24
637	28.52	1.0223	4625519	0.0214	909758	2.355E-08	4.06	.675	3.30
644	28.86	1.0331	5116770	0.0217	873270	2.484E-08	4.15	.675	3.37
651	29.22	1.0440	5498789	0.0209	702366	2.974E-08	4.23	.676	3.42
658	29.55	1.0540	5819136	0.0194	643879	3.009E-08	4.31	.674	3.51
666	29.87	1.0634	6142668	0.0209	630885	3.309E-08	4.40	.674	3.59
673	30.26	1.0748	6450021	0.0217	576307	3.760E-08	4.48	.675	3.64
680	30.61	1.0851	6718975	0.0192	485538	3.949E-08	4.57	.675	3.71
687	30.93	1.0940	6935559	0.0192	449146	4.274E-08	4.66	.675	3.79
694	31.30	1.1043	7168121	0.0203	475308	4.263E-08	4.75	.676	3.84
702	31.66	1.1143	7410866	0.0208	458953	4.533E-08	4.84	.675	3.93
709	32.06	1.1251	7627073	0.0213	432435	4.925E-08	4.94	.675	4.01
717	32.45	1.1356	7843301	0.0201	401489	5.017E-08	5.04	.675	4.09
724	32.82	1.1452	8028562	0.0188	333746	5.625E-08	5.13	.674	4.18
732	33.17	1.1543	8177047	0.0180	280639	6.411E-08	5.22	.674	4.26
739	33.52	1.1632	8309202	0.0189	283753	6.657E-08	5.32	.674	4.34
747	33.92	1.1732	8460801	0.0211	316372	6.655E-08	5.42	.675	4.41
754	34.36	1.1843	8625574	0.0203	309752	6.557E-08	5.52	.676	4.47
763	34.74	1.1935	8770553	0.0193	283723	6.790E-08	5.64	.675	4.58
770	35.16	1.2035	8909297	0.0198	251054	7.876E-08	5.74	.675	4.66
778	35.57	1.2133	9021606	0.0189	220761	8.539E-08	5.85	.676	4.74
786	35.96	1.2224	9130058	0.0195	241452	8.058E-08	5.96	.675	4.84
794	36.41	1.2328	9263058	0.0198	244016	8.125E-08	6.07	.674	4.95
802	36.83	1.2422	9374075	0.0191	205111	9.312E-08	6.19	.676	5.01
810	37.27	1.2519	9468169	0.0186	183193	1.015E-07	6.30	.676	5.10
818	37.67	1.2608	9557268	0.0185	173659	1.062E-07	6.42	.676	5.20
826	38.12	1.2703	9641828	0.0194	173280	1.122E-07	6.53	.675	5.31
834	38.58	1.2802	9730548	0.0204	177757	1.150E-07	6.66	.675	5.41
843	39.09	1.2908	9819585	0.0199	166175	1.199E-07	6.79	.675	5.51
851	39.54	1.3002	9896722	0.0183	151837	1.207E-07	6.92	.675	5.62
860	39.99	1.3091	9971422	0.0191	146615	1.301E-07	7.05	.675	5.73
867	40.50	1.3192	10043337	0.0190	143079	1.326E-07	7.17	.676	5.81
877	40.95	1.3281	10114501	0.0191	144446	1.320E-07	7.31	.676	5.92
885	41.48	1.3383	10187783	0.0210	130818	1.607E-07	7.46	.676	6.04
894	42.05	1.3491	10245319	0.0194	107675	1.800E-07	7.59	.676	6.15
903	42.51	1.3577	10295458	0.0187	98718	1.891E-07	7.75	.676	6.28
911	43.06	1.3677	10344037	0.0189	98283	1.928E-07	7.88	.676	6.38
921	43.56	1.3766	10393741	0.0196	100646	1.946E-07	8.04	.675	6.54
929	44.16	1.3873	10444682	0.0191	94221	2.032E-07	8.18	.676	6.63
939	44.65	1.3958	10487962	0.0185	87379	2.117E-07	8.35	.676	6.76
947	45.23	1.4058	10532061	0.0195	89540	2.182E-07	8.50	.676	6.88

Specimen Id. TC-A-2AB

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
957	45.80	1.4153	10577502	0.0196	87465	2.243E-07	8.67	.675	7.04
965	46.41	1.4254	10619526	0.0190	81881	2.318E-07	8.82	.676	7.15
975	46.96	1.4343	10659384	0.0193	78970	2.445E-07	9.00	.675	7.32
984	47.62	1.4448	10698496	0.0200	72751	2.743E-07	9.17	.675	7.45
993	48.22	1.4543	10732135	0.0184	67585	2.717E-07	9.34	.676	7.57
1002	48.80	1.4631	10766081	0.0182	62457	2.913E-07	9.52	.676	7.71
1012	49.42	1.4724	10794591	0.0191	57555	3.310E-07	9.69	.676	7.85
1021	50.07	1.4822	10823636	0.0193	59569	3.236E-07	9.88	.676	8.00
1030	50.73	1.4917	10854160	0.0192	56800	3.381E-07	10.07	.676	8.15
1040	51.40	1.5014	10880436	0.0196	51060	3.842E-07	10.26	.675	8.34
1049	52.11	1.5113	10905221	0.0192	48066	3.986E-07	10.46	.676	8.47
1059	52.78	1.5205	10928501	0.0184	46181	3.994E-07	10.66	.676	8.63
1068	53.46	1.5298	10951402	0.0185	43501	4.264E-07	10.85	.676	8.79
1078	54.17	1.5391	10972002	0.0183	39849	4.603E-07	11.05	.675	8.98
1087	54.86	1.5481	10991250	0.0189	38489	4.921E-07	11.27	.675	9.15
1097	55.63	1.5580	11010491	0.0196	37518	5.231E-07	11.48	.675	9.33
1106	56.41	1.5677	11028768	0.0182	35483	5.116E-07	11.69	.675	9.50
1116	57.09	1.5762	11045974	0.0183	32685	5.614E-07	11.92	.676	9.66
1125	57.92	1.5861	11061452	0.0191	31225	6.106E-07	12.13	.677	9.80
1136	58.69	1.5952	11077199	0.0195	31098	6.266E-07	12.38	.676	10.03
1145	59.58	1.6056	11092550	0.0197	28517	6.919E-07	12.61	.675	10.25
1155	60.41	1.6150	11105716	0.0183	24870	7.364E-07	12.86	.676	10.41
1165	61.21	1.6239	11117420	0.0183	23411	7.819E-07	13.10	.675	10.64
1174	62.06	1.6333	11129127	0.0188	23422	8.019E-07	13.34	.676	10.81
1184	62.94	1.6427	11140843	0.0186	22847	8.159E-07	13.60	.676	11.01
1194	63.82	1.6519	11151974	0.0190	21890	8.675E-07	13.86	.676	11.23
1203	64.77	1.6617	11162733	0.0188	20550	9.151E-07	14.12	.676	11.44
1213	65.67	1.6707	11172524	0.0186	18903	9.854E-07	14.40	.677	11.62
1222	66.64	1.6803	11181636	0.0179	17575	1.017E-06	14.65	.675	11.90
1232	67.50	1.6886	11190099	0.0179	16739	1.069E-06	14.94	.675	12.14
1242	68.52	1.6982	11198374	0.0198	16189	1.223E-06	15.22	.676	12.33
1251	69.62	1.7084	11206288	0.0186	14367	1.292E-06	15.50	.676	12.55
1261	70.54	1.7168	11212741	0.0180	13420	1.340E-06	15.81	.675	12.85
1270	71.63	1.7264	11219708	0.0189	13442	1.405E-06	16.10	.676	13.04
1280	72.70	1.7356	11226183	0.0183	12415	1.473E-06	16.40	.675	13.33
1289	73.76	1.7446	11232123	0.0182	11611	1.567E-06	16.71	.675	13.58
1299	74.86	1.7538	11237794	0.0189	11054	1.709E-06	17.03	.676	13.80
1308	76.06	1.7635	11243178	0.0187	10402	1.794E-06	17.35	.676	14.06
1318	77.18	1.7725	11248196	0.0182	9715	1.874E-06	17.69	.676	14.33
1327	78.37	1.7817	11252892	0.0187	9028	2.071E-06	18.03	.676	14.60
1336	79.62	1.7912	11257224	0.0183	8214	2.229E-06	18.36	.675	14.92
1346	80.81	1.8000	11261107	0.0181	7560	2.391E-06	18.72	.676	15.16
1355	82.09	1.8093	11264784	0.0184	6995	2.631E-06	19.06	.676	15.44
1364	83.38	1.8184	11268102	0.0184	6596	2.796E-06	19.43	.675	15.79
1373	84.72	1.8277	11271380	0.0187	6412	2.922E-06	19.80	.676	16.04
1382	86.12	1.8372	11274514	0.0182	5841	3.119E-06	20.17	.675	16.39
1391	87.45	1.8459	11277221	0.0178	5221	3.407E-06	20.56	.675	16.71
1400	88.85	1.8550	11279735	0.0182	4893	3.712E-06	20.94	.676	16.96
1408	90.30	1.8641	11282114	0.0179	4518	3.957E-06	21.33	.675	17.33
1416	91.73	1.8728	11284253	0.0170	4131	4.120E-06	21.71	.676	17.59

Specimen Id. TC-A-2AB Page 3

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1425	93.10	1.8811	11286245	0.0178	4044	4.397E-06	22.13	.676	17.92
1434	94.73	1.8906	11288297	0.0195	4191	4.643E-06	22.55	.676	18.26
1443	96.47	1.9006	11290436	0.0200	4103	4.884E-06	23.01	.676	18.64
1451	98.29	1.9107	11292400	0.0197	3687	5.335E-06	23.48	.676	19.02
1460	100.06	1.9202	11294123	0.0181	3225	5.621E-06	23.93	.676	19.39
1468	101.69	1.9288	11295625	0.0168	2776	6.058E-06	24.38	.676	19.75
1475	103.29	1.9370	11296899	0.0170	2637	6.442E-06	24.82	.675	20.17
1483	105.03	1.9458	11298263	0.0184	2787	6.586E-06	25.29	.675	20.54
1491	107.00	1.9554	11299686	0.0188	2729	6.888E-06	25.76	.675	20.93
1499	108.94	1.9646	11300991	0.0183	2498	7.346E-06	26.27	.676	21.28
1506	110.92	1.9737	11302184	0.0179	2209	8.094E-06	26.76	.676	21.68
	112.85	1.9825	11303200						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-2AA	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	74	Modulus	28.8
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	2028.0	Stress ratio (R)	0.60
Final a (in)	0.726	Kmax	25.02

Test Parameters

Initial a (in)	0.727	Initial K	25.00
K-gradient	-2.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
20.35	0.725	0.726	0.002	0.997
22.83	0.828	0.827	-.001	1.001
27.29	0.983	0.982	-.002	1.007
39.20	1.277	1.278	0.001	1.018

Comments

Date of test: 01-10-2001

Specimen Id. TC-B-2AA

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	20.34	0.7244	5						
1874	20.85	0.7469	68888	0.0537	180014	2.982E-07	9.46	.677	7.64
1738	21.58	0.7780	180019	0.0622	239018	2.601E-07	8.99	.676	7.28
1593	22.34	0.8091	307905	0.0626	279571	2.239E-07	8.47	.676	6.86
1460	23.15	0.8406	459590	0.0630	331451	1.902E-07	7.98	.675	6.46
1339	24.00	0.8721	639357	0.0620	387908	1.599E-07	7.52	.675	6.11
1228	24.85	0.9026	847498	0.0618	464378	1.331E-07	7.08	.674	5.77
1127	25.77	0.9339	1103734	0.0625	556947	1.122E-07	6.68	.674	5.44
1034	26.72	0.9651	1404445	0.0626	658905	9.494E-08	6.29	.673	5.14
948	27.72	0.9965	1762639	0.0623	763489	8.160E-08	5.92	.673	4.84
869	28.76	1.0274	2167934	0.0624	887918	7.029E-08	5.58	.672	4.57
799	29.86	1.0589	2650557	0.0619	1019092	6.070E-08	5.26	.672	4.31
732	30.98	1.0893	3187027	0.0615	1230088	5.002E-08	4.95	.671	4.07
672	32.18	1.1204	3880645	0.0619	1500423	4.126E-08	4.67	.670	3.85
617	33.42	1.1512	4687450	0.0617	1804147	3.417E-08	4.40	.677	3.55
566	34.73	1.1821	5684792	0.0618	2278393	2.713E-08	4.15	.682	3.30
519	36.11	1.2130	6965842	0.0613	2870268	2.136E-08	3.91	.670	3.22
487	37.54	1.2434	8555060	0.0455	2542781	1.791E-08	3.74	.676	3.03
	38.27	1.2586	9508624						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-2AB	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	74	Modulus	29.3
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	2028.0	Stress ratio (R)	0.60
Final a (in)	0.726	Kmax	25.02

Test Parameters

Initial a (in)	1.278	Initial K	9.00
K-gradient	6.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
39.96	1.274	1.278	0.004	0.995
46.13	1.382	1.379	-.003	0.999
56.78	1.530	1.526	-.004	1.004
67.63	1.646	1.650	0.003	1.009

Comments

Date of test: 01-15-2001

Specimen Id. TC-8-2A8

Pmax (lbs)	Ev8/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	39.96	1.2740	13						
495	40.89	1.2917	750456	0.0369	1325655	2.786E-08	4.00	.670	3.30
543	41.93	1.3110	1325668	0.0390	1026584	3.798E-08	4.47	.670	3.69
597	43.03	1.3307	1777041	0.0388	727413	5.331E-08	5.00	.671	4.11
656	44.14	1.3497	2053081	0.0375	468375	7.998E-08	5.59	.672	4.58
720	45.24	1.3682	2245416	0.0375	356499	1.051E-07	6.25	.672	5.12
789	46.42	1.3872	2409579	0.0377	282164	1.337E-07	6.96	.673	5.69
866	47.62	1.4059	2527580	0.0378	208557	1.813E-07	7.79	.674	6.35
949	48.89	1.4250	2618137	0.0375	155702	2.411E-07	8.68	.675	7.06
1040	50.15	1.4434	2683282	0.0368	115261	3.196E-07	9.70	.676	7.85
1138	51.47	1.4619	2733398	0.0368	87011	4.232E-07	10.80	.676	8.75
1246	52.82	1.4803	2770293	0.0373	65210	5.719E-07	12.05	.676	9.76
1362	54.27	1.4992	2798608	0.0369	47965	7.700E-07	13.42	.677	10.83
1492	55.70	1.5172	2818259	0.0369	34883	1.057E-06	14.99	.677	12.11
1631	57.25	1.5360	2833491	0.0375	25240	1.488E-06	16.71	.677	13.49
1784	58.85	1.5547	2843498	0.0369	16569	2.230E-06	18.63	.677	15.04
1951	60.46	1.5730	2850059	0.0365	11103	3.292E-06	20.78	.677	16.78
2132	62.16	1.5913	2854601	0.0370	7841	4.724E-06	23.17	.676	18.77
2327	63.95	1.6100	2857900	0.0368	5653	6.511E-06	25.80	.676	20.90
2487	65.76	1.6281	2860254	0.0274	3344	8.192E-06	28.00	.676	22.68
	66.71	1.6374	2861244						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-2BA	Geometry	MT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	72	Modulus	28.3
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	2384.0	Stress ratio (R)	0.10
Final a (in)	0.747	Kmax	29.91

Test Parameters

Initial a (in)	0.747	Initial K	30.00
K-gradient	-10.00	Constant Kmax	27.00

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes			
KKMXP	1	2	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
20.83	0.751	0.747	-.004	1.003
22.82	0.834	0.836	0.002	1.008
24.75	0.906	0.911	0.005	1.012
27.39	0.994	0.994	0.000	1.017
27.82	1.008	1.004	-.004	1.018

Comments

Date of test: 01-31-2001

Specimen Id. TC-A-2BA

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	20.83	0.7507	18						
2381	20.88	0.7531	480	0.0078	1474	5.295E-06	25.82	.226	23.28
2372	21.01	0.7585	1492	0.0115	2321	4.948E-06	24.81	.277	21.75
2361	21.14	0.7646	2801	0.0122	2799	4.356E-06	23.49	.327	20.25
2349	21.29	0.7707	4290	0.0120	3167	3.779E-06	22.20	.377	18.75
2336	21.42	0.7766	5968	0.0124	3986	3.121E-06	20.90	.375	18.82
2323	21.58	0.7832	8277	0.0136	5249	2.582E-06	19.67	.426	17.29
2311	21.74	0.7901	11217	0.0130	5917	2.202E-06	18.53	.476	15.78
2298	21.89	0.7962	14193	0.0122	6717	1.821E-06	17.41	.527	14.25
2286	22.04	0.8023	17935	0.0124	8771	1.409E-06	16.43	.527	14.26
2274	22.19	0.8085	22964	0.0125	11016	1.135E-06	15.49	.577	12.75
2262	22.34	0.8148	28951	0.0130	12695	1.023E-06	14.57	.628	11.22
2250	22.51	0.8215	35658	0.0129	14789	8.741E-07	13.73	.627	11.25
2238	22.66	0.8278	43740	0.0126	16338	7.683E-07	12.91	.678	9.71
2226	22.82	0.8341	51996	0.0128	19830	6.451E-07	12.15	.676	9.78
2214	22.99	0.8406	63570	0.0127	24226	5.226E-07	11.45	.727	8.24
2202	23.15	0.8468	76222	0.0126	27663	4.553E-07	10.77	.726	8.27
2191	23.31	0.8532	91233	0.0129	33257	3.888E-07	10.14	.727	8.24
2180	23.49	0.8597	109480	0.0123	38161	3.222E-07	9.57	.777	6.74
2168	23.64	0.8655	129395	0.0120	43335	2.762E-07	9.01	.776	6.77
2157	23.80	0.8717	152815	0.0127	50895	2.492E-07	8.50	.779	6.68
2147	23.98	0.8781	180290	0.0122	61344	1.993E-07	8.03	.828	5.20
2135	24.13	0.8839	214159	0.0126	70439	1.783E-07	7.54	.827	5.23
2124	24.32	0.8907	250729	0.0136	80991	1.679E-07	7.10	.828	5.20
2113	24.51	0.8975	295150	0.0122	103342	1.180E-07	6.70	.879	3.66
2102	24.66	0.9029	354071	0.0117	126819	9.254E-08	6.30	.878	3.69
2091	24.83	0.9092	421969	0.0133	133402	9.977E-08	5.94	.877	3.72
2081	25.03	0.9162	487473	0.0120	129022	9.277E-08	5.63	.880	3.63
2070	25.17	0.9212	550991	0.0117	173142	6.767E-08	5.27	.884	3.51
2059	25.37	0.9279	660615	0.0137	235096	5.843E-08	4.98	.884	3.51
2049	25.57	0.9349	786086	0.0132	241051	5.481E-08	4.68	.884	3.51
2037	25.75	0.9411	901666	0.0126	256360	4.927E-08	4.39	.884	3.51
2027	25.94	0.9475	1042446	0.0126	351326	3.590E-08	4.14	.884	3.52
2017	26.13	0.9538	1252992	0.0124	458214	2.714E-08	3.90	.884	3.52
2006	26.32	0.9600	1500660	0.0129	521570	2.483E-08	3.66	.884	3.52
1996	26.52	0.9667	1774562	0.0126	607304	2.079E-08	3.46	.884	3.46
1986	26.70	0.9726	2107964	0.0114	849081	1.347E-08	3.26	.884	3.26
1976	26.88	0.9781	2623643	0.0124	1176185	1.050E-08	3.07	.884	3.07
1967	27.09	0.9850	3284148	0.0125	1537482	8.110E-09	2.91	.884	2.91
1956	27.27	0.9906	4161124	0.0119	2337589	5.075E-09	2.73	.884	2.73
1946	27.46	0.9968	5621737	0.0129	5380049	2.402E-09	2.58	.884	2.58
	27.68	1.0035	9541173						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-7D	Geometry	MT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Initial A0 (PD)	0.375
Environment	Lab Air	Initial PD	%1000.00

Specimen Dimensions (in)

Thickness	0.262	Notch depth	0.399
Width	2.001	Gage length	0.000
Height	0.000		

Precrack Parameters

Pmax (lbs)	9000.0	Stress ratio (R)	-0.97
Final a (in)	0.431	Kmax	10.29

Test Parameters

Initial a (in)	0.588	Initial K	12.70
K-gradient	6.00	Stress ratio (R)	-0.97

K Coeff	PD Coeff
	0.153731
	0.590260
	0.000000
	0.000000
	0.000000
	0.000000

Analysis Codes		
KRCP	1	0

Visual Observations

PD	Crack (PD)	Crack (visual)	Error	PDAF
237.33	0.589	0.588	-.001	1.003
333.97	0.704	0.706	0.002	1.005
395.17	0.777	0.776	-.001	1.006

Comments

Date of test: 03-08-2001

Specimen Id. TC-A-7D

Pmax (lbs)	PD (1E-6)	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)
	237.3	0.5888	7				
9619	241.3	0.5935	31286	0.0149	87178	1.709E-07	13.29
9971	249.8	0.6037	87185	0.0201	97895	2.055E-07	13.88
10487	258.2	0.6136	129182	0.0201	75076	2.682E-07	14.75
11027	266.8	0.6239	162261	0.0206	60665	3.401E-07	15.67
11585	275.5	0.6343	189847	0.0201	48268	4.171E-07	16.63
12191	283.7	0.6440	210529	0.0199	36814	5.409E-07	17.69
12820	292.2	0.6542	226661	0.0207	29138	7.104E-07	18.78
13495	301.0	0.6647	239667	0.0210	22175	9.473E-07	19.98
14224	309.8	0.6752	248836	0.0211	14850	1.422E-06	21.27
14984	318.7	0.6858	254517	0.0211	9746	2.160E-06	22.64
15778	327.4	0.6962	258582	0.0205	6888	2.975E-06	24.07
16597	335.9	0.7063	261405	0.0199	5043	3.953E-06	25.57
17425	344.1	0.7162	263625	0.0193	4152	4.647E-06	27.09
18394	352.0	0.7256	265557	0.0212	3381	6.277E-06	28.89
19455	361.9	0.7374	267006	0.0248	2199	1.127E-05	30.88
20378	372.8	0.7504	267756	0.0197	1162	1.698E-05	32.63
21706	378.4	0.7571	268167	0.0190	864	2.194E-05	35.16
	388.6	0.7693	268620				

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-9A	Geometry	4pt
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	28.7
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.250	Notch depth	0.150
Width	0.750	Gage length	0.000
Height	0.000	Alpha ratio	1.000

Precrack Parameters

Pmax (lbs)	680.0	Stress ratio (R)	0.10
Final a (in)	0.185	Kmax	11.97

Test Parameters

Initial a (in)	0.187	Initial K	11.10
K-gradient	6.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.580650	1.002640
5.527980	-3.342220
-21.102409	2.051950
37.139400	-6.416230
-31.403311	38.265362
10.093900	-45.538799

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
6.78	0.188	0.186	-.001	1.012
9.00	0.232	0.232	-.000	1.049
11.68	0.274	0.274	-.001	1.080
15.09	0.315	0.319	0.003	1.109
19.52	0.356	0.358	0.002	1.136
25.54	0.396	0.394	-.002	1.161
34.42	0.437	0.437	-.001	1.187

Comments

Date of test: 03-08-2001

Specimen Id. TC-A-9A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	6.81	0.1883	5						
628	6.83	0.1888	5138	0.0022	15754	1.390E-07	10.11	.208	8.89
630	6.90	0.1905	15759	0.0035	20975	1.678E-07	10.17	.209	8.94
632	6.99	0.1923	26112	0.0036	20245	1.775E-07	10.28	.206	9.07
635	7.07	0.1941	36004	0.0035	19376	1.803E-07	10.38	.205	9.16
637	7.15	0.1958	45489	0.0033	17585	1.865E-07	10.48	.205	9.26
640	7.22	0.1974	53589	0.0033	16823	1.969E-07	10.58	.203	9.37
642	7.30	0.1991	62312	0.0036	17211	2.093E-07	10.69	.201	9.48
645	7.39	0.2010	70799	0.0036	16231	2.206E-07	10.79	.198	9.62
647	7.48	0.2027	78543	0.0034	16348	2.093E-07	10.90	.202	9.67
650	7.56	0.2044	87147	0.0034	16061	2.117E-07	11.01	.199	9.80
652	7.64	0.2061	94603	0.0034	14340	2.381E-07	11.11	.198	9.91
655	7.73	0.2078	101487	0.0035	14627	2.391E-07	11.22	.198	10.00
658	7.81	0.2096	109231	0.0034	15201	2.256E-07	11.33	.197	10.11
660	7.90	0.2113	116688	0.0033	14053	2.335E-07	11.44	.194	10.25
663	7.98	0.2129	123283	0.0034	13206	2.568E-07	11.55	.194	10.35
665	8.07	0.2146	129894	0.0035	13530	2.573E-07	11.66	.191	10.48
668	8.16	0.2164	136813	0.0034	13229	2.605E-07	11.78	.191	10.59
671	8.25	0.2181	143123	0.0034	12619	2.675E-07	11.89	.187	10.74
673	8.33	0.2197	149433	0.0034	12619	2.681E-07	12.01	.189	10.82
676	8.43	0.2215	155742	0.0035	12046	2.934E-07	12.13	.188	10.95
679	8.52	0.2233	161478	0.0035	11263	3.083E-07	12.25	.192	11.00
682	8.61	0.2249	167006	0.0033	10873	3.045E-07	12.37	.190	11.13
684	8.70	0.2266	172351	0.0033	11075	2.951E-07	12.48	.191	11.23
687	8.79	0.2282	178081	0.0034	11460	3.001E-07	12.61	.189	11.36
690	8.89	0.2300	183811	0.0033	10554	3.110E-07	12.72	.188	11.48
693	8.97	0.2315	188635	0.0032	9681	3.330E-07	12.85	.186	11.62
695	9.07	0.2332	193492	0.0034	10181	3.313E-07	12.96	.184	11.76
698	9.17	0.2349	198816	0.0034	9914	3.471E-07	13.09	.186	11.85
701	9.27	0.2367	203406	0.0035	9180	3.783E-07	13.22	.189	11.91
704	9.37	0.2383	207996	0.0035	9364	3.690E-07	13.35	.189	12.03
707	9.47	0.2401	212770	0.0034	9180	3.755E-07	13.48	.189	12.15
709	9.57	0.2418	217176	0.0033	8813	3.762E-07	13.61	.189	12.26
712	9.67	0.2435	221583	0.0033	8445	3.909E-07	13.74	.187	12.42
715	9.77	0.2451	225622	0.0033	7916	4.121E-07	13.87	.187	12.54
718	9.87	0.2467	229499	0.0034	7830	4.314E-07	14.01	.184	12.70
721	9.97	0.2485	233451	0.0036	7826	4.574E-07	14.15	.185	12.81
724	10.09	0.2503	237324	0.0034	7386	4.650E-07	14.28	.192	12.82
727	10.19	0.2519	240837	0.0031	7048	4.445E-07	14.42	.197	12.87
730	10.28	0.2534	244372	0.0033	7225	4.584E-07	14.56	.191	13.08
732	10.40	0.2552	248062	0.0033	7105	4.690E-07	14.69	.188	13.25
735	10.50	0.2568	251477	0.0033	7113	4.609E-07	14.84	.180	13.52
738	10.61	0.2585	255175	0.0034	7093	4.861E-07	14.98	.180	13.64
741	10.72	0.2602	258570	0.0034	6199	5.459E-07	15.13	.179	13.80
744	10.84	0.2619	261374	0.0034	5662	5.922E-07	15.27	.188	13.79
747	10.95	0.2636	264232	0.0034	5682	5.985E-07	15.42	.195	13.80
750	11.06	0.2653	267056	0.0033	5764	5.740E-07	15.57	.198	13.87
753	11.17	0.2669	269996	0.0032	6235	5.210E-07	15.72	.189	14.17
756	11.29	0.2685	273291	0.0034	6352	5.341E-07	15.87	.184	14.39

Specimen Id. TC-A-9A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
759	11.41	0.2703	276349	0.0034	5998	5.705E-07	16.03	.185	14.51
762	11.53	0.2719	279288	0.0033	5528	5.962E-07	16.18	.186	14.64
765	11.64	0.2736	281876	0.0032	5451	5.958E-07	16.34	.188	14.74
768	11.76	0.2752	284739	0.0035	6193	5.572E-07	16.50	.180	15.03
771	11.89	0.2770	288069	0.0036	6122	5.807E-07	16.66	.182	15.15
774	12.02	0.2788	290861	0.0033	5035	6.512E-07	16.83	.181	15.31
777	12.14	0.2803	293104	0.0031	4534	6.939E-07	16.99	.178	15.52
780	12.26	0.2819	295395	0.0032	4756	6.767E-07	17.15	.170	15.81
783	12.38	0.2835	297860	0.0033	4930	6.681E-07	17.31	.170	15.96
786	12.51	0.2852	300325	0.0034	4741	7.121E-07	17.48	.172	16.09
790	12.64	0.2869	302600	0.0035	4374	7.951E-07	17.65	.171	16.26
793	12.78	0.2887	304699	0.0035	4154	8.372E-07	17.83	.176	16.32
796	12.92	0.2904	306755	0.0033	3954	8.318E-07	18.01	.170	16.60
799	13.04	0.2920	308652	0.0034	3796	8.871E-07	18.19	.172	16.73
802	13.19	0.2937	310550	0.0034	3891	8.737E-07	18.36	.173	16.88
805	13.32	0.2954	312543	0.0033	3794	8.589E-07	18.54	.171	17.07
808	13.46	0.2970	314344	0.0032	3392	9.495E-07	18.72	.171	17.24
811	13.59	0.2986	315934	0.0033	3481	9.367E-07	18.90	.171	17.41
814	13.73	0.3002	317824	0.0032	3780	8.345E-07	19.07	.171	17.57
817	13.86	0.3017	319714	0.0032	3780	8.408E-07	19.26	.171	17.74
820	14.00	0.3034	321604	0.0033	3705	9.037E-07	19.44	.170	17.92
824	14.15	0.3051	323419	0.0034	3327	1.024E-06	19.63	.171	18.08
827	14.30	0.3068	324931	0.0034	2873	1.178E-06	19.82	.171	18.26
830	14.45	0.3085	326292	0.0031	2745	1.123E-06	20.01	.171	18.43
833	14.58	0.3099	327676	0.0031	2824	1.099E-06	20.21	.171	18.61
836	14.73	0.3116	329116	0.0033	2820	1.179E-06	20.39	.171	18.78
839	14.89	0.3132	330496	0.0033	2702	1.235E-06	20.59	.171	18.97
842	15.04	0.3149	331818	0.0034	2417	1.418E-06	20.80	.171	19.16
845	15.21	0.3167	332913	0.0034	2199	1.561E-06	21.01	.171	19.35
848	15.37	0.3183	334017	0.0033	2256	1.450E-06	21.22	.171	19.54
851	15.53	0.3199	335169	0.0032	2304	1.370E-06	21.42	.171	19.73
854	15.68	0.3215	336321	0.0031	2256	1.393E-06	21.62	.171	19.92
857	15.84	0.3231	337425	0.0032	2016	1.571E-06	21.82	.171	20.10
860	15.99	0.3247	338337	0.0032	1882	1.684E-06	22.03	.172	20.27
863	16.16	0.3262	339307	0.0032	1968	1.620E-06	22.24	.172	20.46
866	16.32	0.3278	340305	0.0032	2035	1.560E-06	22.45	.172	20.65
870	16.48	0.3294	341342	0.0034	2035	1.673E-06	22.68	.171	20.89
873	16.68	0.3313	342340	0.0035	1958	1.795E-06	22.90	.171	21.09
876	16.85	0.3329	343300	0.0035	1843	1.908E-06	23.15	.171	21.32
879	17.05	0.3348	344183	0.0033	1697	1.936E-06	23.37	.172	21.50
882	17.21	0.3362	344997	0.0030	1562	1.947E-06	23.61	.172	21.72
885	17.39	0.3378	345746	0.0029	1484	1.976E-06	23.80	.172	21.90
888	17.53	0.3391	346480	0.0030	1531	1.990E-06	24.04	.172	22.12
891	17.73	0.3409	347277	0.0033	1545	2.151E-06	24.25	.172	22.31
894	17.91	0.3425	348026	0.0034	1529	2.230E-06	24.51	.172	22.55
897	18.12	0.3443	348806	0.0033	1498	2.228E-06	24.74	.172	22.76
901	18.30	0.3458	349523	0.0032	1310	2.480E-06	25.00	.172	23.00
903	18.50	0.3475	350116	0.0034	1145	2.939E-06	25.24	.172	23.22
907	18.70	0.3492	350668	0.0033	1107	2.940E-06	25.49	.341	18.66
910	18.89	0.3508	351223	0.0031	1109	2.780E-06	25.73	.338	18.92

Specimen Id. TC-A-9A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
913	19.08	0.3523	351777	0.0031	1160	2.713E-06	25.99	.342	19.00
915	19.28	0.3539	352382	0.0032	1135	2.813E-06	26.22	.341	19.19
917	19.48	0.3554	352912	0.0019	1394	1.389E-06	26.39	.342	19.29
921	19.53	0.3559	353776	0.0033	1749	1.910E-06	26.75	.172	24.61
923	19.90	0.3588	354661	0.0046	1439	3.226E-06	26.92	.172	24.76
927	20.13	0.3605	355215	0.0031	1109	2.835E-06	27.27	.173	25.06
931	20.32	0.3619	355770	0.0031	1058	2.883E-06	27.55	.173	25.31
933	20.53	0.3635	356274	0.0033	1008	3.276E-06	27.81	.173	25.55
936	20.76	0.3652	356778	0.0032	957	3.382E-06	28.08	.341	20.56
939	20.98	0.3668	357231	0.0031	879	3.480E-06	28.35	.341	20.76
942	21.19	0.3683	357657	0.0032	834	3.848E-06	28.63	.342	20.94
945	21.43	0.3700	358065	0.0032	759	4.150E-06	28.89	.500	16.05
948	21.63	0.3714	358416	0.0031	687	4.529E-06	29.19	.339	21.43
951	21.88	0.3731	358752	0.0034	655	5.208E-06	29.47	.342	21.54
954	22.13	0.3749	359072	0.0031	590	5.324E-06	29.74	.498	16.58
957	22.34	0.3762	359342	0.0029	557	5.262E-06	30.04	.509	16.40
959	22.57	0.3778	359629	0.0031	599	5.175E-06	30.31	.493	17.07
962	22.81	0.3793	359941	0.0032	657	4.804E-06	30.61	.501	16.97
965	23.05	0.3809	360286	0.0033	702	4.630E-06	30.91	.497	17.29
968	23.31	0.3826	360643	0.0035	634	5.478E-06	31.23	.498	17.42
971	23.60	0.3844	360920	0.0033	502	6.678E-06	31.54	.497	17.64
975	23.85	0.3859	361145	0.0049	354	1.397E-05	32.05	.652	12.38
976	24.41	0.3894	361274	0.0030	215	1.386E-05	32.15	.652	12.42
980	24.34	0.3889	361359	0.0010	246	3.949E-06	32.63	.710	10.50
981	24.57	0.3903	361520	0.0029	387	7.388E-06	32.73	.674	11.86
984	24.82	0.3918	361746	0.0030	478	6.317E-06	33.03	.661	12.43
986	25.09	0.3934	361997	0.0027	499	5.407E-06	33.29	.678	11.92
989	25.28	0.3945	362246	0.0024	690	3.547E-06	33.59	.661	12.67
989	25.51	0.3958	362687	0.0010	1103	9.002E-07	33.67	.175	30.87
994	25.45	0.3955	363348	0.0043	1152	3.732E-06	34.30	.176	31.40
995	26.28	0.4001	363839	0.0062	663	9.389E-06	34.43	.175	31.56
1001	26.58	0.4017	364011	0.0031	341	9.032E-06	35.08	.175	32.16
1003	26.85	0.4032	364180	0.0030	341	8.797E-06	35.42	.175	32.47
1006	27.14	0.4047	364352	0.0031	354	8.720E-06	35.76	.176	32.74
1008	27.44	0.4063	364534	0.0032	357	8.922E-06	36.10	.175	33.10
1011	27.76	0.4079	364709	0.0031	329	9.433E-06	36.45	.175	33.41
1013	28.05	0.4094	364863	0.0029	308	9.457E-06	36.79	.356	26.34
1016	28.33	0.4108	365017	0.0030	329	9.086E-06	37.14	.355	26.60
1018	28.65	0.4124	365192	0.0034	350	9.648E-06	37.51	.342	27.44
1020	29.02	0.4142	365367	0.0026	448	5.860E-06	37.79	.497	21.11
1023	29.19	0.4150	365640	0.0031	561	5.577E-06	38.28	.485	21.92
1025	29.68	0.4173	365928	0.0039	477	8.144E-06	38.56	.337	28.41
1028	30.02	0.4189	366117	0.0031	351	8.892E-06	39.03	.339	28.68
1031	30.36	0.4204	366279	0.0031	297	1.030E-05	39.40	.500	21.89
1033	30.69	0.4219	366414	0.0029	270	1.071E-05	39.76	.491	22.47
1035	31.00	0.4233	366550	0.0030	285	1.035E-05	40.15	.488	22.82
1037	31.36	0.4249	366699	0.0031	312	1.002E-05	40.52	.477	23.53
1040	31.72	0.4264	366861	0.0031	300	1.049E-05	40.92	.473	23.97
1042	32.09	0.4280	366999	0.0031	287	1.092E-05	41.31	.467	24.45
1044	32.46	0.4296	367149	0.0032	310	1.045E-05	41.74	.507	22.86

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1046	32.87	0.4313	367309	0.0031	275	1.126E-05	42.13	.512	22.84
1049	33.21	0.4327	367423	0.0029	243	1.185E-05	42.54	.510	23.16
1052	33.58	0.4341	367552	0.0043	220	1.931E-05	43.10	.667	15.95
	34.28	0.4369	367643						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-10B	Geometry	4PT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	72	Modulus	25.7
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.250	Notch depth	0.148
Width	0.750	Gage length	0.000
Height	0.000	Alpha ratio	1.000

Precrack Parameters

Pmax (lbs)	633.0	Stress ratio (R)	0.10
Final a (in)	0.197	Kmax	11.62

Test Parameters

Initial a (in)	0.197	Initial K	11.30
K-gradient	-2.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.580650	1.002640
5.527980	-3.342220
-21.102409	2.051950
37.139400	-6.416230
-31.403311	38.265362
10.093900	-45.538799

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
7.36	0.192	0.197	0.005	0.963
10.73	0.259	0.253	-.006	1.059
15.08	0.319	0.318	-.002	1.139
19.54	0.363	0.363	-.001	1.194
25.48	0.405	0.406	0.001	1.246
33.68	0.446	0.447	0.001	1.297

Comments

Date of test: 03-20-2001

Specimen Id. TC-A-10B

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	7.36	0.1921	12						
613	7.37	0.1923	149	0.0012	4767	2.484E-07	9.98	.169	9.22
611	7.41	0.1933	4779	0.0028	14443	1.942E-07	9.98	.169	9.21
607	7.49	0.1951	14592	0.0038	19511	1.947E-07	9.96	.169	9.20
602	7.58	0.1971	24290	0.0039	19536	2.003E-07	9.95	.168	9.20
597	7.66	0.1991	34128	0.0039	19787	1.964E-07	9.93	.169	9.17
592	7.75	0.2010	44078	0.0038	19723	1.916E-07	9.91	.169	9.15
587	7.83	0.2028	53851	0.0038	19688	1.953E-07	9.90	.168	9.15
582	7.92	0.2048	63765	0.0039	19462	2.019E-07	9.88	.168	9.13
578	8.01	0.2068	73313	0.0038	18360	2.045E-07	9.87	.168	9.12
573	8.09	0.2086	82126	0.0037	18370	1.993E-07	9.85	.168	9.10
569	8.18	0.2104	91682	0.0038	19841	1.908E-07	9.83	.169	9.08
564	8.27	0.2124	101966	0.0038	20199	1.874E-07	9.82	.168	9.07
560	8.36	0.2142	111881	0.0037	19480	1.892E-07	9.80	.168	9.06
555	8.44	0.2160	121447	0.0038	19489	1.941E-07	9.78	.167	9.05
551	8.54	0.2180	131370	0.0039	20572	1.874E-07	9.77	.167	9.04
546	8.63	0.2199	142019	0.0037	21298	1.748E-07	9.75	.169	9.00
542	8.72	0.2217	152668	0.0037	21665	1.726E-07	9.73	.168	9.00
538	8.81	0.2236	163684	0.0038	21933	1.744E-07	9.72	.167	8.99
533	8.91	0.2255	174601	0.0038	21461	1.787E-07	9.70	.168	8.97
529	9.00	0.2275	185145	0.0038	21573	1.767E-07	9.68	.166	8.97
525	9.10	0.2294	196175	0.0038	22045	1.720E-07	9.67	.167	8.95
521	9.20	0.2313	207190	0.0038	21559	1.765E-07	9.65	.168	8.92
516	9.30	0.2332	217733	0.0037	21547	1.735E-07	9.63	.168	8.90
512	9.39	0.2350	228737	0.0037	22931	1.626E-07	9.61	.167	8.90
508	9.49	0.2369	240664	0.0038	23394	1.618E-07	9.60	.166	8.89
504	9.59	0.2388	252131	0.0037	22469	1.650E-07	9.58	.164	8.90
500	9.69	0.2406	263133	0.0037	22922	1.631E-07	9.56	.165	8.87
496	9.80	0.2425	275053	0.0039	23839	1.623E-07	9.55	.166	8.85
492	9.90	0.2445	286972	0.0037	22920	1.602E-07	9.53	.165	8.84
488	10.00	0.2462	297973	0.0035	22462	1.575E-07	9.51	.164	8.84
485	10.10	0.2480	309433	0.0037	23378	1.581E-07	9.50	.163	8.83
481	10.21	0.2499	321351	0.0040	24299	1.633E-07	9.48	.162	8.83
477	10.33	0.2520	333732	0.0038	24300	1.564E-07	9.46	.165	8.78
473	10.43	0.2537	345651	0.0038	23381	1.622E-07	9.45	.165	8.76
469	10.55	0.2558	357113	0.0038	22463	1.710E-07	9.43	.163	8.77
465	10.65	0.2575	368114	0.0033	22462	1.465E-07	9.41	.163	8.75
462	10.74	0.2591	379574	0.0035	25678	1.382E-07	9.40	.162	8.75
458	10.86	0.2611	393792	0.0040	28335	1.397E-07	9.38	.161	8.74
454	10.98	0.2630	407910	0.0038	26143	1.454E-07	9.36	.161	8.73
451	11.10	0.2649	419935	0.0037	24069	1.524E-07	9.35	.162	8.70
447	11.21	0.2667	431978	0.0036	24636	1.470E-07	9.33	.162	8.69
443	11.32	0.2685	444571	0.0037	25186	1.487E-07	9.31	.162	8.67
440	11.45	0.2704	457164	0.0037	24613	1.483E-07	9.30	.162	8.66
437	11.56	0.2722	469184	0.0030	28919	1.032E-07	9.28	.161	8.65
433	11.64	0.2734	486083	0.0035	36863	9.516E-08	9.26	.162	8.63
430	11.79	0.2757	506047	0.0042	34558	1.219E-07	9.25	.163	8.60
426	11.92	0.2776	520641	0.0038	29251	1.310E-07	9.23	.164	8.58
423	12.04	0.2795	535298	0.0037	29447	1.256E-07	9.21	.164	8.56

Specimen Id. TC-A-10B

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
419	12.16	0.2813	550088	0.0037	29946	1.252E-07	9.20	.164	8.54
416	12.30	0.2832	565245	0.0037	29736	1.254E-07	9.18	.164	8.53
412	12.42	0.2850	579824	0.0036	27532	1.322E-07	9.16	.164	8.51
409	12.55	0.2869	592777	0.0036	26608	1.371E-07	9.15	.164	8.50
406	12.68	0.2887	606432	0.0036	28403	1.271E-07	9.13	.164	8.48
403	12.81	0.2905	621180	0.0036	28985	1.248E-07	9.12	.164	8.47
399	12.94	0.2923	635416	0.0035	27867	1.271E-07	9.10	.164	8.45
396	13.07	0.2940	649047	0.0036	28177	1.285E-07	9.08	.164	8.44
393	13.21	0.2959	663594	0.0038	29568	1.271E-07	9.07	.162	8.44
390	13.35	0.2978	678615	0.0036	29987	1.204E-07	9.05	.162	8.43
386	13.48	0.2995	693581	0.0036	29414	1.230E-07	9.03	.161	8.42
383	13.62	0.3014	708029	0.0036	28898	1.239E-07	9.02	.162	8.40
380	13.76	0.3031	722479	0.0035	29416	1.199E-07	9.00	.161	8.39
377	13.90	0.3049	737445	0.0036	30964	1.148E-07	8.99	.163	8.36
374	14.04	0.3067	753443	0.0035	31357	1.132E-07	8.97	.162	8.35
371	14.18	0.3085	768802	0.0036	29563	1.233E-07	8.96	.162	8.34
368	14.33	0.3103	783005	0.0036	29052	1.256E-07	8.94	.161	8.33
365	14.48	0.3121	797854	0.0036	30991	1.154E-07	8.92	.162	8.31
362	14.63	0.3139	813996	0.0036	32282	1.118E-07	8.91	.161	8.30
359	14.78	0.3157	830136	0.0037	32928	1.109E-07	8.89	.162	8.28
356	14.94	0.3176	846924	0.0036	37454	9.527E-08	8.88	.161	8.27
353	15.09	0.3193	867591	0.0035	39549	8.854E-08	8.86	.162	8.25
350	15.24	0.3211	886473	0.0035	34532	1.013E-07	8.84	.162	8.23
347	15.40	0.3228	902123	0.0037	31821	1.167E-07	8.83	.162	8.22
344	15.57	0.3248	918294	0.0036	30396	1.199E-07	8.81	.162	8.21
341	15.73	0.3265	932519	0.0034	28450	1.209E-07	8.80	.162	8.19
338	15.89	0.3282	946744	0.0035	29097	1.189E-07	8.78	.162	8.18
336	16.05	0.3299	961616	0.0035	30373	1.152E-07	8.77	.162	8.16
333	16.22	0.3317	977116	0.0036	30995	1.153E-07	8.75	.163	8.14
330	16.38	0.3335	992611	0.0034	29698	1.154E-07	8.74	.162	8.13
327	16.54	0.3351	1006814	0.0034	30343	1.135E-07	8.72	.163	8.11
324	16.72	0.3369	1022954	0.0037	32282	1.133E-07	8.70	.162	8.10
322	16.90	0.3388	1039096	0.0035	32284	1.096E-07	8.69	.163	8.08
319	17.07	0.3405	1055238	0.0035	33591	1.040E-07	8.67	.162	8.08
316	17.25	0.3423	1072687	0.0036	32338	1.103E-07	8.66	.162	8.06
313	17.43	0.3440	1087576	0.0034	30384	1.123E-07	8.64	.162	8.05
311	17.61	0.3457	1103071	0.0034	31634	1.085E-07	8.63	.162	8.03
308	17.79	0.3475	1119210	0.0035	32940	1.063E-07	8.61	.163	8.01
305	17.98	0.3492	1136011	0.0036	34235	1.055E-07	8.60	.162	8.00
303	18.18	0.3511	1153445	0.0034	32929	1.044E-07	8.58	.163	7.98
300	18.35	0.3526	1168940	0.0033	33571	9.880E-08	8.57	.163	7.97
298	18.55	0.3544	1187017	0.0035	35664	9.858E-08	8.55	.162	7.96
295	18.74	0.3562	1204604	0.0035	35175	9.986E-08	8.54	.163	7.94
293	18.94	0.3579	1222191	0.0035	38413	9.089E-08	8.52	.162	7.93
290	19.14	0.3596	1243017	0.0034	42605	8.040E-08	8.51	.163	7.91
288	19.34	0.3613	1264796	0.0028	52446	5.292E-08	8.49	.163	7.90
285	19.47	0.3624	1295463	0.0035	58095	5.943E-08	8.48	.162	7.89
283	19.75	0.3648	1322891	0.0042	43556	9.605E-08	8.46	.163	7.87
280	19.97	0.3666	1339018	0.0035	32261	1.076E-07	8.45	.162	7.86
277	20.17	0.3683	1355152	0.0033	35512	9.347E-08	8.43	.163	7.84

Specimen Id. TC-A-10B

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
275	20.38	0.3699	1374530	0.0034	40365	8.406E-08	8.42	.162	7.84
273	20.60	0.3716	1395517	0.0035	40564	8.704E-08	8.40	.162	7.82
270	20.83	0.3735	1415094	0.0034	38137	8.921E-08	8.39	.164	7.79
268	21.04	0.3750	1433654	0.0032	38726	8.219E-08	8.37	.163	7.79
266	21.25	0.3766	1453819	0.0033	42755	7.831E-08	8.36	.163	7.77
263	21.48	0.3784	1476409	0.0035	44421	7.980E-08	8.34	.164	7.75
261	21.72	0.3802	1498240	0.0032	40400	7.804E-08	8.33	.164	7.74
259	21.91	0.3815	1516808	0.0029	39539	7.373E-08	8.31	.165	7.71
256	22.12	0.3831	1537779	0.0036	46977	7.572E-08	8.30	.164	7.71
254	22.41	0.3851	1563785	0.0037	50226	7.397E-08	8.29	.164	7.70
252	22.65	0.3868	1588005	0.0035	46509	7.516E-08	8.27	.165	7.67
249	22.91	0.3886	1610293	0.0034	43834	7.762E-08	8.25	.165	7.66
247	23.14	0.3902	1631839	0.0032	43732	7.258E-08	8.24	.166	7.64
245	23.38	0.3918	1654025	0.0033	50803	6.458E-08	8.22	.222	7.11
243	23.64	0.3935	1682642	0.0034	56284	6.090E-08	8.21	.167	7.60
241	23.90	0.3952	1710309	0.0033	50851	6.476E-08	8.20	.167	7.59
238	24.14	0.3968	1733493	0.0034	52416	6.485E-08	8.18	.167	7.57
236	24.43	0.3986	1762725	0.0036	59220	6.028E-08	8.17	.167	7.56
234	24.71	0.4004	1792713	0.0034	56448	6.047E-08	8.15	.166	7.55
232	24.98	0.4020	1819173	0.0030	50400	5.929E-08	8.14	.166	7.54
230	25.19	0.4033	1843113	0.0031	55456	5.603E-08	8.12	.166	7.53
228	25.49	0.4051	1874629	0.0035	60505	5.820E-08	8.11	.166	7.51
225	25.78	0.4069	1903618	0.0033	51934	6.371E-08	8.09	.220	7.01
223	26.05	0.4084	1926563	0.0033	50201	6.574E-08	8.08	.221	6.99
221	26.35	0.4102	1953819	0.0035	54475	6.380E-08	8.06	.221	6.98
219	26.66	0.4119	1981038	0.0033	55443	5.872E-08	8.05	.221	6.97
217	26.93	0.4134	2009262	0.0030	53430	5.547E-08	8.04	.221	6.96
215	27.19	0.4149	2034468	0.0031	54466	5.709E-08	8.02	.221	6.94
213	27.50	0.4165	2063728	0.0035	60004	5.785E-08	8.01	.221	6.93
211	27.84	0.4183	2094472	0.0035	57237	6.074E-08	7.99	.220	6.93
209	28.15	0.4200	2120965	0.0031	51711	6.021E-08	7.98	.221	6.91
207	28.43	0.4215	2146183	0.0031	53740	5.703E-08	7.96	.220	6.90
205	28.75	0.4231	2174705	0.0035	62227	5.616E-08	7.95	.222	6.87
203	29.12	0.4250	2208410	0.0034	62709	5.495E-08	7.93	.221	6.87
201	29.43	0.4265	2237414	0.0031	54204	5.709E-08	7.92	.221	6.85
199	29.74	0.4280	2262614	0.0031	54180	5.683E-08	7.91	.219	6.86
197	30.07	0.4296	2291594	0.0032	63000	5.008E-08	7.89	.220	6.84
195	30.40	0.4312	2325614	0.0033	64260	5.163E-08	7.88	.222	6.81
194	30.77	0.4329	2355854	0.0033	56702	5.813E-08	7.86	.274	6.34
192	31.11	0.4345	2382316	0.0033	59224	5.568E-08	7.85	.221	6.79
190	31.49	0.4362	2415078	0.0034	61743	5.464E-08	7.83	.276	6.30
188	31.86	0.4379	2444058	0.0029	56196	5.218E-08	7.82	.275	6.30
186	32.15	0.4391	2471274	0.0030	63252	4.805E-08	7.80	.275	6.29
184	32.56	0.4409	2507310	0.0036	70056	5.076E-08	7.79	.276	6.27
182	32.98	0.4427	2541330	0.0032	65520	4.890E-08	7.78	.220	6.74
181	33.31	0.4441	2572830	0.0031	64089	4.795E-08	7.76	.275	6.25
175	33.72	0.4458	2605419	0.0092	46826	1.973E-07	7.69	.274	6.20
176	35.89	0.4534	2619656	0.0040	14433	2.784E-07	7.71	.890	0.94
	34.85	0.4498	2619852						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-11A	Geometry	4pt
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	72	Modulus	26.7
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.250	Notch depth	0.151
Width	0.750	Gage length	0.000
Height	0.000	Alpha ratio	1.000

Precrack Parameters

Pmax (lbs)	1687.0	Stress ratio (R)	0.10
Final a (in)	0.189	Kmax	30.06

Test Parameters

Initial a (in)	0.189	Initial K	30.00
K-gradient	-10.00	Constant Kmax	27.00

K Coeff	EvB/P Coeff
0.580650	1.002640
5.527980	-3.342220
-21.102409	2.051950
37.139400	-6.416230
-31.403311	38.265362
10.093900	-45.538799

Analysis Codes

KKMXP	1	2	0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
7.88	0.202	0.204	0.002	0.964
9.01	0.222	0.221	-.001	0.980
11.67	0.264	0.264	-.000	1.011
16.73	0.322	0.323	0.001	1.050
22.88	0.371	0.360	-.011	1.081
25.51	0.387	0.391	0.003	1.091
28.51	0.404	0.405	0.002	1.101
28.51	0.404	0.407	0.004	1.101

Comments

Date of test: 04-02-2001

Specimen Id. TC-A-11A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	7.79	0.1999	102						
1631	7.04	0.1863	220	-.0144	174	-8.303E-05	24.18	.174	24.18
1671	7.00	0.1855	275	-.0010	117	-8.745E-06	25.96	.196	23.71
1671	6.99	0.1853	337	0.0007	138	4.769E-06	25.97	.175	24.33
1671	7.03	0.1861	413	0.0010	153	6.392E-06	25.97	.174	24.36
1669	7.04	0.1863	490	0.0000	120	3.791E-07	25.87	.174	24.36
1668	7.03	0.1862	533	0.0001	86	6.359E-07	25.83	.176	24.30
1667	7.04	0.1863	576	0.0006	86	6.835E-06	25.79	.172	24.42
1666	7.07	0.1868	618	0.0007	86	8.499E-06	25.73	.173	24.39
1664	7.08	0.1871	661	0.0004	93	4.715E-06	25.66	.176	24.30
1663	7.09	0.1872	711	0.0004	99	3.849E-06	25.59	.177	24.27
1661	7.10	0.1874	760	0.0005	93	5.614E-06	25.53	.179	24.21
1660	7.12	0.1877	803	0.0004	86	4.448E-06	25.49	.181	24.16
1659	7.12	0.1878	846	0.0003	85	3.852E-06	25.43	.180	24.19
1658	7.13	0.1880	888	0.0005	88	6.158E-06	25.37	.184	24.07
1657	7.15	0.1884	934	0.0004	91	4.616E-06	25.33	.185	24.04
1655	7.16	0.1885	979	0.0005	91	5.313E-06	25.24	.184	24.07
1655	7.18	0.1888	1024	0.0004	90	4.554E-06	25.22	.186	24.01
1652	7.18	0.1889	1069	0.0004	93	4.819E-06	25.12	.187	23.98
1652	7.20	0.1893	1117	0.0004	96	4.145E-06	25.12	.188	23.95
1650	7.20	0.1893	1165	0.0005	91	5.165E-06	25.01	.189	23.92
1649	7.23	0.1898	1208	0.0009	99	8.890E-06	24.96	.226	22.83
1646	7.25	0.1901	1264	0.0009	218	4.053E-06	24.84	.230	22.71
1641	7.27	0.1906	1425	0.0019	491	3.776E-06	24.62	.225	22.86
1635	7.35	0.1920	1755	0.0031	860	3.554E-06	24.35	.225	22.86
1624	7.44	0.1937	2285	0.0041	1281	3.201E-06	23.88	.276	21.35
1613	7.57	0.1961	3036	0.0045	1528	2.961E-06	23.43	.275	21.38
1602	7.69	0.1982	3812	0.0037	1404	2.641E-06	22.96	.275	21.38
1592	7.78	0.1998	4440	0.0032	1269	2.561E-06	22.53	.326	19.88
1584	7.88	0.2015	5081	0.0034	1295	2.620E-06	22.18	.326	19.88
1576	7.97	0.2032	5735	0.0031	1269	2.459E-06	21.87	.325	19.92
1568	8.04	0.2046	6349	0.0029	1256	2.327E-06	21.56	.324	19.96
1560	8.12	0.2061	6991	0.0035	1499	2.367E-06	21.25	.377	18.41
1553	8.22	0.2081	7849	0.0035	1510	2.289E-06	20.98	.377	18.42
1546	8.30	0.2096	8502	0.0026	1233	2.075E-06	20.71	.375	18.49
1539	8.36	0.2107	9082	0.0026	1362	1.914E-06	20.45	.376	18.47
1533	8.44	0.2122	9863	0.0032	1735	1.854E-06	20.20	.375	18.51
1525	8.53	0.2139	10817	0.0036	1946	1.842E-06	19.91	.427	16.98
1517	8.63	0.2158	11809	0.0038	2070	1.819E-06	19.61	.426	17.02
1508	8.74	0.2177	12886	0.0041	2468	1.641E-06	19.27	.426	17.03
1500	8.86	0.2198	14277	0.0039	2616	1.503E-06	18.97	.425	17.07
1491	8.96	0.2216	15502	0.0034	2414	1.425E-06	18.67	.425	17.08
1483	9.05	0.2233	16691	0.0036	2535	1.414E-06	18.37	.430	16.95
1476	9.16	0.2252	18037	0.0036	2743	1.314E-06	18.11	.476	15.59
1468	9.26	0.2269	19434	0.0035	2843	1.218E-06	17.83	.476	15.60
1460	9.36	0.2286	20880	0.0035	2936	1.209E-06	17.57	.475	15.64
1453	9.47	0.2304	22371	0.0035	3092	1.138E-06	17.30	.475	15.65
1445	9.57	0.2322	23972	0.0033	3093	1.080E-06	17.05	.479	15.54
1438	9.66	0.2338	25464	0.0032	3104	1.037E-06	16.81	.484	15.40

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1431	9.76	0.2354	27075	0.0033	3333	9.829E-07	16.58	.526	14.15
1424	9.86	0.2370	28797	0.0033	3584	9.342E-07	16.34	.525	14.19
1417	9.97	0.2387	30660	0.0034	3865	8.925E-07	16.11	.524	14.23
1410	10.08	0.2405	32662	0.0034	4015	8.483E-07	15.88	.524	14.24
1403	10.18	0.2421	34674	0.0033	4035	8.137E-07	15.65	.529	14.10
1396	10.28	0.2438	36697	0.0033	4186	7.912E-07	15.42	.533	13.99
1389	10.39	0.2455	38861	0.0034	4683	7.225E-07	15.21	.576	12.71
1382	10.50	0.2472	41380	0.0035	5107	6.918E-07	14.98	.576	12.71
1375	10.62	0.2490	43967	0.0034	5006	6.878E-07	14.77	.575	12.75
1368	10.73	0.2506	46385	0.0032	5002	6.497E-07	14.55	.574	12.79
1361	10.84	0.2522	48969	0.0033	5375	6.084E-07	14.35	.576	12.74
1354	10.94	0.2539	51761	0.0033	5686	5.761E-07	14.14	.580	12.62
1348	11.06	0.2555	54656	0.0034	6031	5.651E-07	13.94	.584	12.51
1341	11.18	0.2573	57791	0.0034	6564	5.221E-07	13.74	.626	11.25
1334	11.29	0.2589	61220	0.0033	6695	4.910E-07	13.54	.626	11.26
1328	11.41	0.2606	64487	0.0032	6429	4.965E-07	13.36	.625	11.30
1321	11.52	0.2621	67648	0.0034	6880	4.910E-07	13.16	.625	11.30
1314	11.65	0.2639	71366	0.0035	7545	4.698E-07	12.97	.626	11.28
1307	11.77	0.2657	75193	0.0033	7559	4.410E-07	12.78	.630	11.17
1300	11.89	0.2673	78925	0.0034	7926	4.248E-07	12.59	.633	11.08
1294	12.02	0.2690	83119	0.0034	8225	4.144E-07	12.42	.637	10.97
1288	12.14	0.2707	87151	0.0032	7933	4.016E-07	12.24	.677	9.76
1281	12.25	0.2722	91052	0.0031	8178	3.794E-07	12.07	.676	9.80
1275	12.37	0.2738	95329	0.0032	8971	3.547E-07	11.91	.676	9.81
1269	12.50	0.2754	100024	0.0033	9861	3.378E-07	11.74	.675	9.84
1262	12.63	0.2771	105190	0.0035	10920	3.234E-07	11.57	.676	9.82
1255	12.77	0.2789	110943	0.0036	11230	3.180E-07	11.40	.679	9.73
1249	12.91	0.2807	116420	0.0032	10369	3.093E-07	11.23	.682	9.65
1242	13.02	0.2821	121313	0.0031	10956	2.840E-07	11.07	.685	9.56
1236	13.16	0.2838	127376	0.0034	12733	2.707E-07	10.91	.688	9.48
1230	13.30	0.2856	134046	0.0032	11732	2.739E-07	10.77	.727	8.30
1224	13.42	0.2870	139107	0.0028	11337	2.475E-07	10.62	.727	8.30
1218	13.54	0.2884	145383	0.0034	14681	2.303E-07	10.47	.727	8.31
1212	13.70	0.2904	153788	0.0037	16189	2.258E-07	10.33	.726	8.34
1205	13.85	0.2921	161571	0.0034	15466	2.214E-07	10.16	.726	8.35
1198	14.00	0.2938	169254	0.0035	16272	2.173E-07	10.01	.727	8.32
1192	14.15	0.2956	177843	0.0035	17184	2.021E-07	9.86	.732	8.17
1185	14.30	0.2973	186438	0.0034	16878	2.000E-07	9.71	.734	8.12
1179	14.45	0.2990	194721	0.0033	17192	1.894E-07	9.58	.736	8.06
1173	14.59	0.3005	203630	0.0032	18855	1.702E-07	9.44	.740	7.94
1167	14.74	0.3022	213576	0.0033	19403	1.691E-07	9.31	.777	6.82
1161	14.89	0.3038	223033	0.0031	18707	1.664E-07	9.18	.777	6.82
1154	15.03	0.3053	232282	0.0033	20699	1.598E-07	9.04	.777	6.83
1149	15.20	0.3071	243732	0.0035	22851	1.536E-07	8.92	.776	6.86
1142	15.36	0.3088	255133	0.0032	22667	1.394E-07	8.79	.775	6.89
1136	15.50	0.3103	266399	0.0033	24754	1.332E-07	8.66	.777	6.84
1130	15.68	0.3121	279887	0.0035	26868	1.315E-07	8.54	.780	6.75
1124	15.85	0.3138	293267	0.0033	26881	1.232E-07	8.41	.782	6.69
1117	16.00	0.3154	306768	0.0033	27485	1.194E-07	8.29	.784	6.64
1112	16.17	0.3171	320751	0.0033	26854	1.242E-07	8.17	.787	6.55

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1105	16.34	0.3187	333621	0.0033	26250	1.244E-07	8.05	.789	6.49
1099	16.51	0.3204	347002	0.0035	26527	1.308E-07	7.93	.828	5.29
1094	16.70	0.3222	360148	0.0032	24979	1.268E-07	7.83	.828	5.30
1087	16.84	0.3235	371980	0.0031	25453	1.212E-07	7.71	.828	5.30
1082	17.03	0.3253	385601	0.0032	22937	1.408E-07	7.61	.827	5.33
1072	17.19	0.3268	394917	0.0052	11383	4.572E-07	7.43	.827	5.34
1072	17.60	0.3305	396984	0.0024	21780	1.085E-07	7.43	.890	3.38
1063	17.44	0.3291	416697	-.0003	45049	-6.392E-09	7.27	.826	5.37
1062	17.56	0.3302	442033	0.0033	56084	5.904E-08	7.25	.826	5.38
1055	17.81	0.3324	472780	0.0048	64225	7.512E-08	7.13	.830	5.25
1049	18.11	0.3350	506258	0.0039	49222	7.884E-08	7.02	.831	5.23
1041	18.26	0.3363	522002	0.0029	38608	7.398E-08	6.89	.832	5.20
1035	18.44	0.3379	544867	0.0036	53398	6.681E-08	6.79	.835	5.11
1029	18.68	0.3399	575400	0.0038	54890	6.909E-08	6.69	.838	5.02
1023	18.89	0.3417	599757	0.0034	45988	7.368E-08	6.59	.839	4.99
1016	19.09	0.3433	621387	0.0037	37791	9.850E-08	6.48	.879	3.76
1012	19.35	0.3454	637547	0.0029	30030	9.737E-08	6.41	.878	3.79
1007	19.45	0.3462	651418	0.0015	25582	6.011E-08	6.33	.878	3.79
1003	19.54	0.3469	663129	0.0020	32826	6.240E-08	6.27	.878	3.79
999	19.70	0.3483	684243	0.0029	50602	5.721E-08	6.20	.878	3.79
993	19.91	0.3498	713731	0.0035	78794	4.485E-08	6.11	.878	3.80
986	20.16	0.3518	763037	0.0044	102157	4.342E-08	6.00	.877	3.83
979	20.49	0.3543	815889	0.0041	89836	4.610E-08	5.91	.876	3.86
972	20.71	0.3559	852873	0.0034	83078	4.075E-08	5.80	.877	3.84
965	20.94	0.3577	898967	0.0039	88630	4.348E-08	5.70	.878	3.81
960	21.23	0.3598	941503	0.0032	77971	4.053E-08	5.63	.879	3.78
954	21.38	0.3608	976938	0.0027	78959	3.430E-08	5.54	.881	3.72
949	21.61	0.3625	1020461	0.0034	92789	3.625E-08	5.47	.883	3.66
943	21.85	0.3642	1069726	0.0035	87031	4.026E-08	5.39	.883	3.66
938	22.12	0.3660	1107492	0.0031	63674	4.809E-08	5.32	.886	3.57
932	22.30	0.3672	1133400	0.0030	56271	5.286E-08	5.24	.886	3.57
926	22.55	0.3690	1163764	0.0034	73945	4.648E-08	5.17	.888	3.51
922	22.81	0.3707	1207345	0.0027	74497	3.609E-08	5.11	.888	3.51
916	22.96	0.3717	1238261	0.0024	101400	2.341E-08	5.03	.888	3.51
911	23.17	0.3731	1308744	0.0036	178706	1.988E-08	4.96	.888	3.52
906	23.51	0.3752	1416967	0.0039	180199	2.170E-08	4.89	.888	3.52
899	23.79	0.3770	1488943	0.0033	136650	2.418E-08	4.81	.888	3.52
893	24.03	0.3785	1553617	0.0035	138770	2.489E-08	4.74	.888	3.52
888	24.34	0.3804	1627713	0.0034	166765	2.037E-08	4.67	.888	3.53
882	24.59	0.3819	1720382	0.0030	181131	1.652E-08	4.60	.888	3.53
877	24.84	0.3834	1808844	0.0028	172795	1.593E-08	4.55	.888	3.53
872	25.05	0.3847	1893177	0.0028	240299	1.151E-08	4.48	.888	3.53
866	25.31	0.3862	2049143	0.0038	274423	1.398E-08	4.41	.888	3.53
860	25.71	0.3885	2167601	0.0040	185961	2.138E-08	4.35	.888	3.54
853	26.00	0.3902	2235104	0.0037	132156	2.790E-08	4.27	.888	3.54
849	26.36	0.3922	2299757	0.0029	89589	3.234E-08	4.22	.888	3.54
843	26.52	0.3931	2324693	0.0022	131121	1.693E-08	4.15	.888	3.54
839	26.77	0.3944	2430878	0.0029	284806	1.035E-08	4.11	.888	3.55
834	27.07	0.3960	2609499	0.0030	497040	6.100E-09	4.06	.888	3.55
829	27.33	0.3974	2927918	0.0028	648037	4.291E-09	4.00	.888	3.55

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
824	27.59	0.3988	3257536	0.0032	486821	6.620E-09	3.94	.888	3.55
817	27.95	0.4007	3414739	0.0042	477183	8.869E-09	3.88	.888	3.55
	28.41	0.4030	3734719						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-12A	Geometry	4PT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	72	Modulus	31.0
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.250	Notch depth	0.149
Width	0.750	Gage length	0.000
Height	0.000	Alpha ratio	1.000

Precrack Parameters

Pmax (lbs)	447.0	Stress ratio (R)	0.10
Final a (in)	0.199	Kmax	8.27

Test Parameters

Initial a (in)	0.199	Initial K	8.00
K-gradient	6.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.580650	1.002640
5.527980	-3.342220
-21.102409	2.051950
37.139400	-6.416230
-31.403311	38.265362
10.093900	-45.538799

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
7.27	0.202	0.199	-.003	1.047
9.03	0.237	0.237	0.000	1.083
11.69	0.280	0.282	0.002	1.124
15.10	0.322	0.324	0.002	1.162
17.60	0.347	0.347	-.000	1.184
20.58	0.371	0.371	0.000	1.205
24.13	0.395	0.397	0.002	1.225
28.46	0.419	0.418	-.001	1.245
37.85	0.458	0.456	-.002	1.276
51.73	0.496	0.496	0.000	1.307

Comments

Date of test: 04-02-2001

Specimen Id. TC-A-12A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	7.00	0.1965	69						
426	7.00	0.1965	274	0.0051	474	1.084E-05	7.09	.173	6.52
425	7.27	0.2017	543	0.0045	336	1.341E-05	7.07	.221	6.12
429	7.23	0.2010	610	0.0004	176	2.120E-06	7.21	.172	6.63
428	7.29	0.2020	718	0.0005	21371	2.139E-08	7.18	.173	6.60
430	7.26	0.2014	21981	0.0018	66302	2.775E-08	7.25	.163	6.74
431	7.37	0.2039	67020	0.0048	78044	6.203E-08	7.29	.162	6.78
433	7.48	0.2063	100025	0.0042	48844	8.673E-08	7.38	.162	6.87
435	7.57	0.2081	115864	0.0036	40184	8.896E-08	7.46	.163	6.94
436	7.65	0.2098	140209	0.0036	58026	6.216E-08	7.54	.163	7.01
438	7.74	0.2117	173891	0.0039	58944	6.542E-08	7.62	.161	7.10
440	7.84	0.2137	199154	0.0035	43071	8.211E-08	7.69	.161	7.17
442	7.91	0.2153	216961	0.0038	32026	1.190E-07	7.78	.161	7.25
443	8.02	0.2175	231180	0.0030	40399	7.325E-08	7.83	.162	7.29
445	8.06	0.2182	257361	0.0030	57421	5.193E-08	7.93	.161	7.39
447	8.17	0.2205	288601	0.0043	52179	8.250E-08	7.99	.160	7.46
449	8.27	0.2225	309540	0.0038	32520	1.153E-07	8.08	.159	7.55
451	8.36	0.2242	321121	0.0032	34128	9.455E-08	8.16	.161	7.61
452	8.44	0.2258	343668	0.0035	49107	7.156E-08	8.25	.162	7.68
454	8.54	0.2277	370228	0.0039	43703	8.819E-08	8.33	.160	7.77
456	8.64	0.2296	387371	0.0035	32707	1.061E-07	8.41	.159	7.86
458	8.72	0.2312	402935	0.0035	30444	1.142E-07	8.50	.160	7.93
460	8.82	0.2331	417815	0.0036	37864	9.464E-08	8.58	.161	8.00
462	8.91	0.2348	440799	0.0035	44307	7.870E-08	8.67	.161	8.08
463	9.01	0.2366	462123	0.0032	33875	9.543E-08	8.74	.160	8.16
465	9.09	0.2380	474674	0.0034	23062	1.487E-07	8.84	.160	8.25
467	9.20	0.2400	485184	0.0036	27436	1.312E-07	8.91	.161	8.31
469	9.29	0.2416	502110	0.0033	38236	8.736E-08	9.01	.160	8.41
471	9.39	0.2433	523420	0.0034	36236	9.354E-08	9.09	.160	8.48
473	9.48	0.2450	538346	0.0032	27969	1.161E-07	9.17	.160	8.56
475	9.57	0.2466	551389	0.0035	27441	1.273E-07	9.27	.159	8.66
476	9.68	0.2485	565786	0.0035	27350	1.267E-07	9.35	.160	8.73
478	9.77	0.2501	578739	0.0032	25369	1.275E-07	9.45	.160	8.82
480	9.87	0.2517	591156	0.0036	27263	1.303E-07	9.54	.160	8.90
482	9.98	0.2536	606002	0.0039	29521	1.335E-07	9.64	.161	8.99
484	10.11	0.2557	620677	0.0038	27156	1.416E-07	9.74	.161	9.08
486	10.22	0.2575	633158	0.0035	24301	1.433E-07	9.84	.161	9.18
488	10.32	0.2592	644978	0.0034	23393	1.440E-07	9.94	.161	9.27
490	10.43	0.2608	656552	0.0035	24511	1.424E-07	10.04	.160	9.37
492	10.54	0.2627	669488	0.0036	24364	1.465E-07	10.14	.160	9.46
494	10.65	0.2644	680915	0.0033	21878	1.502E-07	10.24	.160	9.55
496	10.75	0.2659	691366	0.0034	21177	1.601E-07	10.34	.160	9.65
498	10.87	0.2678	702092	0.0035	23745	1.475E-07	10.44	.160	9.74
500	10.98	0.2694	715112	0.0032	25278	1.262E-07	10.54	.160	9.83
502	11.08	0.2710	727370	0.0034	20219	1.658E-07	10.64	.161	9.92
504	11.20	0.2728	735330	0.0035	16722	2.095E-07	10.74	.161	10.01
506	11.31	0.2745	744092	0.0035	18720	1.893E-07	10.85	.160	10.13
508	11.44	0.2763	754051	0.0037	18715	1.953E-07	10.96	.160	10.23
510	11.57	0.2781	762807	0.0030	20042	1.478E-07	11.06	.160	10.32

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
512	11.65	0.2793	774093	0.0033	21359	1.552E-07	11.18	.161	10.43
514	11.80	0.2814	784166	0.0039	16301	2.371E-07	11.28	.161	10.51
516	11.92	0.2832	790393	0.0034	13891	2.483E-07	11.40	.160	10.64
518	12.05	0.2849	798056	0.0034	14347	2.359E-07	11.51	.160	10.75
520	12.17	0.2866	804740	0.0031	13381	2.326E-07	11.62	.160	10.85
522	12.27	0.2880	811438	0.0032	14292	2.247E-07	11.74	.162	10.93
524	12.40	0.2898	819031	0.0035	15438	2.276E-07	11.84	.162	11.03
526	12.54	0.2915	826875	0.0033	17929	1.859E-07	11.96	.160	11.16
528	12.66	0.2931	836961	0.0034	22094	1.557E-07	12.09	.161	11.27
530	12.80	0.2950	848969	0.0038	19583	1.922E-07	12.21	.161	11.38
532	12.95	0.2969	856544	0.0036	11078	3.245E-07	12.33	.161	11.50
535	13.08	0.2986	860047	0.0034	8492	3.946E-07	12.46	.161	11.62
537	13.21	0.3002	865036	0.0034	10104	3.357E-07	12.59	.160	11.75
539	13.35	0.3019	870151	0.0032	10205	3.181E-07	12.70	.160	11.86
541	13.47	0.3035	875241	0.0033	10979	2.987E-07	12.83	.160	11.98
543	13.62	0.3052	881130	0.0033	11371	2.935E-07	12.95	.160	12.09
545	13.75	0.3068	886612	0.0033	11366	2.876E-07	13.08	.160	12.21
547	13.89	0.3085	892496	0.0035	11950	2.899E-07	13.21	.162	12.30
549	14.04	0.3103	898562	0.0034	11413	3.004E-07	13.34	.161	12.44
551	14.18	0.3119	903909	0.0033	11205	2.964E-07	13.48	.160	12.58
553	14.33	0.3136	909767	0.0033	13495	2.446E-07	13.61	.161	12.68
555	14.47	0.3152	917404	0.0034	15473	2.194E-07	13.74	.161	12.81
557	14.63	0.3170	925241	0.0035	13581	2.576E-07	13.88	.161	12.94
559	14.79	0.3187	930985	0.0034	9498	3.559E-07	14.02	.161	13.07
561	14.93	0.3204	934739	0.0031	6701	4.656E-07	14.15	.161	13.20
563	15.07	0.3218	937686	0.0036	5892	6.063E-07	14.31	.160	13.36
565	15.27	0.3239	940630	0.0034	6643	5.100E-07	14.43	.161	13.45
568	15.39	0.3252	944329	0.0031	8053	3.903E-07	14.60	.161	13.61
569	15.56	0.3271	948683	0.0034	8615	3.945E-07	14.72	.161	13.72
572	15.71	0.3286	952943	0.0032	9330	3.475E-07	14.88	.162	13.85
574	15.88	0.3303	958013	0.0033	10692	3.118E-07	15.02	.161	14.00
576	16.04	0.3320	963635	0.0034	10565	3.176E-07	15.17	.161	14.14
578	16.21	0.3337	968577	0.0035	9115	3.791E-07	15.32	.161	14.29
580	16.39	0.3354	972749	0.0035	7453	4.698E-07	15.48	.161	14.43
582	16.57	0.3372	976030	0.0035	6625	5.319E-07	15.65	.161	14.59
585	16.75	0.3389	979374	0.0044	8061	5.421E-07	15.85	.161	14.78
587	17.03	0.3415	984091	0.0050	9639	5.230E-07	16.05	.161	14.96
591	17.29	0.3440	989013	0.0049	9866	4.989E-07	16.30	.161	15.19
594	17.56	0.3465	993956	0.0049	9889	4.928E-07	16.54	.161	15.42
597	17.83	0.3489	998902	0.0050	9873	5.060E-07	16.79	.162	15.64
600	18.13	0.3515	1003829	0.0051	9531	5.308E-07	17.04	.161	15.88
603	18.41	0.3539	1008434	0.0049	8873	5.498E-07	17.30	.162	16.11
606	18.70	0.3563	1012702	0.0049	8209	5.922E-07	17.56	.161	16.37
609	18.99	0.3588	1016642	0.0048	7722	6.198E-07	17.81	.162	16.58
612	19.28	0.3611	1020424	0.0049	7731	6.382E-07	18.08	.161	16.86
615	19.60	0.3637	1024374	0.0050	7567	6.648E-07	18.35	.162	17.09
618	19.91	0.3662	1027992	0.0049	6795	7.142E-07	18.63	.161	17.37
621	20.22	0.3686	1031169	0.0047	5964	7.866E-07	18.90	.162	17.60
624	20.53	0.3708	1033956	0.0048	5597	8.496E-07	19.18	.162	17.86
627	20.86	0.3733	1036766	0.0050	5566	8.931E-07	19.47	.161	18.15

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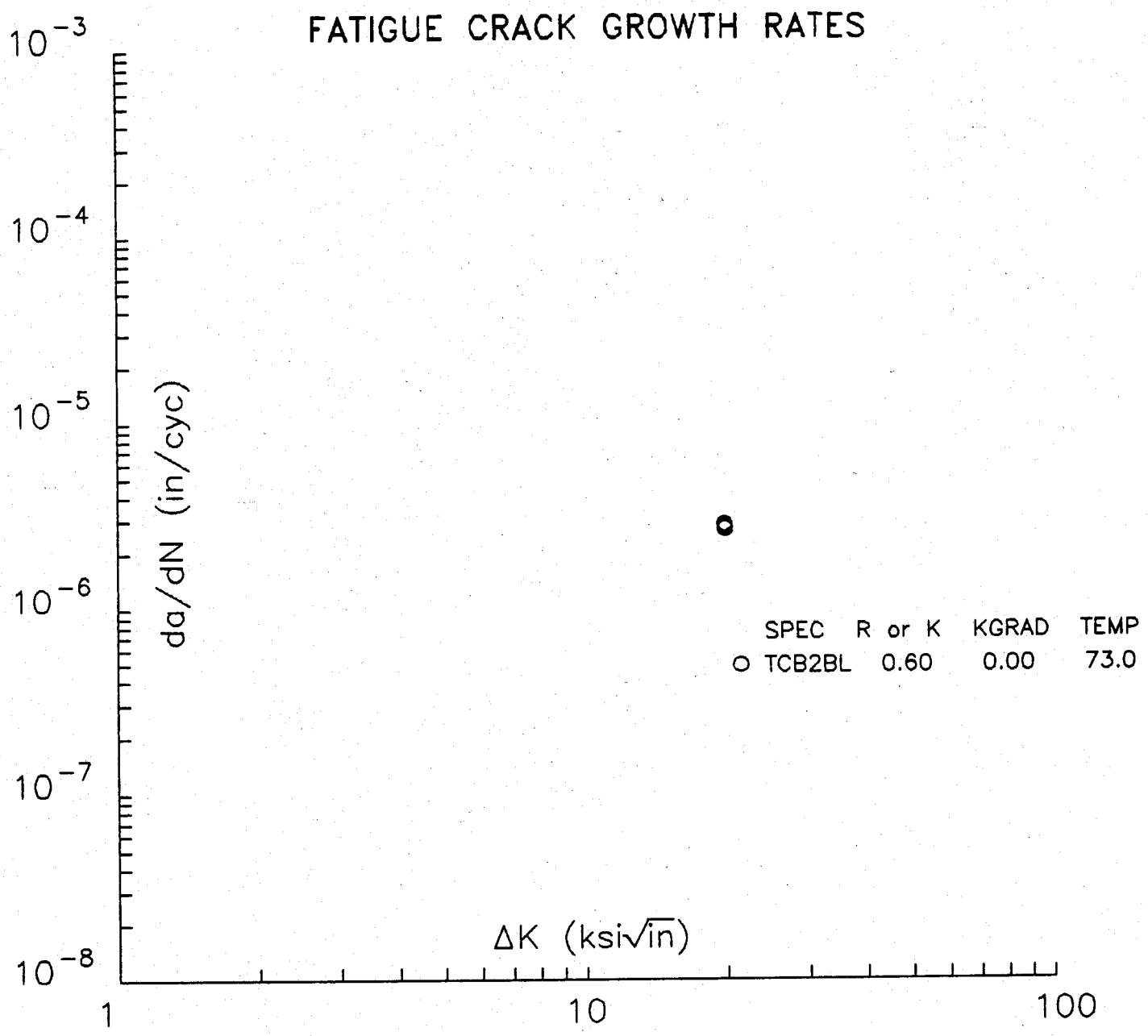
Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
630	21.20	0.3758	1039522	0.0051	5433	9.322E-07	19.77	.161	18.43
633	21.56	0.3784	1042199	0.0049	5188	9.513E-07	20.07	.161	18.71
636	21.90	0.3808	1044710	0.0046	5062	9.102E-07	20.36	.162	18.96
638	22.23	0.3830	1047261	0.0048	5194	9.193E-07	20.67	.162	19.25
641	22.61	0.3855	1049903	0.0049	4960	9.853E-07	20.97	.163	19.50
644	22.96	0.3879	1052221	0.0046	4530	1.025E-06	21.28	.163	19.79
647	23.32	0.3902	1054433	0.0047	4538	1.038E-06	21.60	.163	20.08
649	23.70	0.3926	1056759	0.0046	4340	1.065E-06	21.90	.161	20.41
652	24.06	0.3948	1058773	0.0047	3898	1.196E-06	22.23	.162	20.70
655	24.46	0.3972	1060657	0.0047	4082	1.157E-06	22.54	.165	20.91
658	24.84	0.3995	1062855	0.0050	4570	1.089E-06	22.91	.163	21.30
660	25.30	0.4022	1065227	0.0051	4398	1.150E-06	23.24	.164	21.59
663	25.71	0.4046	1067253	0.0046	3880	1.195E-06	23.60	.165	21.90
666	26.12	0.4069	1069106	0.0048	3706	1.282E-06	23.96	.168	22.15
669	26.57	0.4093	1070959	0.0048	3453	1.392E-06	24.31	.167	22.50
671	27.01	0.4117	1072559	0.0047	3029	1.549E-06	24.68	.169	22.79
674	27.46	0.4140	1073988	0.0046	2771	1.653E-06	25.03	.165	23.23
676	27.89	0.4162	1075331	0.0048	3040	1.575E-06	25.42	.164	23.61
679	28.40	0.4188	1077028	0.0049	3193	1.522E-06	25.79	.168	23.84
681	28.87	0.4211	1078523	0.0042	2454	1.721E-06	26.15	.168	24.18
684	29.27	0.4230	1079482	0.0042	2092	2.030E-06	26.54	.168	24.53
686	29.76	0.4254	1080615	0.0047	2258	2.090E-06	26.90	.169	24.84
688	30.28	0.4277	1081740	0.0048	2118	2.260E-06	27.30	.167	25.27
691	30.81	0.4301	1082733	0.0046	1987	2.323E-06	27.70	.170	25.55
693	31.31	0.4324	1083727	0.0047	1944	2.398E-06	28.13	.169	25.97
695	31.87	0.4348	1084677	0.0048	1902	2.516E-06	28.54	.170	26.32
698	32.43	0.4371	1085629	0.0048	1909	2.499E-06	28.99	.166	26.86
700	33.02	0.4396	1086585	0.0048	1782	2.689E-06	29.42	.164	27.33
702	33.60	0.4419	1087410	0.0045	1631	2.760E-06	29.85	.167	27.63
704	34.14	0.4441	1088216	0.0044	1581	2.769E-06	30.30	.167	28.04
706	34.73	0.4463	1088992	0.0041	1413	2.891E-06	30.68	.167	28.40
708	35.21	0.4482	1089629	0.0041	1419	2.886E-06	31.13	.168	28.77
710	35.82	0.4504	1090411	0.0051	1706	2.968E-06	31.59	.169	29.17
712	36.60	0.4532	1091334	0.0054	1701	3.204E-06	32.09	.170	29.60
714	37.35	0.4559	1092112	0.0042	1599	2.597E-06	32.54	.170	30.01
716	37.79	0.4574	1092933	0.0046	1601	2.849E-06	33.14	.166	30.71
718	38.70	0.4604	1093713	0.0051	1327	3.877E-06	33.52	.166	31.07
720	39.34	0.4625	1094259	0.0041	1014	4.093E-06	34.08	.167	31.54
721	39.99	0.4646	1094727	0.0039	943	4.129E-06	34.51	.164	32.06
723	40.57	0.4664	1095202	0.0043	1086	3.974E-06	35.02	.164	32.53
725	41.39	0.4689	1095813	0.0052	1156	4.475E-06	35.54	.164	33.01
726	42.29	0.4716	1096359	0.0048	1002	4.774E-06	36.07	.165	33.46
728	43.01	0.4737	1096815	0.0045	978	4.587E-06	36.67	.165	34.02
730	43.86	0.4761	1097337	0.0047	973	4.782E-06	37.19	.165	34.50
731	44.68	0.4783	1097787	0.0043	901	4.792E-06	37.73	.165	35.01
732	45.45	0.4804	1098237	0.0043	918	4.643E-06	38.28	.166	35.48
734	46.29	0.4826	1098705	0.0044	935	4.665E-06	38.81	.341	28.42
735	47.13	0.4847	1099172	0.0045	917	4.949E-06	39.40	.336	29.07
736	48.09	0.4871	1099622	0.0046	881	5.218E-06	39.96	.509	21.82
738	49.00	0.4893	1100054	0.0045	863	5.263E-06	40.58	.501	22.49

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
739	49.99	0.4917	1100485	0.0046	971	4.721E-06	41.18	.501	22.82
740	50.97	0.4939	1101024	0.0058	930	6.215E-06	41.98	.641	16.73
741	52.61	0.4974	1101415	0.0043	704	6.087E-06	42.40	.687	14.75
742	52.99	0.4982	1101728	0.0030	770	3.835E-06	43.20	.676	15.55
743	54.10	0.5004	1102185	0.0042	790	5.377E-06	43.61	.611	18.85
	55.17	0.5025	1102519						

Appendix B.
Phase B–Constant ΔK Test TC-B-2B


FATIGUE CRACK GROWTH RATES
10^-3
10^-4
10^-5
10^-6
10^-7
10^-8
da/dN (in/cyc)
ΔK (ksi√in)
1
10
100
SPEC R or K KGRAD TEMP
O TCB2BL 0.60 0.00 73.0

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCB2BL	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	73	Modulus	28.6
Environment	Lab Air		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	4484.0	Stress ratio (R)	0.60
Final a (in)	0.617	Kmax	49.85

Test Parameters

Initial a (in)	0.617	Initial K	50.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
17.98	0.616	0.617	0.001	0.999
19.22	0.677	0.676	-.001	1.001
20.57	0.739	0.736	-.003	1.002
22.05	0.801	0.808	0.007	1.004
23.65	0.863	0.859	-.004	1.006

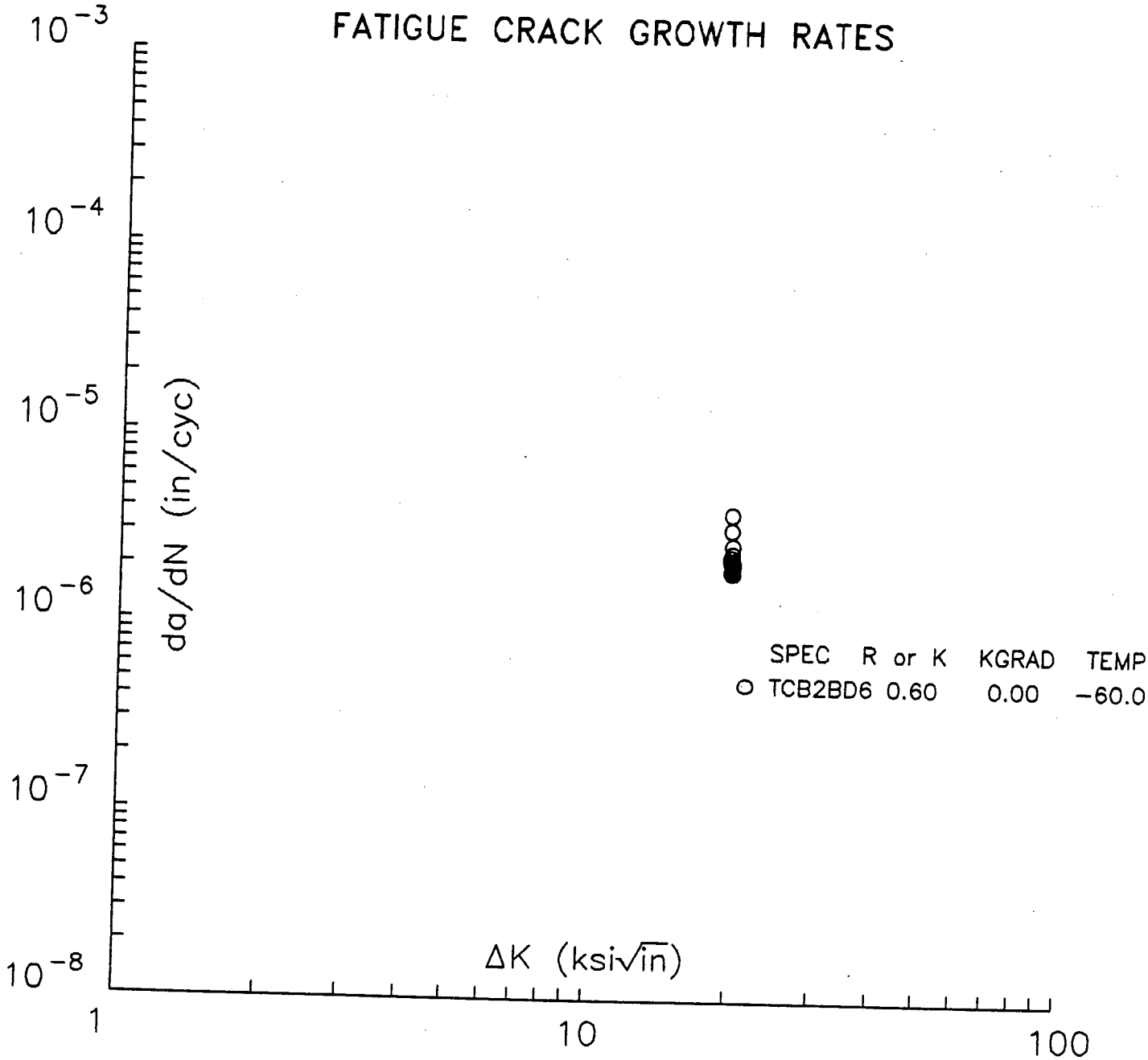
Comments

Date of test: 04-27-2001

Lab Air
40-70% RH

Specimen Id. TC82BL

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	17.98	0.6158	4						
4448	18.13	0.6233	2728	0.0231	8144	2.833E-06	19.99	.676	16.19
4399	18.43	0.6389	8148	0.0310	10872	2.855E-06	19.99	.676	16.19
4336	18.74	0.6543	13600	0.0308	10924	2.820E-06	20.00	.676	16.20
4274	19.06	0.6697	19072	0.0309	10936	2.825E-06	20.01	.676	16.21
4215	19.38	0.6852	24536	0.0308	10998	2.803E-06	20.01	.676	16.21
4155	19.71	0.7005	30070	0.0308	11173	2.761E-06	20.02	.676	16.22
4098	20.05	0.7161	35709	0.0310	11368	2.729E-06	20.03	.676	16.22
4041	20.40	0.7316	41438	0.0313	11369	2.750E-06	20.03	.676	16.23
3986	20.76	0.7473	47078	0.0313	11250	2.780E-06	20.04	.676	16.23
3931	21.12	0.7628	52688	0.0308	11267	2.736E-06	20.05	.676	16.24
3878	21.49	0.7782	58345	0.0308	11454	2.687E-06	20.05	.676	16.24
3826	21.86	0.7936	64142	0.0312	11585	2.695E-06	20.06	.676	16.25
3775	22.26	0.8094	69930	0.0314	11380	2.755E-06	20.06	.676	16.25
3724	22.65	0.8250	75522	0.0309	11184	2.763E-06	20.07	.676	16.26
3675	23.05	0.8403	81114	0.0306	11184	2.737E-06	20.07	.676	16.26
	23.46	0.8556	86706						


FATIGUE CRACK GROWTH RATES
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
da/dN (in/cyc)
SPEC R or K KGRAD TEMP
TCB2BD6 0.60 0.00 −60.0
ΔK (ksi√in)
1
10
100

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCB2BD6	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	-60	Modulus	30.8
Environment	21%RH		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	4484.0	Stress ratio (R)	0.60
Final a (in)	0.617	Kmax	49.85

Test Parameters

Initial a (in)	0.860	Initial K	50.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
23.72	0.864	0.859	-.005	1.005
26.32	0.945	0.951	0.006	0.997
29.38	1.029	1.032	0.003	0.989
31.67	1.085	1.080	-.005	0.983

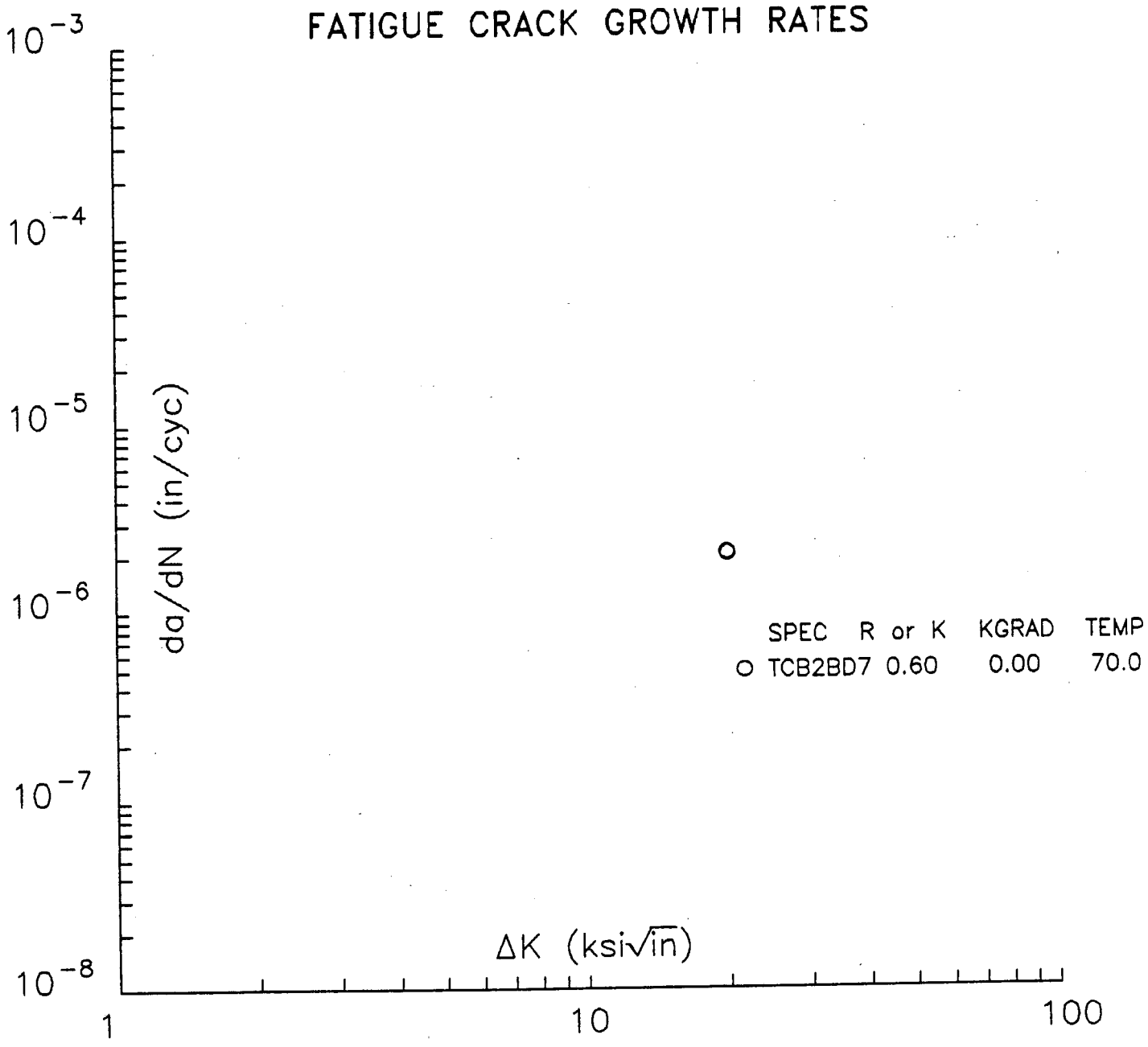
Comments

Date of test: 05-03-2001

Dry Air
-60°F

Specimen Id. TCB28D6 Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	23.59	0.8595	47						
3575	23.87	0.8691	3392	0.0224	10249	2.184E-06	20.05	.676	16.24
3537	24.27	0.8819	10296	0.0267	13896	1.921E-06	20.04	.676	16.23
3493	24.70	0.8958	17288	0.0279	13704	2.039E-06	20.02	.676	16.21
3448	25.15	0.9098	24000	0.0279	13266	2.104E-06	20.00	.676	16.20
3403	25.61	0.9237	30554	0.0279	13012	2.145E-06	19.98	.676	16.18
3365	26.08	0.9377	37012	0.0242	11127	2.178E-06	19.96	.676	16.17
3316	26.43	0.9480	41681	0.0279	10429	2.671E-06	19.94	.676	16.15
3280	27.04	0.9656	47441	0.0316	13032	2.425E-06	19.92	.676	16.14
3232	27.54	0.9796	54713	0.0279	14355	1.940E-06	19.90	.676	16.12
3191	28.04	0.9934	61796	0.0281	14178	1.983E-06	19.89	.676	16.11
3150	28.58	1.0077	68891	0.0284	14334	1.984E-06	19.87	.676	16.09
3098	29.12	1.0219	76130	0.0359	11102	3.234E-06	19.84	.676	16.07
3069	29.97	1.0436	79993	0.0286	7301	3.921E-06	19.83	.676	16.06
3017	30.25	1.0505	83431	0.0222	9553	2.329E-06	19.81	.676	16.04
2990	30.87	1.0658	89546	0.0279	12568	2.223E-06	19.80	.676	16.03
	31.40	1.0784	95999						


FATIGUE CRACK GROWTH RATES
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
da/dN (in/cyc)
SPEC R or K KGRAD TEMP
O TCB2BD7 0.60 0.00 70.0
ΔK (ksi√in)
1
10
100

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCB2BD7	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	70	Modulus	29.8
Environment	21%RH		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	4484.0	Stress ratio (R)	0.60
Final a (in)	0.617	Kmax	49.85

Test Parameters

Initial a (in)	1.080	Initial K	50.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
30.95	1.080	1.080	0.000	1.000
34.69	1.157	1.157	-.000	0.984

Comments

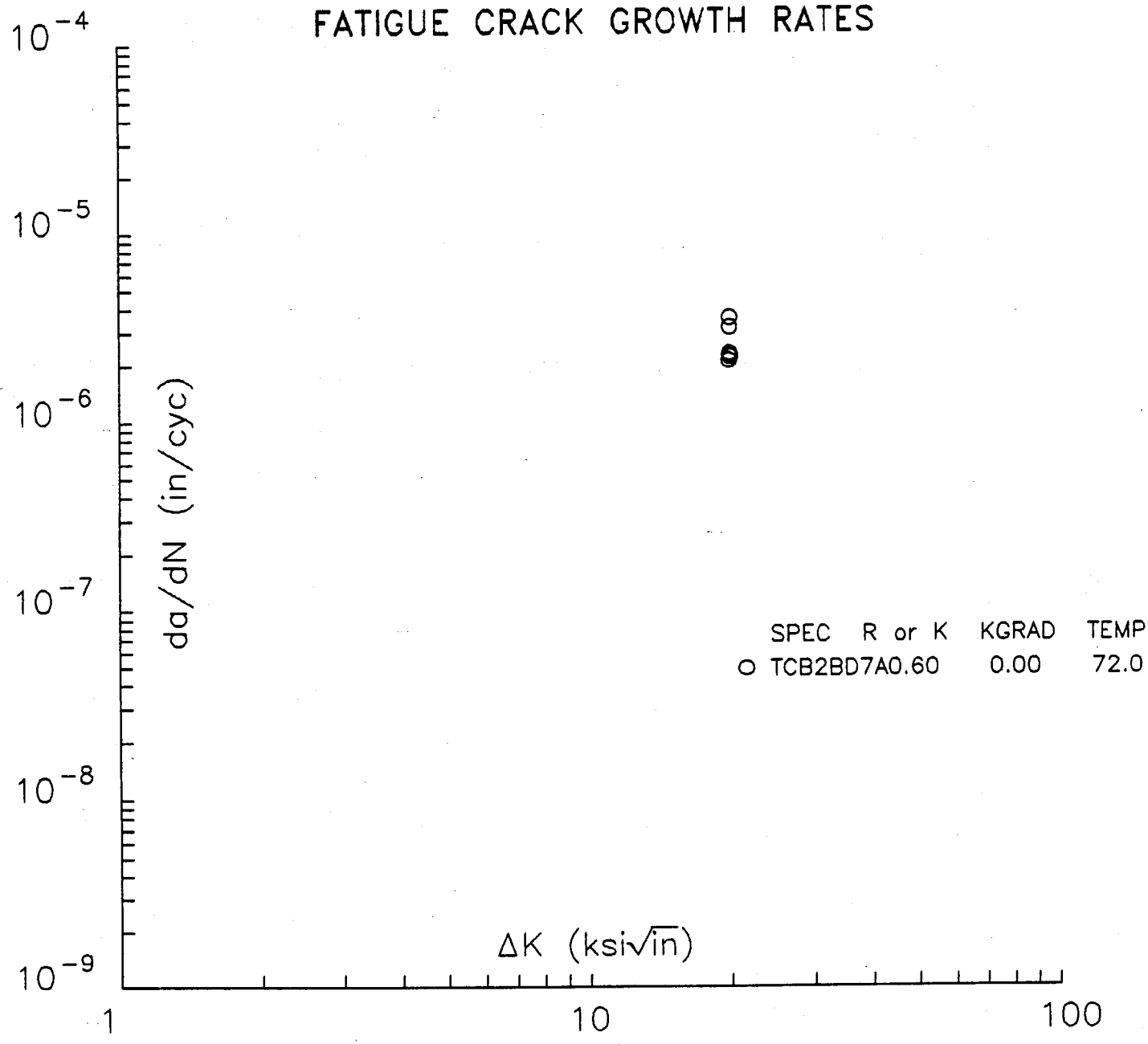
Date of test: 05-08-2001

70°-dry air

17% RH

Specimen Id. TCB2BD7

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	34.32	1.1498	297						
2831	31.83	1.0991	3584	-.0379	9497	-3.992E-06	19.85	.676	16.08
2886	32.44	1.1119	9794	0.0257	12498	2.060E-06	19.90	.676	16.12
2849	33.07	1.1248	16082	0.0259	12464	2.082E-06	19.87	.676	16.09
2812	33.71	1.1379	22258	0.0258	12352	2.090E-06	19.83	.676	16.06
	34.36	1.1507	28434						


FATIGUE CRACK GROWTH RATES
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
da/dN (in/cyc)
ΔK (ksi√in)
1
10
100
SPEC R or K KGRAD TEMP
O TCB2BD7A0.60 0.00 72.0

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCB2BD7A	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	72	Modulus	29.8
Environment	9 % R.H.		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	4484.0	Stress ratio (R)	0.60
Final a (in)	0.617	Kmax	49.85

Test Parameters

Initial a (in)	1.308	Initial K	50.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

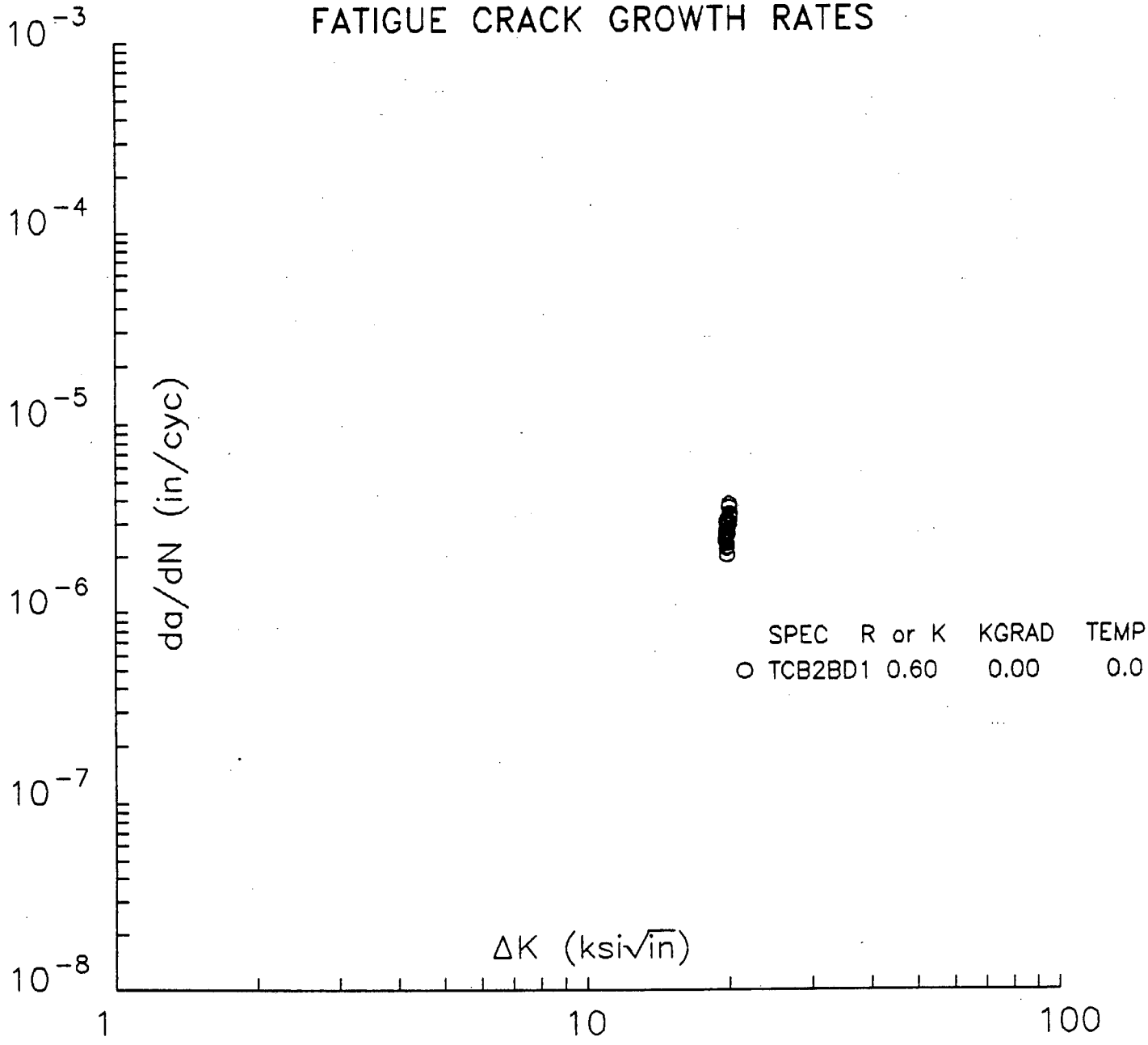
EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
34.19	1.157	1.157	0.000	0.997
38.40	1.242	1.245	0.003	0.992
41.60	1.299	1.291	-.008	0.988
43.94	1.337	1.342	0.005	0.985

Comments

Date of test: 05-21-2001

Specimen Id. TCB28D7A

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	34.19	1.1567	39						
2763	34.44	1.1620	2338	0.0177	7784	2.273E-06	19.95	.675	16.21
2738	35.02	1.1744	7823	0.0267	11942	2.232E-06	19.94	.675	16.20
2704	35.71	1.1887	14280	0.0287	12849	2.234E-06	19.93	.675	16.19
2669	36.42	1.2031	20672	0.0287	12786	2.241E-06	19.92	.675	16.18
2633	37.14	1.2174	27066	0.0286	12852	2.227E-06	19.90	.675	16.17
2604	37.88	1.2317	33524	0.0243	10465	2.320E-06	19.89	.675	16.16
2564	38.40	1.2416	37531	0.0288	7984	3.607E-06	19.88	.676	16.10
2534	39.42	1.2605	41508	0.0331	10321	3.209E-06	19.87	.675	16.14
2495	40.21	1.2748	47852	0.0288	12848	2.242E-06	19.85	.675	16.13
2461	41.04	1.2893	54356	0.0290	13657	2.127E-06	19.84	.676	16.07
2428	41.89	1.3038	61510	0.0283	13344	2.123E-06	19.82	.676	16.06
	42.72	1.3176	67700						


FATIGUE CRACK GROWTH RATES
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
da/dN (in/cyc)
SPEC R or K KGRAD TEMP
O TCB2BD1 0.60 0.00 0.0
ΔK (ksi√in)
1
10
100

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCB2BD1	Geometry	CT
Contract #	18.3630	Orientation	LT
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	0	Modulus	29.1
Environment			

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	0.000

Precrack Parameters

Pmax (lbs)	4484.0	Stress ratio (R)	0.60
Final a (in)	0.617	Kmax	49.85

Test Parameters

Initial a (in)	1.341	Initial K	50.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
43.51	1.324	1.342	0.018	0.977
49.14	1.414	1.410	-.004	0.980
54.80	1.492	1.474	-.018	0.983
62.87	1.585	1.587	0.001	0.986
210.78	2.204	2.205	0.002	1.008

Comments

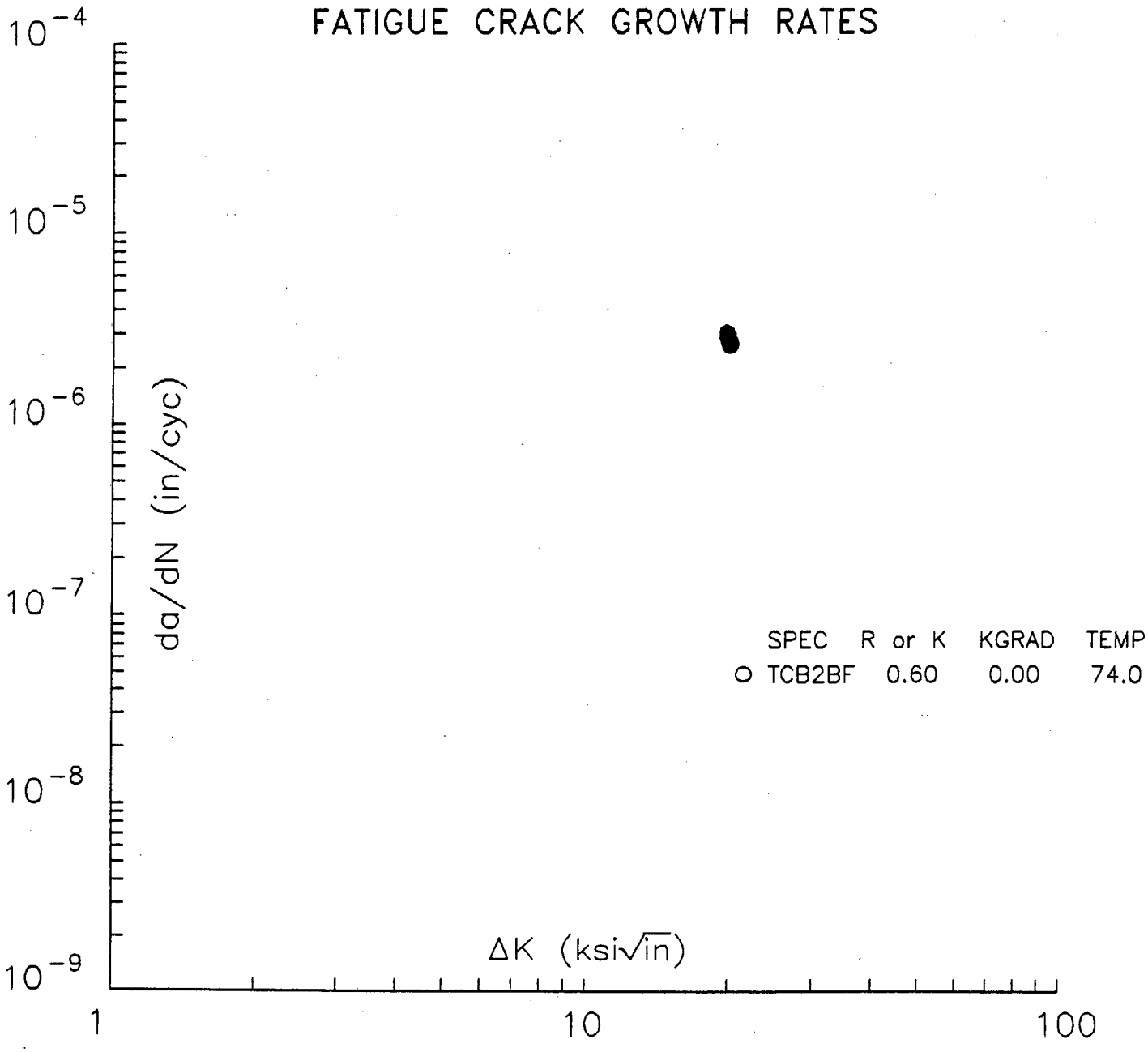
Date of test: 05-30-2001
Test seg. 140 F 10% R.H. 0 cycles to 105836 cycles
Test seg 75 F 45% R.H. 105836 cycles to 189469 cycles
Test seg 75 F 95% R.H. 189469 cycles to 278389 cycles
Test seg 140 F 85% R.H. 278389 cycles to 320215 cycles

Specimen Id. TCB2BD1 Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	43.51	1.3242	11						
2341	43.96	1.3320	3141	0.0233	9461	2.468E-06	19.69	.676	15.95
2316	44.88	1.3476	9472	0.0310	12790	2.426E-06	19.70	.676	15.95
2283	45.82	1.3631	15931	0.0311	13007	2.388E-06	19.70	.676	15.96
2251	46.80	1.3786	22479	0.0310	13098	2.364E-06	19.71	.676	15.96
2220	47.79	1.3940	29029	0.0296	12436	2.379E-06	19.72	.676	15.97
2186	48.72	1.4082	34915	0.0317	11738	2.702E-06	19.72	.676	15.98
2156	49.92	1.4258	40767	0.0327	12276	2.665E-06	19.73	.676	15.98
2122	50.98	1.4409	47190	0.0307	13048	2.357E-06	19.74	.676	15.99
2091	52.11	1.4565	53815	0.0309	13284	2.330E-06	19.74	.676	15.99
2060	53.25	1.4719	60475	0.0299	12779	2.337E-06	19.75	.676	16.00
2025	54.36	1.4864	66594	0.0337	11169	3.019E-06	19.76	.676	16.00
1998	55.88	1.5056	71643	0.0324	10630	3.046E-06	19.76	.676	16.01
1963	56.96	1.5188	77224	0.0285	12215	2.336E-06	19.77	.676	16.01
1934	58.25	1.5341	83858	0.0312	13330	2.342E-06	19.78	.676	16.02
1904	59.62	1.5500	90554	0.0315	13310	2.366E-06	19.78	.676	16.02
1873	61.03	1.5656	97168	0.0314	14374	2.184E-06	19.79	.676	16.03
1842	62.48	1.5814	104929	0.0311	15466	2.012E-06	19.80	.676	16.04
1812	63.96	1.5967	112635	0.0311	13976	2.224E-06	19.80	.676	16.04
1782	65.51	1.6125	118905	0.0311	12256	2.536E-06	19.81	.676	16.05
1752	67.08	1.6278	124890	0.0308	11974	2.570E-06	19.82	.676	16.05
1722	68.71	1.6432	130879	0.0311	11973	2.598E-06	19.82	.676	16.06
1693	70.43	1.6589	136864	0.0307	11685	2.626E-06	19.83	.677	16.01
1663	72.13	1.6739	142564	0.0304	11400	2.663E-06	19.84	.677	16.02
1634	73.93	1.6893	148264	0.0312	11685	2.666E-06	19.85	.677	16.03
1605	75.85	1.7051	154249	0.0316	11970	2.640E-06	19.85	.677	16.03
1576	77.85	1.7209	160234	0.0309	11685	2.647E-06	19.86	.677	16.04
1547	79.83	1.7360	165934	0.0305	11400	2.679E-06	19.87	.677	16.04
1519	81.92	1.7514	171634	0.0306	11400	2.689E-06	19.87	.677	16.05
1489	84.07	1.7667	177334	0.0320	11160	2.868E-06	19.88	.677	16.05
1462	86.53	1.7834	182794	0.0306	10538	2.904E-06	19.89	.676	16.11
1433	88.64	1.7973	187871	0.0293	10094	2.903E-06	19.90	.676	16.12
1406	91.08	1.8127	192887	0.0312	10260	3.042E-06	19.90	.677	16.07
1378	93.67	1.8285	198131	0.0308	10488	2.935E-06	19.91	.677	16.08
1350	96.25	1.8435	203375	0.0301	10488	2.872E-06	19.92	.677	16.08
1323	98.94	1.8586	208619	0.0308	10716	2.875E-06	19.92	.677	16.09
1296	101.86	1.8743	214091	0.0308	10716	2.877E-06	19.93	.677	16.10
1269	104.79	1.8894	219335	0.0302	10488	2.881E-06	19.94	.677	16.10
1242	107.85	1.9045	224579	0.0310	10716	2.895E-06	19.95	.677	16.11
1215	111.21	1.9205	230051	0.0312	10716	2.909E-06	19.95	.677	16.11
1188	114.58	1.9357	235295	0.0305	10488	2.909E-06	19.96	.677	16.12
1162	118.10	1.9510	240539	0.0306	10488	2.921E-06	19.97	.677	16.13
1136	121.81	1.9663	245783	0.0301	10260	2.931E-06	19.98	.677	16.13
1110	125.53	1.9810	250799	0.0302	10260	2.939E-06	19.99	.677	16.14
1084	129.62	1.9965	256043	0.0310	10488	2.958E-06	19.99	.677	16.14
1059	133.94	2.0121	261287	0.0310	10488	2.952E-06	20.00	.677	16.15
1033	138.42	2.0275	266531	0.0307	10488	2.931E-06	20.01	.677	16.16
1008	143.12	2.0428	271775	0.0301	10032	3.003E-06	20.02	.677	16.16
981	147.87	2.0576	276563	0.0322	8892	3.619E-06	20.02	.677	16.17

Specimen Id. TCB2BD1

Pmax (lbs)	Ev8/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
958	153.77	2.0750	280667	0.0310	8294	3.741E-06	20.03	.676	16.22
932	158.64	2.0886	284857	0.0285	8740	3.258E-06	20.04	.677	16.18
910	164.21	2.1035	289407	0.0294	9100	3.235E-06	20.05	.677	16.19
886	169.97	2.1181	293957	0.0302	9282	3.257E-06	20.05	.677	16.19
862	176.49	2.1337	298689	0.0308	9282	3.315E-06	20.06	.677	16.20
839	183.16	2.1488	303239	0.0301	9100	3.311E-06	20.07	.677	16.21
815	190.14	2.1638	307789	0.0307	9282	3.313E-06	20.08	.677	16.21
792	197.91	2.1796	312521	0.0307	9282	3.310E-06	20.08	.677	16.22
	205.75	2.1945	317071						


FATIGUE CRACK GROWTH RATES
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
da/dN (in/cyc)
SPEC R or K KGRAD TEMP
O TCB2BF 0.60 0.00 74.0
ΔK (ksi√in)
1
10
100

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCB2BF	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	74	Modulus	29.0
Environment	LAB AIR		

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.610
Width	3.007	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	4484.0	Stress ratio (R)	0.60
Final a (in)	0.617	Kmax	49.85

Test Parameters

Initial a (in)	2.205	Initial K	50.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
213.42	2.209	2.205	-.004	1.010
282.71	2.302	2.309	0.007	0.996
370.94	2.381	2.378	-.003	0.983

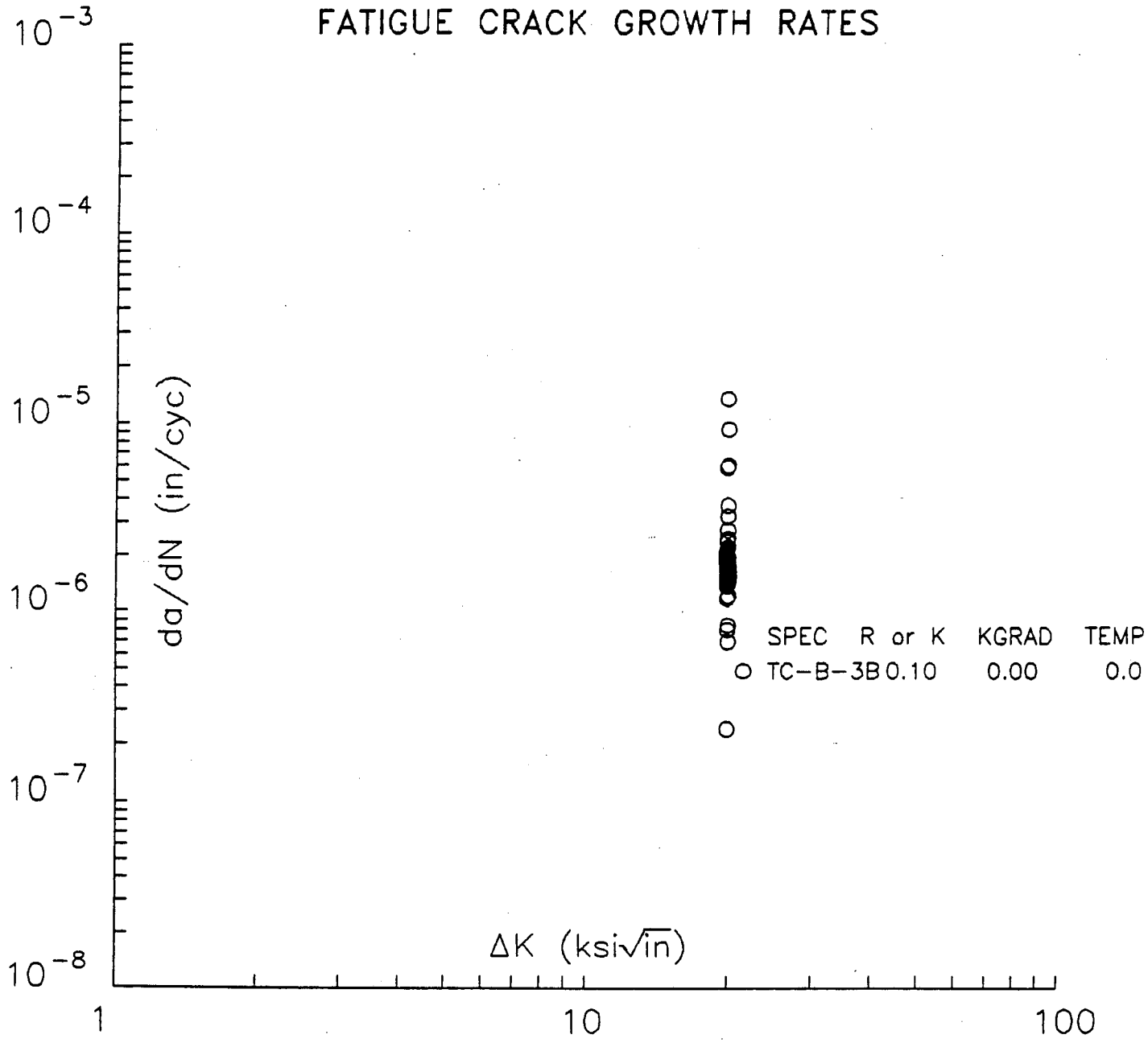
Comments

Date of test: 08-02-2001
Test Seg 8 Room Temp Lab Air

Specimen Id. TC82BF

Pmax (lbs)	EvB/P	a (in)	N (Xi)	da (in)	dN (Xi)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	213.11	2.2087	6						
744	214.56	2.2111	897	0.0077	2820	2.721E-06	20.14	.676	16.31
737	217.83	2.2164	2825	0.0110	4080	2.694E-06	20.13	.677	16.25
729	221.47	2.2221	4977	0.0113	4280	2.651E-06	20.12	.677	16.24
720	225.12	2.2277	7105	0.0114	4286	2.668E-06	20.10	.677	16.23
711	229.00	2.2335	9263	0.0115	4300	2.665E-06	20.09	.677	16.22
702	232.85	2.2392	11405	0.0113	4287	2.636E-06	20.08	.677	16.21
693	236.80	2.2448	13550	0.0114	4296	2.662E-06	20.06	.677	16.20
685	240.94	2.2506	15701	0.0114	4293	2.663E-06	20.05	.677	16.19
676	245.09	2.2563	17843	0.0116	4354	2.654E-06	20.04	.677	16.18
667	249.53	2.2622	20055	0.0118	4348	2.706E-06	20.02	.677	16.17
658	254.05	2.2680	22191	0.0115	4114	2.793E-06	20.01	.677	16.16
650	258.51	2.2736	24169	0.0113	4017	2.818E-06	20.00	.677	16.15
641	263.13	2.2793	26208	0.0115	4083	2.811E-06	19.98	.677	16.14
633	267.95	2.2851	28252	0.0115	4088	2.814E-06	19.97	.677	16.13
624	272.84	2.2908	30296	0.0114	4088	2.783E-06	19.96	.677	16.12
615	277.80	2.2965	32340	0.0121	4229	2.856E-06	19.94	.677	16.10
608	283.60	2.3029	34525	0.0112	3902	2.878E-06	19.93	.677	16.10
599	288.05	2.3077	36243	0.0107	3702	2.888E-06	19.92	.677	16.08
591	293.63	2.3136	38227	0.0117	3906	2.997E-06	19.91	.677	16.07
583	299.31	2.3194	40148	0.0115	3860	2.980E-06	19.89	.677	16.06
575	305.00	2.3251	42087	0.0115	3973	2.896E-06	19.88	.677	16.05
567	311.00	2.3309	44121	0.0118	4089	2.874E-06	19.87	.677	16.04
558	317.28	2.3369	46176	0.0118	4057	2.906E-06	19.85	.677	16.03
550	323.67	2.3427	48178	0.0118	4004	2.943E-06	19.84	.677	16.02
542	330.31	2.3487	50180	0.0115	3927	2.921E-06	19.83	.676	16.06
534	336.72	2.3542	52105	0.0112	3850	2.919E-06	19.81	.677	16.00
527	343.47	2.3599	54030	0.0114	3927	2.912E-06	19.80	.676	16.04
519	350.49	2.3656	56032	0.0117	3927	2.989E-06	19.79	.677	15.98
511	358.02	2.3716	57957	0.0118	3850	3.066E-06	19.77	.677	15.97
	365.57	2.3774	59882						

PHASE B–Constant ΔK Test TC-B-3B


FATIGUE CRACK GROWTH RATES
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
da/dN (in/cyc)
SPEC R or K KGRAD TEMP
TC-B-3B 0.10 0.00 0.0
ΔK (ksi√in)
1
10
100

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-B-3B	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	0	Modulus	28.4
Environment			

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.592
Width	3.003	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	1990.0	Stress ratio (R)	0.10
Final a (in)	0.615	Kmax	22.12

Test Parameters

Initial a (in)	0.615	Initial K	22.20
K-gradient	0.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
17.97	0.610	0.614	0.005	0.994
22.50	0.810	0.808	-.002	0.996
27.38	0.976	0.972	-.004	0.997
34.82	1.170	1.171	0.001	0.998
45.36	1.369	1.369	0.000	0.999
56.03	1.517	1.513	-.004	1.000
72.58	1.683	1.686	0.003	1.001
149.16	2.059	2.060	0.000	1.004

Comments

Date of test: 07-03-2001

Seg 1	75 F 47% RH	0 to 100896 cycles
Seg 2	-60 F Dry	100896 to 201888 cycles
Seg 3	75 F 10 % RH	201888 to 305448 cycles
Seg 4	140 F 10% RH	305448 to 418718 cycles
Seg 5	74 F 47% RH	418718 to 513708 cycles
Seg 6	74 F 98% RH	513708 to 618362 cycles
Seg 7	140 F 98% RH	618362 to 718782 cycles
Seg 8	74 F 47% RH	718782 to 822883 cycles

Specimen Id. TC-B-38 Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	17.97	0.6096	4						
1980	18.13	0.6177	3408	0.0177	8280	2.140E-06	19.88	.176	18.20
1966	18.32	0.6273	8284	0.0156	7790	2.002E-06	19.88	.176	18.20
1952	18.44	0.6332	11198	0.0120	5836	2.055E-06	19.88	.176	18.20
1940	18.56	0.6393	14119	0.0122	6066	2.011E-06	19.88	.176	18.20
1929	18.68	0.6454	17264	0.0123	6237	1.968E-06	19.88	.176	18.20
1918	18.81	0.6516	20356	0.0123	6058	2.024E-06	19.88	.176	18.20
1907	18.94	0.6577	23322	0.0123	6042	2.044E-06	19.88	.176	18.21
1896	19.07	0.6639	26398	0.0122	6172	1.975E-06	19.89	.176	18.21
1885	19.20	0.6699	29494	0.0123	6216	1.977E-06	19.89	.176	18.21
1874	19.33	0.6762	32614	0.0125	6240	1.997E-06	19.89	.176	18.21
1864	19.46	0.6824	35734	0.0120	6120	1.959E-06	19.89	.176	18.21
1853	19.59	0.6882	38734	0.0119	5880	2.019E-06	19.89	.176	18.21
1843	19.72	0.6942	41614	0.0120	5880	2.045E-06	19.89	.176	18.21
1833	19.86	0.7002	44614	0.0122	6120	2.001E-06	19.89	.176	18.21
1823	20.00	0.7065	47734	0.0124	6120	2.028E-06	19.89	.177	18.19
1812	20.13	0.7126	50734	0.0121	6000	2.011E-06	19.90	.176	18.22
1802	20.27	0.7185	53734	0.0119	6000	1.983E-06	19.90	.177	18.19
1793	20.41	0.7245	56734	0.0120	6000	1.999E-06	19.90	.178	18.17
1783	20.54	0.7305	59734	0.0121	6000	2.013E-06	19.90	.183	18.06
1773	20.69	0.7366	62734	0.0121	6000	2.015E-06	19.90	.184	18.04
1764	20.83	0.7426	65734	0.0122	6240	1.952E-06	19.90	.185	18.03
1754	20.97	0.7488	68974	0.0122	6360	1.912E-06	19.90	.184	18.04
1745	21.12	0.7548	72094	0.0120	6240	1.917E-06	19.90	.185	18.03
1735	21.26	0.7607	75214	0.0124	6360	1.945E-06	19.90	.184	18.04
1726	21.42	0.7671	78454	0.0123	6240	1.979E-06	19.90	.185	18.02
1716	21.56	0.7731	81454	0.0118	6120	1.929E-06	19.91	.186	18.00
1707	21.71	0.7790	84574	0.0120	6480	1.852E-06	19.91	.186	18.00
1698	21.86	0.7851	87934	0.0121	6480	1.864E-06	19.91	.189	17.93
1689	22.01	0.7910	91054	0.0119	6120	1.944E-06	19.91	.191	17.90
1680	22.16	0.7970	94054	0.0121	6240	1.939E-06	19.91	.192	17.87
1671	22.32	0.8031	97294	0.0131	5980	2.193E-06	19.91	.192	17.88
1655	22.50	0.8101	100034	0.0216	3643	5.942E-06	19.91	.193	17.85
1651	22.89	0.8248	100937	0.0140	1018	1.374E-05	19.91	.241	16.80
1639	22.87	0.8241	101051	0.0011	4522	2.422E-07	19.91	.217	17.33
1634	22.91	0.8259	105458	0.0091	11207	8.140E-07	19.91	.229	17.06
1629	23.11	0.8332	112258	0.0137	11498	1.189E-06	19.91	.241	16.80
1619	23.28	0.8395	116956	0.0124	8937	1.389E-06	19.92	.241	16.80
1610	23.45	0.8456	121195	0.0122	8321	1.462E-06	19.92	.250	16.60
1602	23.61	0.8517	125277	0.0122	8007	1.520E-06	19.92	.248	16.65
1594	23.78	0.8578	129202	0.0119	7693	1.552E-06	19.92	.253	16.54
1585	23.95	0.8636	132970	0.0118	7536	1.570E-06	19.92	.250	16.60
1577	24.12	0.8696	136738	0.0121	7693	1.573E-06	19.92	.252	16.55
1569	24.29	0.8757	140663	0.0124	7850	1.579E-06	19.92	.246	16.69
1561	24.47	0.8820	144588	0.0121	7536	1.607E-06	19.92	.252	16.55
1553	24.64	0.8879	148199	0.0118	7222	1.629E-06	19.92	.248	16.64
1545	24.81	0.8938	151810	0.0119	7379	1.617E-06	19.92	.245	16.71
1537	24.99	0.8998	155578	0.0121	7536	1.605E-06	19.92	.245	16.72
1529	25.17	0.9059	159346	0.0123	7536	1.633E-06	19.92	.245	16.71

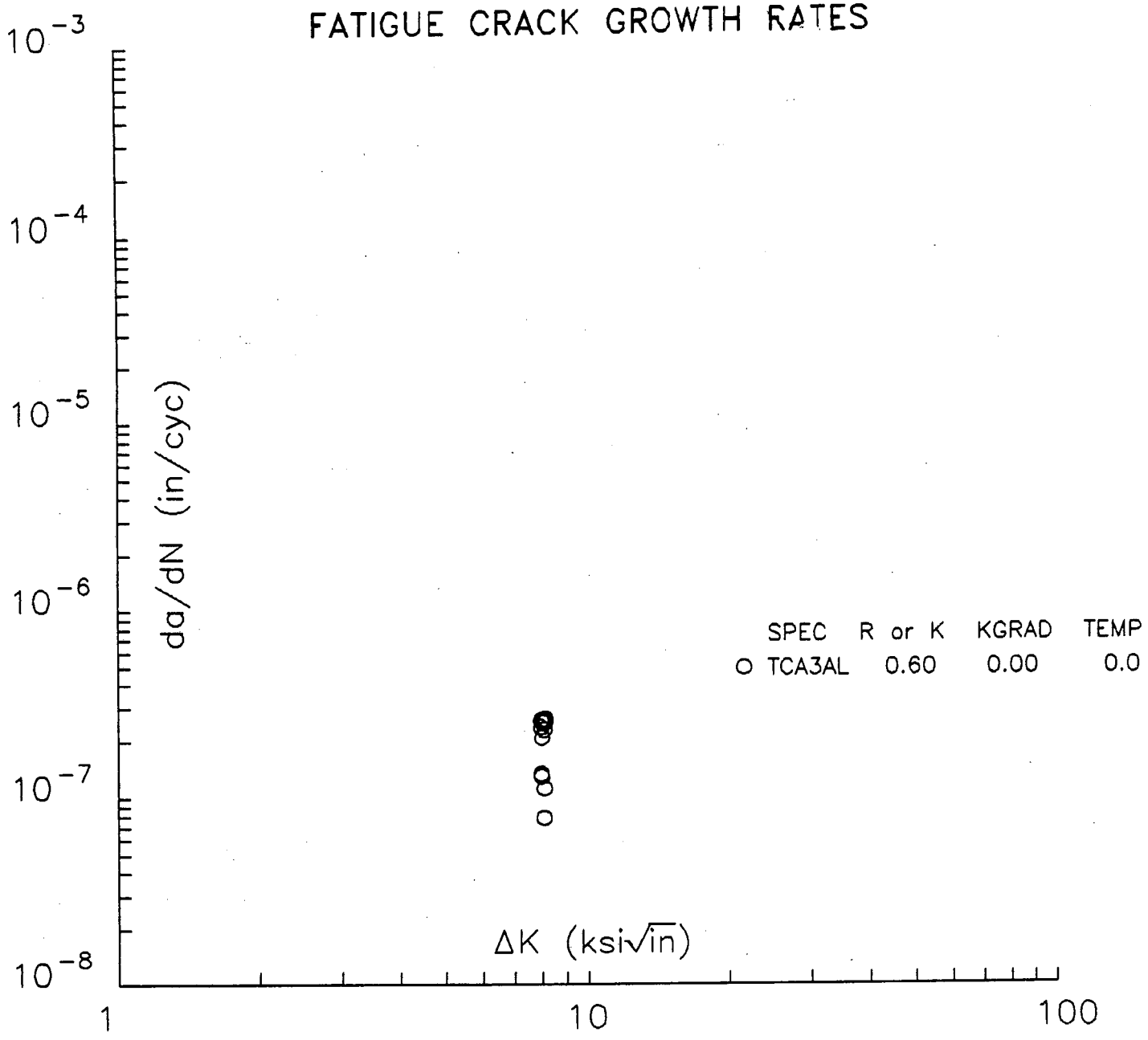
Pmax (lbs)	Ev8/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1521	25.36	0.9121	163114	0.0122	7379	1.652E-06	19.92	.242	16.77
1513	25.54	0.9181	166725	0.0119	7222	1.650E-06	19.93	.243	16.77
1505	25.72	0.9240	170336	0.0121	7379	1.640E-06	19.93	.243	16.77
1498	25.91	0.9302	174104	0.0122	7379	1.651E-06	19.93	.239	16.84
1490	26.09	0.9362	177715	0.0121	7222	1.671E-06	19.93	.238	16.87
1482	26.28	0.9422	181326	0.0121	7222	1.669E-06	19.93	.238	16.87
1475	26.47	0.9482	184937	0.0120	7222	1.661E-06	19.93	.237	16.90
1467	26.66	0.9542	188548	0.0123	7380	1.666E-06	19.93	.236	16.91
1460	26.87	0.9605	192317	0.0124	7380	1.679E-06	19.93	.233	16.98
1452	27.07	0.9666	195928	0.0120	7065	1.698E-06	19.93	.231	17.02
1444	27.26	0.9725	199382	0.0127	6187	2.058E-06	19.93	.230	17.05
1438	27.48	0.9794	202115	0.0117	4842	2.413E-06	19.93	.228	17.09
1430	27.65	0.9842	204224	0.0110	5311	2.063E-06	19.93	.224	17.19
1423	27.85	0.9903	207425	0.0124	6482	1.918E-06	19.93	.224	17.18
1416	28.07	0.9966	210706	0.0125	6331	1.969E-06	19.93	.223	17.22
1408	28.28	1.0028	213756	0.0118	6088	1.946E-06	19.94	.224	17.20
1401	28.47	1.0085	216794	0.0119	6205	1.914E-06	19.94	.223	17.20
1394	28.69	1.0147	219961	0.0122	6365	1.923E-06	19.94	.225	17.17
1387	28.90	1.0207	223159	0.0121	6396	1.888E-06	19.94	.225	17.16
1380	29.12	1.0267	226357	0.0122	6519	1.873E-06	19.94	.228	17.11
1372	29.34	1.0330	229678	0.0124	6642	1.866E-06	19.94	.228	17.10
1365	29.56	1.0391	232999	0.0122	6519	1.868E-06	19.94	.228	17.10
1358	29.78	1.0451	236197	0.0118	6396	1.853E-06	19.94	.231	17.04
1352	30.00	1.0510	239395	0.0118	6519	1.817E-06	19.94	.230	17.06
1345	30.22	1.0570	242716	0.0123	6765	1.822E-06	19.94	.232	17.02
1338	30.46	1.0633	246160	0.0124	6765	1.827E-06	19.94	.230	17.07
1331	30.69	1.0693	249481	0.0119	6642	1.794E-06	19.94	.229	17.08
1324	30.91	1.0752	252802	0.0118	6642	1.776E-06	19.94	.232	17.02
1317	31.14	1.0811	256123	0.0119	6642	1.795E-06	19.94	.231	17.03
1310	31.37	1.0871	259444	0.0123	6765	1.815E-06	19.94	.231	17.05
1304	31.62	1.0934	262888	0.0124	6765	1.826E-06	19.94	.231	17.04
1297	31.86	1.0995	266209	0.0121	6642	1.821E-06	19.94	.232	17.02
1290	32.10	1.1055	269530	0.0121	6642	1.823E-06	19.95	.231	17.05
1284	32.35	1.1116	272851	0.0118	6519	1.811E-06	19.95	.232	17.02
1277	32.58	1.1173	276049	0.0117	6519	1.800E-06	19.95	.231	17.04
1270	32.83	1.1233	279370	0.0122	6765	1.808E-06	19.95	.232	17.03
1264	33.09	1.1295	282814	0.0122	6765	1.810E-06	19.95	.234	16.98
1257	33.34	1.1356	286135	0.0120	6642	1.812E-06	19.95	.234	16.98
1251	33.59	1.1416	289456	0.0121	6765	1.791E-06	19.95	.235	16.96
1244	33.86	1.1477	292900	0.0123	6888	1.781E-06	19.95	.233	17.00
1238	34.12	1.1539	296344	0.0121	6765	1.784E-06	19.95	.233	17.01
1231	34.38	1.1598	299665	0.0117	6642	1.767E-06	19.95	.233	16.99
1225	34.64	1.1656	302986	0.0111	5535	1.999E-06	19.95	.235	16.96
1219	34.87	1.1708	305200	0.0118	4274	2.770E-06	19.95	.236	16.94
1213	35.17	1.1774	307260	0.0130	5227	2.489E-06	19.95	.239	16.87
1206	35.46	1.1838	310427	0.0125	6490	1.927E-06	19.95	.237	16.92
1199	35.74	1.1899	313750	0.0122	6768	1.805E-06	19.95	.237	16.91
1193	36.02	1.1961	317195	0.0120	6767	1.776E-06	19.95	.240	16.84
1187	36.29	1.2019	320517	0.0119	6643	1.793E-06	19.95	.241	16.83
1181	36.58	1.2080	323838	0.0120	6765	1.777E-06	19.95	.243	16.79

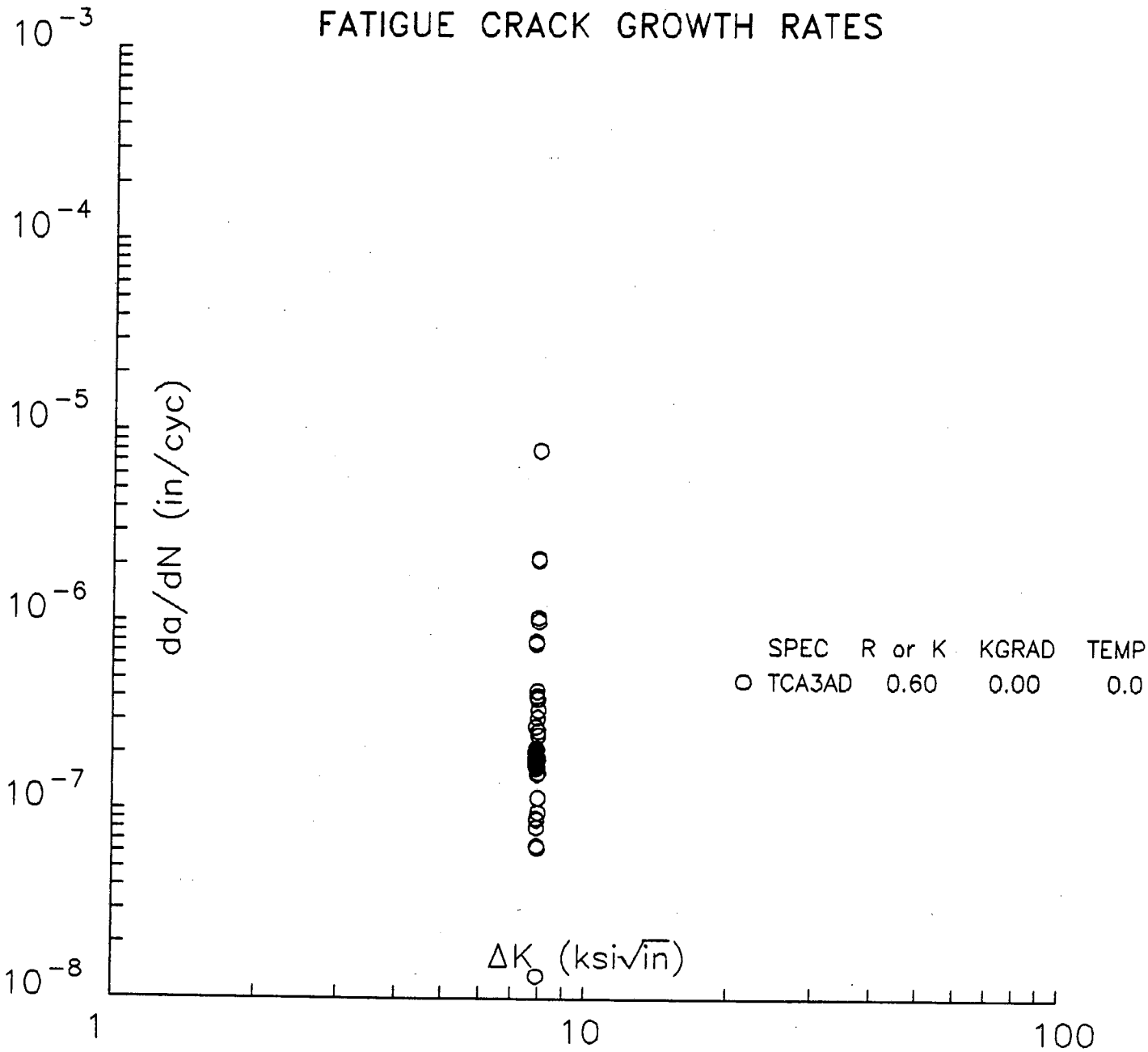
Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1174	36.86	1.2140	327282	0.0121	6888	1.755E-06	19.96	.243	16.78
1168	37.16	1.2201	330726	0.0121	6888	1.758E-06	19.96	.247	16.70
1162	37.45	1.2261	334170	0.0120	6888	1.735E-06	19.96	.247	16.69
1156	37.74	1.2320	337614	0.0121	7011	1.729E-06	19.96	.248	16.67
1150	38.05	1.2382	341181	0.0124	7134	1.732E-06	19.96	.246	16.72
1143	38.36	1.2444	344748	0.0121	6888	1.750E-06	19.96	.249	16.65
1137	38.65	1.2503	348069	0.0118	6765	1.745E-06	19.96	.253	16.57
1131	38.96	1.2562	351513	0.0123	7134	1.720E-06	19.96	.254	16.54
1125	39.28	1.2625	355203	0.0120	7134	1.686E-06	19.96	.256	16.49
1119	39.58	1.2682	358647	0.0116	6888	1.689E-06	19.96	.257	16.48
1113	39.89	1.2741	362091	0.0121	7011	1.726E-06	19.96	.257	16.47
1107	40.22	1.2803	365658	0.0123	7257	1.696E-06	19.96	.249	16.66
1101	40.55	1.2865	369348	0.0122	7494	1.633E-06	19.96	.260	16.42
1095	40.88	1.2925	373152	0.0121	7323	1.654E-06	19.96	.259	16.43
1089	41.22	1.2986	376671	0.0120	7038	1.701E-06	19.96	.260	16.41
1083	41.55	1.3045	380190	0.0121	7191	1.679E-06	19.96	.264	16.33
1077	41.89	1.3107	383862	0.0123	7344	1.672E-06	19.96	.263	16.34
1071	42.24	1.3168	387534	0.0122	7191	1.692E-06	19.96	.264	16.32
1065	42.58	1.3228	391053	0.0120	7038	1.710E-06	19.96	.262	16.36
1059	42.93	1.3288	394572	0.0121	7191	1.682E-06	19.97	.264	16.33
1053	43.29	1.3349	398244	0.0122	7344	1.663E-06	19.97	.265	16.31
1047	43.65	1.3410	401916	0.0121	7191	1.681E-06	19.97	.266	16.28
1042	44.01	1.3470	405435	0.0118	7040	1.679E-06	19.97	.266	16.29
1036	44.36	1.3529	408956	0.0119	7195	1.654E-06	19.97	.266	16.28
1030	44.73	1.3589	412630	0.0121	7347	1.649E-06	19.97	.270	16.20
1026	45.11	1.3650	416302	0.0076	10719	7.052E-07	19.97	.267	16.26
1018	45.20	1.3665	423349	0.0121	14160	8.572E-07	19.97	.313	15.24
1015	45.87	1.3771	430462	0.0166	10933	1.517E-06	19.97	.354	14.33
1007	46.25	1.3830	434282	0.0122	7831	1.562E-06	19.97	.356	14.28
1001	46.66	1.3893	438293	0.0125	8022	1.552E-06	19.97	.355	14.30
995	47.06	1.3955	442304	0.0127	7640	1.656E-06	19.97	.353	14.36
986	47.49	1.4020	445933	0.0181	5501	3.285E-06	19.97	.350	14.42
983	48.27	1.4136	447806	0.0127	3402	3.747E-06	19.97	.339	14.66
975	48.35	1.4147	449335	0.0059	4875	1.212E-06	19.97	.342	14.60
972	48.67	1.4195	452680	0.0107	7302	1.463E-06	19.97	.337	14.72
967	49.08	1.4254	456637	0.0120	7935	1.517E-06	19.97	.332	14.83
961	49.51	1.4315	460615	0.0120	7803	1.541E-06	19.97	.330	14.86
955	49.93	1.4374	464440	0.0120	7650	1.563E-06	19.97	.325	14.97
950	50.36	1.4435	468265	0.0121	7803	1.556E-06	19.98	.321	15.06
944	50.80	1.4496	472243	0.0121	7803	1.552E-06	19.98	.318	15.14
938	51.24	1.4556	476068	0.0120	7650	1.571E-06	19.98	.312	15.27
933	51.69	1.4616	479893	0.0123	7650	1.605E-06	19.98	.309	15.34
927	52.16	1.4679	483718	0.0123	7497	1.635E-06	19.98	.306	15.40
922	52.61	1.4739	487390	0.0119	7344	1.626E-06	19.98	.303	15.47
916	53.07	1.4798	491062	0.0119	7344	1.616E-06	19.98	.301	15.52
911	53.53	1.4857	494734	0.0119	7344	1.622E-06	19.98	.300	15.54
905	54.00	1.4917	498406	0.0122	7497	1.626E-06	19.98	.298	15.59
900	54.49	1.4979	502231	0.0123	7497	1.641E-06	19.98	.294	15.67
894	54.98	1.5040	505903	0.0119	7191	1.661E-06	19.98	.291	15.73
888	55.46	1.5099	509422	0.0119	7192	1.656E-06	19.98	.291	15.75

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
883	55.96	1.5159	513095	0.0121	7501	1.615E-06	19.98	.296	15.62
878	56.46	1.5220	516923	0.0120	7653	1.567E-06	19.98	.312	15.27
872	56.97	1.5279	520748	0.0119	7650	1.562E-06	19.98	.319	15.11
867	57.48	1.5339	524573	0.0122	7803	1.567E-06	19.98	.324	15.01
861	58.02	1.5401	528551	0.0124	7956	1.555E-06	19.98	.329	14.91
856	58.56	1.5463	532529	0.0120	7803	1.543E-06	19.98	.331	14.85
850	59.08	1.5522	536354	0.0118	7650	1.539E-06	19.98	.332	14.83
845	59.61	1.5581	540179	0.0120	7803	1.541E-06	19.99	.333	14.81
839	60.17	1.5642	544157	0.0121	7803	1.556E-06	19.99	.333	14.80
834	60.72	1.5702	547982	0.0121	7803	1.553E-06	19.99	.333	14.82
829	61.29	1.5763	551960	0.0122	7956	1.528E-06	19.99	.333	14.81
823	61.87	1.5824	555938	0.0121	7803	1.549E-06	19.99	.331	14.85
818	62.45	1.5884	559763	0.0120	7650	1.574E-06	19.99	.330	14.87
812	63.03	1.5944	563588	0.0120	7650	1.572E-06	19.99	.329	14.91
807	63.62	1.6004	567413	0.0121	7650	1.578E-06	19.99	.325	14.98
802	64.23	1.6065	571238	0.0118	7497	1.577E-06	19.99	.326	14.96
797	64.81	1.6122	574910	0.0120	7497	1.595E-06	19.99	.323	15.04
791	65.44	1.6184	578735	0.0125	7650	1.630E-06	19.99	.322	15.07
786	66.09	1.6247	582560	0.0123	7497	1.640E-06	19.99	.319	15.13
781	66.72	1.6307	586232	0.0120	7344	1.629E-06	19.99	.319	15.13
775	67.36	1.6367	589904	0.0118	7344	1.600E-06	19.99	.318	15.15
770	67.98	1.6425	593576	0.0118	7344	1.606E-06	19.99	.318	15.16
765	68.64	1.6485	597248	0.0122	7497	1.628E-06	19.99	.317	15.17
760	69.33	1.6547	601073	0.0124	7650	1.616E-06	19.99	.317	15.17
754	70.02	1.6608	604898	0.0119	7344	1.626E-06	19.99	.316	15.20
749	70.68	1.6666	608417	0.0116	7038	1.649E-06	20.00	.316	15.20
744	71.35	1.6724	611936	0.0119	7191	1.652E-06	20.00	.314	15.24
738	72.06	1.6785	615608	0.0137	6123	2.245E-06	20.00	.313	15.27
731	72.97	1.6862	618059	0.0194	3199	6.075E-06	20.00	.312	15.29
727	74.40	1.6979	618807	0.0129	1363	9.444E-06	20.00	.311	15.30
720	74.54	1.6991	619422	0.0048	2969	1.611E-06	20.00	.308	15.37
717	75.00	1.7027	621776	0.0097	6061	1.595E-06	20.00	.304	15.47
713	75.75	1.7087	625483	0.0120	7520	1.602E-06	20.00	.300	15.55
708	76.52	1.7148	629296	0.0119	7770	1.538E-06	20.00	.298	15.59
703	77.28	1.7207	633253	0.0121	7782	1.550E-06	20.00	.295	15.67
698	78.09	1.7268	637078	0.0123	7344	1.681E-06	20.00	.290	15.78
692	78.91	1.7330	640597	0.0123	6885	1.791E-06	20.00	.285	15.90
687	79.74	1.7392	643963	0.0121	6732	1.804E-06	20.00	.284	15.91
682	80.57	1.7452	647329	0.0121	6732	1.797E-06	20.00	.284	15.91
677	81.42	1.7513	650695	0.0122	6732	1.813E-06	20.00	.282	15.97
672	82.28	1.7574	654061	0.0119	6579	1.807E-06	20.00	.279	16.03
667	83.11	1.7631	657274	0.0117	6426	1.816E-06	20.00	.277	16.08
662	83.96	1.7690	660487	0.0121	6579	1.834E-06	20.00	.277	16.06
657	84.87	1.7752	663853	0.0121	6579	1.842E-06	20.01	.273	16.15
652	85.76	1.7811	667066	0.0119	6426	1.845E-06	20.01	.273	16.15
647	86.67	1.7871	670279	0.0120	6426	1.867E-06	20.01	.270	16.22
642	87.60	1.7931	673492	0.0123	6426	1.918E-06	20.01	.270	16.24
637	88.58	1.7994	676705	0.0123	6426	1.917E-06	20.01	.268	16.27
632	89.55	1.8055	679918	0.0119	6273	1.891E-06	20.01	.268	16.27
627	90.49	1.8113	682978	0.0119	6273	1.901E-06	20.01	.268	16.27

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
622	91.50	1.8174	686191	0.0122	6426	1.900E-06	20.01	.267	16.30
617	92.51	1.8235	689404	0.0112	6579	1.695E-06	20.01	.267	16.30
612	93.37	1.8285	692770	0.0120	6885	1.736E-06	20.01	.270	16.23
608	94.56	1.8354	696289	0.0131	6732	1.949E-06	20.01	.269	16.26
602	95.65	1.8417	699502	0.0122	6273	1.946E-06	20.01	.268	16.28
597	96.71	1.8476	702562	0.0119	6120	1.948E-06	20.01	.270	16.24
593	97.79	1.8536	705622	0.0119	6120	1.945E-06	20.01	.271	16.22
588	98.89	1.8595	708682	0.0120	6273	1.910E-06	20.01	.268	16.29
583	100.02	1.8656	711895	0.0121	6426	1.882E-06	20.01	.269	16.25
578	101.17	1.8716	715108	0.0114	7803	1.465E-06	20.01	.266	16.33
573	102.20	1.8770	719698	0.0118	9560	1.229E-06	20.02	.278	16.06
569	103.46	1.8834	724668	0.0126	8790	1.439E-06	20.02	.283	15.95
564	104.71	1.8896	728488	0.0124	7449	1.659E-06	20.02	.282	15.97
559	105.95	1.8957	732117	0.0121	7184	1.679E-06	20.02	.282	15.98
554	107.18	1.9017	735672	0.0118	7074	1.669E-06	20.02	.278	16.06
549	108.41	1.9075	739191	0.0118	7038	1.675E-06	20.02	.276	16.10
545	109.68	1.9135	742710	0.0120	7038	1.699E-06	20.02	.272	16.19
540	110.98	1.9195	746229	0.0120	7038	1.701E-06	20.02	.269	16.25
535	112.31	1.9255	749748	0.0123	7191	1.708E-06	20.02	.266	16.32
530	113.73	1.9318	753420	0.0123	7191	1.712E-06	20.02	.263	16.39
526	115.10	1.9378	756939	0.0119	6885	1.723E-06	20.02	.257	16.52
521	116.47	1.9436	760305	0.0118	6732	1.752E-06	20.02	.257	16.54
516	117.88	1.9496	763671	0.0119	6732	1.769E-06	20.02	.255	16.57
512	119.33	1.9556	767037	0.0120	6732	1.786E-06	20.02	.252	16.64
507	120.81	1.9616	770403	0.0121	6885	1.763E-06	20.02	.250	16.69
502	122.34	1.9677	773922	0.0121	6885	1.764E-06	20.02	.250	16.68
498	123.88	1.9737	777288	0.0119	6579	1.815E-06	20.02	.247	16.75
493	125.42	1.9796	780501	0.0119	6579	1.812E-06	20.03	.247	16.75
489	127.01	1.9857	783867	0.0123	6732	1.820E-06	20.03	.247	16.76
484	128.69	1.9919	787233	0.0123	6579	1.871E-06	20.03	.245	16.79
479	130.36	1.9980	790446	0.0120	6426	1.867E-06	20.03	.247	16.76
475	132.02	2.0039	793659	0.0120	6426	1.866E-06	20.03	.246	16.77
470	133.76	2.0100	796872	0.0120	6273	1.910E-06	20.03	.246	16.78
466	135.48	2.0159	799932	0.0120	6273	1.906E-06	20.03	.246	16.79
461	137.27	2.0219	803145	0.0122	6426	1.895E-06	20.03	.245	16.81
457	139.13	2.0280	806358	0.0119	6273	1.891E-06	20.03	.244	16.82
452	140.89	2.0338	809418	0.0118	6273	1.878E-06	20.03	.243	16.85
448	142.79	2.0398	812631	0.0122	6426	1.895E-06	20.03	.243	16.85
444	144.76	2.0460	815844	0.0122	6426	1.902E-06	20.03	.241	16.89
	146.75	2.0520	819057						

PHASE B–Constant ΔK Test TC-A-3A


FATIGUE CRACK GROWTH RATES
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
da/dN (in/cyc)
SPEC R or K KGRAD TEMP
O TCA3AL 0.60 0.00 0.0
ΔK (ksi√in)
1
10
100


FATIGUE CRACK GROWTH RATES
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
da/dN (in/cyc)
ΔK_o (ksi$\sqrt{in}$)
1
10
100
SPEC R or K KGRAD TEMP
TCA3AD 0.60 0.00 0.0

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCA3AL	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	0	Modulus	28.0
Environment			

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.605
Width	3.003	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	1707.0	Stress ratio (R)	0.60
Final a (in)	0.669	Kmax	19.97

Test Parameters

Initial a (in)	0.671	Initial K	20.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
19.12	0.666	0.669	0.003	0.994
19.58	0.692	0.692	-.000	0.999
20.92	0.764	0.757	-.007	1.015
21.99	0.818	0.822	0.004	1.027

Comments

Date of test: 05-18-2001
Seg 1 75 F 40% R.H. 0 to 725996 cycles

Specimen Id. TCA3AL Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	19.12	0.6657	4						
1699	19.15	0.6674	10535	0.0085	35530	2.385E-07	7.96	.675	6.47
1693	19.27	0.6741	35534	0.0142	54898	2.595E-07	7.97	.675	6.48
1686	19.40	0.6817	65433	0.0118	87980	1.345E-07	7.98	.675	6.48
1675	19.47	0.6860	123513	0.0151	115648	1.310E-07	7.99	.675	6.49
1667	19.67	0.6968	181081	0.0186	87892	2.117E-07	8.00	.675	6.50
1656	19.80	0.7046	211405	0.0151	59408	2.541E-07	8.01	.675	6.51
1647	19.94	0.7119	240489	0.0147	57862	2.545E-07	8.03	.675	6.52
1637	20.07	0.7193	269267	0.0151	58970	2.554E-07	8.04	.675	6.53
1628	20.21	0.7270	299459	0.0152	59862	2.543E-07	8.05	.675	6.54
1619	20.35	0.7345	329129	0.0149	58432	2.551E-07	8.06	.675	6.55
1610	20.49	0.7419	357891	0.0148	57886	2.552E-07	8.07	.675	6.55
1601	20.63	0.7493	387015	0.0148	58928	2.517E-07	8.08	.675	6.56
1597	20.78	0.7567	416819	0.0076	97112	7.854E-08	8.08	.675	6.57
1584	20.78	0.7569	484127	0.0151	133829	1.130E-07	8.10	.675	6.58
1580	21.07	0.7719	550648	0.0220	94851	2.321E-07	8.10	.675	6.58
1567	21.21	0.7789	578978	0.0147	56064	2.615E-07	8.12	.675	6.59
1558	21.36	0.7865	606712	0.0149	56356	2.641E-07	8.13	.675	6.60
1550	21.51	0.7938	635334	0.0147	57067	2.570E-07	8.14	.674	6.63
1542	21.66	0.8012	663779	0.0148	56220	2.641E-07	8.14	.675	6.62
	21.81	0.8087	691554						

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCA3AD	Geometry	CT
Contract #	18.03630	Orientation	LT
Material	Steel	Yield (ksi)	58.0
Temperature (F)	0	Modulus	29.5
Environment			

Specimen Dimensions (in)

Thickness	0.225	Notch depth	0.595
Width	3.003	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	1707.0	Stress ratio (R)	0.60
Final a (in)	0.669	Kmax	19.97

Test Parameters

Initial a (in)	0.822	Initial K	20.00
K-gradient	0.00	Stress ratio (R)	0.60

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
22.71	0.817	0.822	0.005	0.994
28.83	1.011	1.017	0.006	0.988
32.50	1.105	1.088	-.017	0.985
36.92	1.202	1.203	0.001	0.982
48.13	1.394	1.400	0.006	0.976

Comments

Date of test: 07-12-2001
Seg 2 -60 F Dry 0 to 507650 cycles
Seg 3 78 F 10% R.H. 507650 to 594622
sEG 3 78 F 40 % R.H. 594622 Installed new Environment chamber
Seg 3 78 F 9% R.H. 594622 to 1038504 cycles
Seg 4 140 F 9% R.H. 1038504 to 1441268 cycles
Seg 5 75 F 48% R.H. 1441268 to 1999291 cycles
Seg 6 75 F 98% R.H. 1999291 to 3009511 cycles
Seg 7 140 F 98% R.H. 3009511 to 3273944 cycles

Specimen Id. TCA3AD

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	22.71	0.8172	2						
1481	22.78	0.8197	13387	0.0081	42524	1.895E-07	7.97	.675	6.47
1475	22.93	0.8253	42526	0.0117	62654	1.866E-07	7.96	.674	6.49
1468	23.10	0.8314	76041	0.0111	70969	1.570E-07	7.96	.674	6.49
1460	23.24	0.8364	113495	0.0116	73409	1.582E-07	7.96	.675	6.47
1453	23.43	0.8430	149450	0.0128	68973	1.854E-07	7.96	.674	6.49
1445	23.60	0.8492	182467	0.0120	63958	1.880E-07	7.96	.674	6.49
1438	23.77	0.8550	213408	0.0100	52790	1.902E-07	7.96	.674	6.49
1429	23.89	0.8593	235257	0.0118	44538	2.644E-07	7.96	.675	6.47
1423	24.11	0.8668	257946	0.0135	53879	2.500E-07	7.96	.675	6.47
1415	24.29	0.8727	289136	0.0110	58364	1.885E-07	7.96	.674	6.48
1406	24.44	0.8778	316310	0.0132	38768	3.410E-07	7.96	.674	6.48
1400	24.68	0.8860	327904	0.0135	13402	1.008E-06	7.95	.674	6.48
1395	24.84	0.8913	329712	0.0054	46508	1.161E-07	7.95	.673	6.50
1385	24.84	0.8914	374412	0.0103	106399	9.712E-08	7.95	.674	6.48
1381	25.16	0.9017	436111	0.0163	95700	1.704E-07	7.95	.674	6.48
1372	25.34	0.9077	470112	0.0110	59889	1.832E-07	7.95	.674	6.48
1363	25.50	0.9126	496000	0.0143	36626	3.917E-07	7.95	.674	6.48
1350	25.80	0.9220	506738	0.0251	12014	2.091E-06	7.95	.673	6.50
1345	26.30	0.9378	508014	0.0159	2005	7.948E-06	7.95	.675	6.46
1335	26.31	0.9379	508743	0.0012	6917	1.768E-07	7.95	.676	6.44
1332	26.34	0.9390	514931	0.0051	28847	1.784E-07	7.94	.675	6.46
1328	26.48	0.9431	537590	0.0101	55995	1.797E-07	7.94	.673	6.49
1322	26.67	0.9490	570926	0.0115	68322	1.690E-07	7.94	.673	6.49
1315	26.86	0.9546	605912	0.0119	69474	1.708E-07	7.94	.673	6.49
1315	27.07	0.9609	640400	0.0017	124944	1.338E-08	7.94	.673	6.49
1302	26.91	0.9563	730856	0.0116	181554	6.367E-08	7.94	.675	6.45
1301	27.46	0.9725	821954	0.0222	124417	1.784E-07	7.94	.674	6.47
1289	27.67	0.9785	855273	0.0119	66631	1.784E-07	7.94	.673	6.49
1282	27.87	0.9843	888585	0.0120	66624	1.796E-07	7.94	.673	6.49
1275	28.08	0.9905	921897	0.0123	65236	1.887E-07	7.94	.673	6.49
1269	28.30	0.9967	953821	0.0117	63850	1.828E-07	7.94	.674	6.47
1262	28.50	1.0021	985747	0.0112	63857	1.751E-07	7.93	.673	6.49
1253	28.70	1.0078	1017678	0.0160	51368	3.118E-07	7.93	.674	6.47
1242	29.08	1.0182	1037115	0.0260	24716	1.050E-06	7.93	.673	6.48
1236	29.66	1.0338	1042394	0.0159	7504	2.120E-06	7.93	.674	6.46
1227	29.67	1.0341	1044619	0.0007	4447	1.555E-07	7.93	.673	6.48
1226	29.69	1.0345	1046841	0.0033	17777	1.875E-07	7.93	.673	6.48
1222	29.80	1.0374	1062395	0.0084	46676	1.793E-07	7.93	.674	6.46
1218	30.00	1.0429	1093516	0.0114	64452	1.769E-07	7.93	.675	6.44
1212	30.23	1.0488	1126847	0.0120	66660	1.795E-07	7.93	.675	6.44
1205	30.46	1.0548	1160177	0.0118	64438	1.824E-07	7.93	.675	6.44
1199	30.69	1.0605	1191285	0.0115	62216	1.846E-07	7.92	.675	6.44
1193	30.91	1.0663	1222393	0.0116	64438	1.806E-07	7.92	.675	6.44
1187	31.15	1.0722	1255723	0.0118	66660	1.763E-07	7.92	.675	6.44
1181	31.38	1.0781	1289053	0.0118	66660	1.771E-07	7.92	.676	6.42
1175	31.62	1.0840	1322383	0.0118	66660	1.768E-07	7.92	.675	6.44
1169	31.86	1.0898	1355713	0.0119	65549	1.812E-07	7.92	.675	6.43
1163	32.11	1.0959	1387932	0.0119	64442	1.851E-07	7.92	.675	6.43

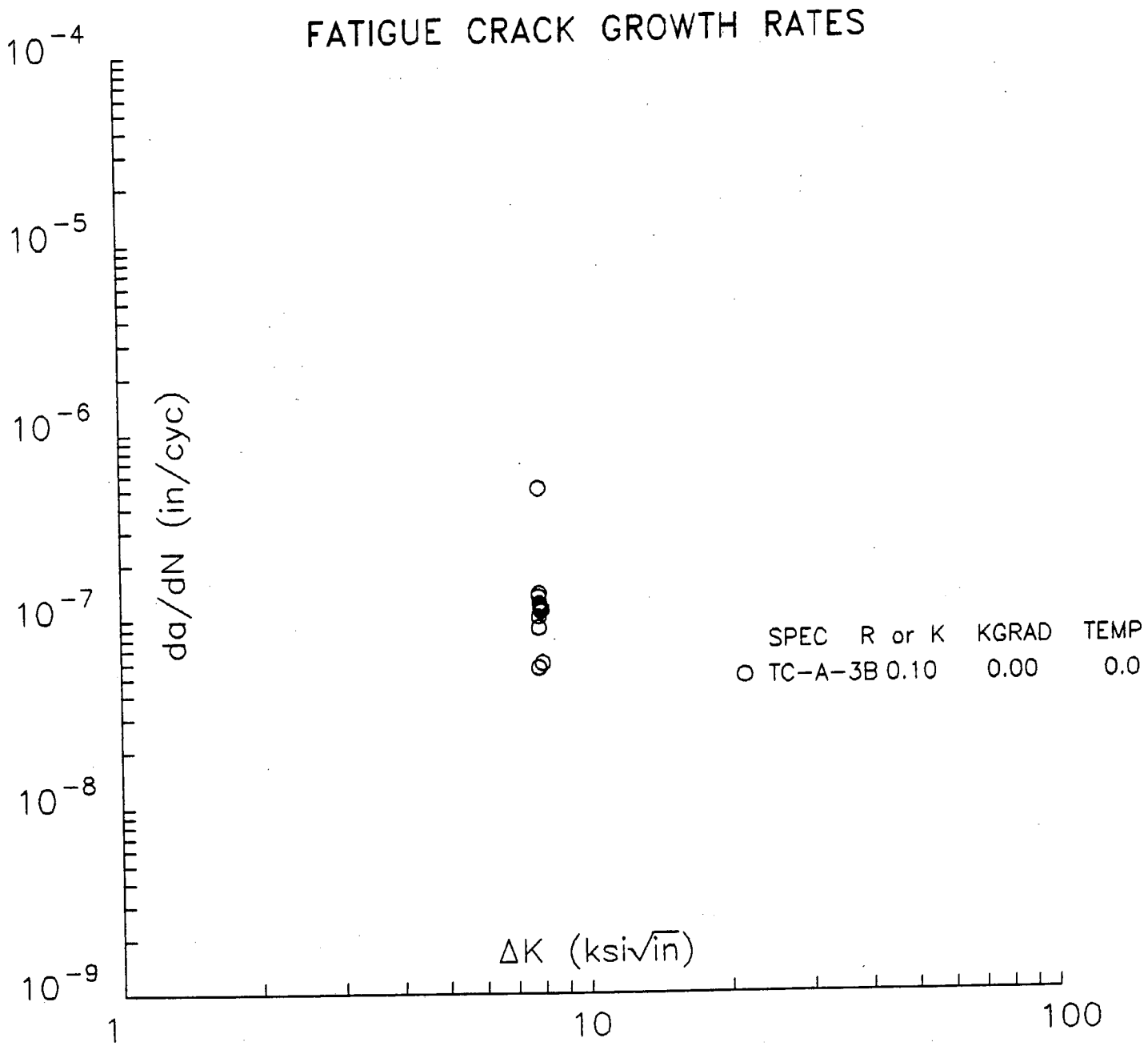
Specimen Id. TCA3AD

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
1159	32.36	1.1018	1420154	0.0064	98922	6.504E-08	7.92	.675	6.43
1151	32.38	1.1023	1486853	0.0118	131979	8.924E-08	7.92	.675	6.43
1147	32.85	1.1135	1552133	0.0175	97215	1.802E-07	7.92	.675	6.43
1139	33.12	1.1198	1584068	0.0118	63874	1.846E-07	7.91	.675	6.43
1133	33.36	1.1253	1616008	0.0115	54151	2.118E-07	7.91	.674	6.45
1126	33.62	1.1313	1638219	0.0140	32486	4.309E-07	7.91	.675	6.43
1121	33.97	1.1393	1648494	0.0117	28721	4.058E-07	7.91	.675	6.43
1114	34.13	1.1429	1666940	0.0092	50224	1.833E-07	7.91	.675	6.43
1109	34.39	1.1485	1698718	0.0117	65110	1.790E-07	7.91	.675	6.43
1104	34.66	1.1546	1732050	0.0120	66670	1.794E-07	7.91	.675	6.43
1098	34.93	1.1605	1765388	0.0119	65574	1.822E-07	7.91	.675	6.43
1092	35.21	1.1665	1797624	0.0117	63404	1.839E-07	7.91	.674	6.44
1086	35.47	1.1722	1828791	0.0115	64509	1.786E-07	7.91	.675	6.42
1081	35.75	1.1781	1862133	0.0118	66385	1.781E-07	7.90	.676	6.40
1075	36.03	1.1840	1895177	0.0119	66356	1.796E-07	7.90	.675	6.42
1069	36.32	1.1900	1928489	0.0121	66633	1.812E-07	7.90	.675	6.42
1066	36.61	1.1961	1961809	0.0079	97173	8.115E-08	7.90	.675	6.42
1058	36.70	1.1979	2025661	0.0116	128048	9.032E-08	7.90	.675	6.42
1054	37.18	1.2076	2089857	0.0159	95079	1.670E-07	7.90	.675	6.42
1047	37.49	1.2137	2120740	0.0119	60031	1.984E-07	7.90	.675	6.42
1041	37.78	1.2195	2149888	0.0116	56908	2.032E-07	7.90	.675	6.42
1036	38.07	1.2253	2177648	0.0115	56908	2.024E-07	7.90	.675	6.42
1030	38.37	1.2311	2206796	0.0116	58296	1.993E-07	7.90	.675	6.42
1025	38.67	1.2369	2235944	0.0118	58296	2.017E-07	7.89	.676	6.39
1019	38.98	1.2428	2265092	0.0119	61072	1.941E-07	7.89	.675	6.41
1014	39.29	1.2488	2297016	0.0119	62460	1.905E-07	7.89	.675	6.41
1008	39.61	1.2547	2327552	0.0119	58296	2.046E-07	7.89	.675	6.41
1003	39.94	1.2607	2355312	0.0118	55521	2.126E-07	7.89	.675	6.41
997	40.25	1.2665	2383072	0.0117	56910	2.049E-07	7.89	.675	6.41
992	40.58	1.2724	2412222	0.0119	58297	2.042E-07	7.89	.675	6.41
986	40.91	1.2784	2441370	0.0119	56908	2.088E-07	7.89	.675	6.41
981	41.24	1.2842	2469130	0.0118	56908	2.069E-07	7.89	.675	6.41
976	41.58	1.2902	2498278	0.0118	58296	2.029E-07	7.89	.676	6.39
970	41.92	1.2961	2527426	0.0117	58296	2.015E-07	7.88	.675	6.41
965	42.26	1.3019	2556574	0.0119	58296	2.047E-07	7.88	.676	6.39
960	42.61	1.3080	2585722	0.0116	56908	2.047E-07	7.88	.676	6.38
954	42.95	1.3136	2613482	0.0116	56908	2.032E-07	7.88	.675	6.40
949	43.30	1.3196	2642630	0.0121	58297	2.075E-07	7.88	.675	6.40
944	43.67	1.3257	2671778	0.0122	58299	2.086E-07	7.88	.675	6.40
938	44.04	1.3317	2700929	0.0118	58300	2.028E-07	7.88	.675	6.40
933	44.40	1.3375	2730078	0.0116	56909	2.046E-07	7.88	.676	6.38
928	44.77	1.3434	2757838	0.0118	56916	2.071E-07	7.88	.675	6.40
923	45.14	1.3493	2786994	0.0116	56926	2.044E-07	7.87	.675	6.40
917	45.51	1.3550	2814764	0.0116	55816	2.081E-07	7.87	.676	6.38
912	45.89	1.3609	2842810	0.0120	56934	2.099E-07	7.87	.675	6.40
907	46.28	1.3670	2871698	0.0119	58889	2.024E-07	7.87	.675	6.40
902	46.67	1.3728	2901698	0.0119	59999	1.976E-07	7.87	.676	6.37
897	47.07	1.3788	2931696	0.0120	57795	2.070E-07	7.87	.675	6.39
892	47.47	1.3848	2959494	0.0117	57816	2.021E-07	7.87	.675	6.39
886	47.86	1.3905	2989512	0.0135	48628	2.780E-07	7.87	.676	6.37

Specimen Id. TCA3AD Page 3

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
879	48.39	1.3983	3008122	0.0170	21512	7.889E-07	7.87	.675	6.39
875	49.02	1.4075	3011024	0.0111	14516	7.664E-07	7.87	.675	6.39
869	49.16	1.4094	3022638	0.0068	38316	1.779E-07	7.87	.675	6.39
866	49.50	1.4143	3049340	0.0112	57202	1.961E-07	7.87	.675	6.39
861	49.95	1.4207	3079840	0.0123	63486	1.936E-07	7.87	.675	6.39
856	50.37	1.4266	3112826	0.0122	67581	1.803E-07	7.87	.675	6.39
851	50.82	1.4328	3147421	0.0120	69519	1.723E-07	7.87	.675	6.39
846	51.24	1.4386	3182345	0.0122	69112	1.764E-07	7.87	.675	6.39
840	51.72	1.4450	3216533	0.0131	68376	1.914E-07	7.87	.676	6.37
	52.21	1.4516	3250721						

PHASE B–Constant ΔK Test TC-A-3B


FATIGUE CRACK GROWTH RATES
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
da/dN (in/cyc)
ΔK (ksi√in)
1
10
100
SPEC R or K KGRAD TEMP
O TC-A-3B 0.10 0.00 0.0

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TC-A-3B	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	Steel	Yield (ksi)	58.0
Temperature (F)	0	Modulus	28.0
Environment			

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.609
Width	3.006	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	798.0	Stress ratio (R)	0.10
Final a (in)	0.623	Kmax	8.91

Test Parameters

Initial a (in)	0.623	Initial K	8.90
K-gradient	0.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP	1	2	0

Visual Observations

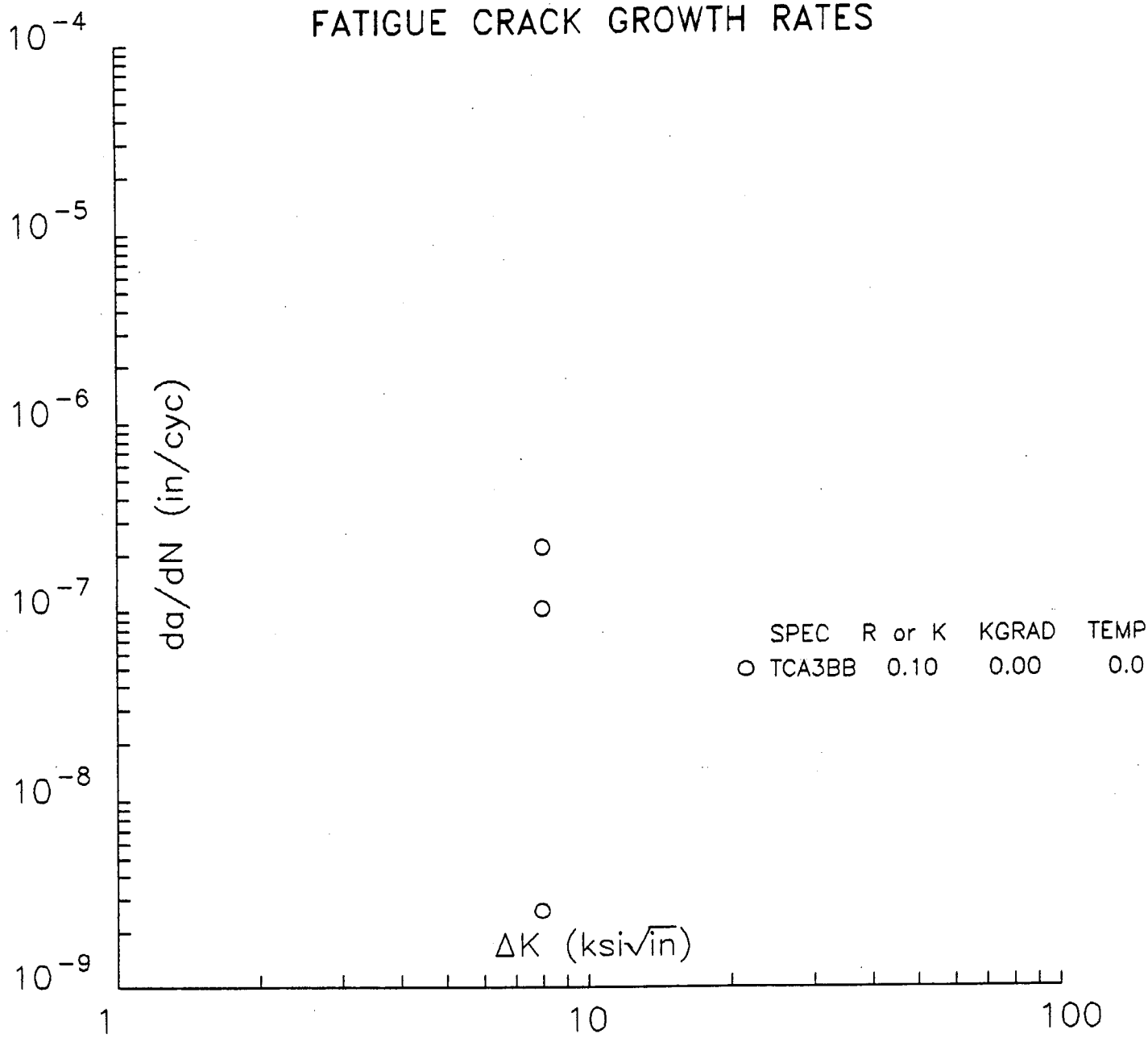
EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
18.12	0.623	0.623	0.000	1.000
20.83	0.729	0.729	-.000	0.978

Comments

Date of test: 07-27-2001
Seg 1 75 F 45% RH 0 to 755423 cycles
Seg 2 -60 F Dry 755423 to 1618332 cycles

Specimen Id. TC-A-38 Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	18.12	0.6230	4						
795	18.10	0.6218	20244	0.0037	63876	5.847E-08	8.01	.175	7.34
793	18.21	0.6267	63880	0.0101	90140	1.124E-07	8.00	.176	7.33
789	18.33	0.6319	110384	0.0102	92406	1.108E-07	7.99	.179	7.29
784	18.45	0.6370	156286	0.0102	92352	1.109E-07	7.99	.184	7.24
779	18.58	0.6422	202736	0.0104	93934	1.109E-07	7.98	.186	7.22
775	18.71	0.6474	250220	0.0102	93317	1.094E-07	7.97	.191	7.16
770	18.83	0.6524	296053	0.0102	91698	1.108E-07	7.97	.191	7.16
766	18.96	0.6575	341918	0.0103	91592	1.122E-07	7.96	.194	7.13
762	19.09	0.6627	387645	0.0103	90680	1.139E-07	7.95	.193	7.13
757	19.22	0.6679	432598	0.0104	89981	1.150E-07	7.95	.193	7.13
753	19.35	0.6730	477626	0.0101	88501	1.144E-07	7.94	.194	7.11
749	19.48	0.6780	521099	0.0100	87612	1.147E-07	7.93	.192	7.12
744	19.61	0.6831	565238	0.0104	88547	1.171E-07	7.93	.193	7.10
740	19.75	0.6884	609646	0.0104	87851	1.188E-07	7.92	.191	7.12
736	19.88	0.6935	653089	0.0103	86378	1.190E-07	7.91	.193	7.09
732	20.02	0.6986	696024	0.0106	88246	1.199E-07	7.91	.193	7.09
720	20.16	0.7041	741336	0.0299	59378	5.028E-07	7.89	.191	7.09
714	20.83	0.7285	755402	0.0361	264412	1.367E-07	7.88	.176	7.22
703	21.11	0.7402	1005747	0.0176	317905	5.540E-08	7.87	.254	6.53
698	21.25	0.7461	1073307	0.0121	135073	8.973E-08	7.87	.335	5.82
694	21.41	0.7524	1140820	0.0126	122687	1.028E-07	7.87	.333	5.84
690	21.56	0.7587	1195994	0.0131	99503	1.313E-07	7.87	.321	5.94
	21.73	0.7654	1240323						


FATIGUE CRACK GROWTH RATES
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
da/dN (in/cyc)
ΔK (ksi√in)
1
10
100
SPEC R or K KGRAD TEMP
O TCA3BB 0.10 0.00 0.0

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCA3BB	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	0	Modulus	30.0
Environment	DRY		

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.609
Width	3.006	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	798.0	Stress ratio (R)	0.10
Final a (in)	0.622	Kmax	8.90

Test Parameters

Initial a (in)	0.782	Initial K	8.90
K-gradient	0.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

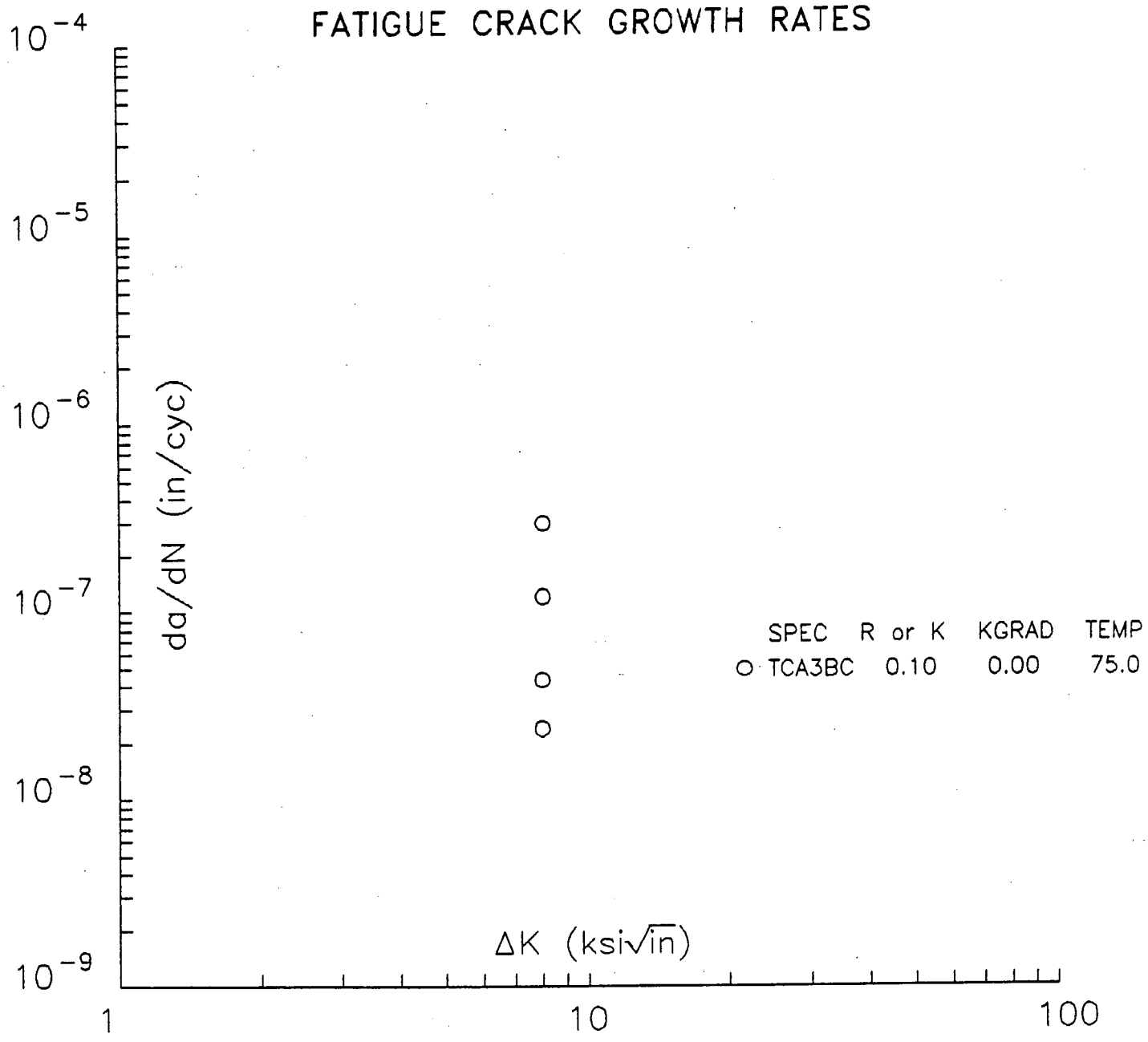
EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
21.66	0.782	0.782	-.000	1.000
22.27	0.788	0.788	0.000	0.979

Comments

Date of test: 08-14-2001

Specimen Id. TCA388

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	21.40	0.7714	13						
688	21.65	0.7816	59092	0.0125	119289	1.046E-07	7.99	.463	4.76
691	21.84	0.7839	119302	-.0120	122075	-9.860E-08	8.01	.478	4.65
684	21.35	0.7696	181167	-.0006	122664	-5.144E-09	7.98	.385	5.45
690	21.78	0.7832	241967	0.0134	60879	2.204E-07	8.00	.482	4.60
685	21.76	0.7830	242047	-.0003	160	-1.886E-06	7.99	.425	5.10
687	21.75	0.7829	242126	-.0019	341286	-5.640E-09	8.00	.495	4.49
683	21.64	0.7811	583333	0.0018	685028	2.623E-09	7.97	.495	4.47
	21.93	0.7847	927154						


FATIGUE CRACK GROWTH RATES
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
da/dN (in/cyc)
ΔK (ksi√in)
1
10
100
SPEC R or K KGRAD TEMP
TCA3BC 0.10 0.00 75.0

AUTOMATED FATIGUE CRACK GROWTH RATE ANALYSIS

Specimen Id.	TCA3BC	Geometry	CT
Contract #	18.03630	Orientation	L-T
Material	STEEL	Yield (ksi)	58.0
Temperature (F)	75	Modulus	29.5
Environment	10 % R.H.		

Specimen Dimensions (in)

Thickness	0.226	Notch depth	0.609
Width	3.006	Gage length	0.000
Height	0.000	Alpha ratio	1.250

Precrack Parameters

Pmax (lbs)	798.0	Stress ratio (R)	0.10
Final a (in)	0.622	Kmax	8.90

Test Parameters

Initial a (in)	0.788	Initial K	8.90
K-gradient	0.00	Stress ratio (R)	0.10

K Coeff	EvB/P Coeff
0.886000	1.000980
4.640000	-4.669510
-13.320000	18.460100
14.720000	-236.824997
-5.600000	1214.880000
0.000000	-2143.570100

Analysis Codes

KRP 1 2 0

Visual Observations

EvB/P	Crack (EvB/P)	Crack (visual)	Error	CAF
21.85	0.788	0.788	-.000	0.998
22.27	0.806	0.806	0.000	1.000

Comments

Date of test: 09-04-2001

Specimen Id. TCA3BC Page 1

Pmax (lbs)	EvB/P	a (in)	N (X1)	da (in)	dN (X1)	da/dN (in/cyc)	dK (ksi[in]^.5)	CCL	dKeff (ksi[in]^.5)
	21.85	0.7880	4						
682	21.83	0.7872	15475	0.0046	104906	4.338E-08	8.00	.363	5.66
682	21.95	0.7925	104910	0.0057	236590	2.404E-08	8.00	.506	4.39
673	21.96	0.7929	252065	0.0264	220394	1.200E-07	8.01	.502	4.43
674	22.61	0.8190	325304	0.0217	73319	2.964E-07	8.01	.361	5.68
	22.50	0.8146	325384