Results:

Test No.	N_{leak}	THESE METHODS USE ANL'S REVISED F_{EN} EXPRESSIONS								
		Method #1: Strain-Integrated				Method #2: Simplified				Meth
		F_{en}	Adjusted N_{air}	N_{water}	Difference	F_{en}	Adjusted N_{air}	N_{water}	Difference	F_{en}
1	365	3.858	767	199	-45.53%	1.673	767	458	25.61%	4.182

The F_{en} methods identified above are described below (the NUREG/

Method #1: Strain-Integrated

$F_{en,i}$ is computed ANL's revised F_{en} expressions at each time interval, i, using T_i.

$$\text{Overall Integrated } F_{en} = \frac{\Sigma\, F_{en,i}\,(\varepsilon_i - \varepsilon_{i-1})}{(\varepsilon_{max} - \varepsilon_{min})} \qquad \text{for strain rates} > 0$$

Method #2: Simplified

F_{en} is computed ANL's revised F_{en} expressions for the entire time interval where strain rate >
The average strain rate is used (i.e., a "straight line" from the valley to the peak).

Method #3: Multi-Linear Strain-Based

The loading consists of either two or more ramps (for strain rate > 0), depending on the test
$F_{en,i}$ is computed ANL's revised F_{en} expressions at for each ramp using the average T for each
For the 2-ramp case:

$$\text{Overall } F_{en} = \frac{F_{en,1}\,\Delta\varepsilon_1 + F_{en,2}\,\Delta\varepsilon_2}{(\Delta\varepsilon_1 + \Delta\varepsilon_2)} \qquad \text{for strain rates} > 0$$

Similar calculations are performed for the more-ramps cases, except there are more terms in

Method #4: 6909 Strain-Integrated

Same as Method #1 except that F_{en} is computed NUREG/CR-6909 methodology.

Method #5: 6909 Simplified

Same as Method #2 except that F_{en} is computed NUREG/CR-6909 methodology.

Method #6: 6909 Multi-Linear Strain-Based

Same as Method #3 except that F_{en} is computed NUREG/CR-6909 methodology.

S			THESE METHODS USE NUREG/CR-6909 F_{EN} EXI							
hod #3: Multi-Linear Strain-Based			Method #4: 6909 Strain-Integrated				Method #5: 6909 Simplified			
Adjusted N_{air}	N_{water}	Difference	F_{en}	Adjusted N_{air}	N_{water}	Difference	F_{en}	Adjusted N_{air}	N_{water}	Difference
767	183	-49.74%	4.190	767	183	-49.84%	2.821	767	272	-25.49%

CR-6909 best fit air curve for SS were used):

0 using the average T for the interval.

case.
ramp.

ıstead of 2.

Design ma

Nfenv(av)
957
sdt dev
362
Nfenv (min)
365
Nfenv (max)
1408

Factor on life
surfrace finish:
Size:
Total factor:

Fig 7 of the B
no heat-to-h
used for step
at 24°C and 3
So, not need

PRESSIONS			
Method #6: 6909 Multi-Linear Strain-Based			
F_{en}	Adjusted N_{air}	N_{water}	Difference
4.385	767	175	-52.07%

argin N obs/N est = 1.8

	Nf env
cycles	458
	365
cycles	1101
	693
cycles	1163
	1155
cycles	1195
	1079
	1408

e to account for:

2

1.3

2.6

Bettis paper PVP2004-2748 shows
eat variability for the heat of material
pped pipe test. Smooth specimen data
357°C fall on the best-fit-curve fot test specimens.
to apply any factor for heat-to-heat variability.

The purpose of this comparison is to validate the Fen expressions and not determine the conservatism

Methodology for comparing estimates of fatigue life based on the Fen expressions with the

1. The Fen expressions are based on data obtained on small smooth test specimens (i.e., cyclindrical ga

2. To apply these expressions to data obtained on large components would require an adjustment of th
   to account for the following effects (i.e., by applying the following adjustment subfactors):
   - (i) effects of material variability (i.e., heat-to-heat variability) and data scatter. Heat-to-hea
     of the heat being tested as compared to the median (or best estimate) response
     Data scatter refers essentially to "within-heat" variability (or "intrinsic" variabilit
     If the baseline fatigue S-N data for the heat of material used in the experiments
     should predict the test results within the data scatter (i.e., within a factor of ±2)
     Heat-to-heat variation may be ±2.5. Actual values in NUREG/CR-6909 are ±2.8 f
   - (ii) size effect
     Larger surface area in components means higher probability of fatigue cracks in
     Typically the decrease in fatigue life due to size effect is in the range of 1.4-1.8 (
   - (iii) surface roughness
     Since fabrication processes such as milling, grinding, etc. produce rough surface
     Typically the decrease in fatigue life due to the effect of surface roughness is in
   - (iv) sequential loading
     As discussed in Section 2 and demostrated in Fig. 1 of NUREG/CR-6909, fatigue
     at stress levels below the fatigue limit defined by test specimen data obtained u
     The data under variable loading conditions (i.e., variable strain cycles, specificall
     decrease in fatigue life relative to that obtained under constant loading conditic

in the ASME Code fatigue evaluation methodology. The following method is used for the comparison.

experimental test results.

ıuge specimens or tube specimens).

ıe estimates based on the Fen expressions

t variation refers to the difference between the median response
e from various heats represented in (or by) the baseline S-N fatiogue data.
:y).
is known, then estimates from Fen expressions
, provided other effects are absent.
'or carbon steels, ±2.1 for low-alloy steels, and ±2.3 for stainless steels .

itiating at surface flaws/discontinuities, which would decrease fatigue life.
NUREG/CR-6909).

s where fatigue cracks may initiate, which can also decrease fatigue life.
the range of 2.0-3.5 (NUREG/CR-6909).

:racks greater than 100-250 microns (i.e., 4 to 10 mils) can grow even
nder constant loading conditions.
y a few high strain cycles followed by low strain cycles) show significant
ɔns. The decrease in life is in the range 1.2-2.0.

Test No. 1 ANL Best Fit Air Curve for SS (Eqn. (32) from NUREG/CR-6909): $\ln(N_{air}) = 6.891$

Uses NEW F_{en} Expressions Strain amplitude, ε_a = 0.8039 %, so N_{air} = 1,995 cycles; Integra

No.	Time t (min)	Time t (sec)	Temperature T (°C)	Temperature T (°F)	Strain e (%)	Strain Rate R (%/sec)	T'	O'	R'
1	0.00	0.00	37.78	100.00	0.0000	---	---	---	---
2	0.00	0.06	38.82	101.88	-0.0039	-0.0646	0.000	0.290	0.000
3	0.00	0.12	41.18	106.12	-0.0126	-0.1460	0.000	0.290	0.000
4	0.00	0.18	44.28	111.71	-0.0241	-0.1913	0.000	0.290	0.000
5	0.00	0.24	47.84	118.12	-0.0372	-0.2181	0.000	0.290	0.000
6	0.01	0.30	51.70	125.07	-0.0513	-0.2346	0.000	0.290	0.000
7	0.01	0.36	55.77	132.39	-0.0660	-0.2454	0.000	0.290	0.000
8	0.01	0.42	59.99	139.99	-0.0812	-0.2531	0.000	0.290	0.000
9	0.01	0.48	64.34	147.80	-0.0967	-0.2588	0.000	0.290	0.000
10	0.01	0.54	68.79	155.83	-0.1125	-0.2633	0.000	0.290	0.000
11	0.01	0.60	73.31	163.97	-0.1285	-0.2668	0.000	0.290	0.000
12	0.01	0.66	77.92	172.25	-0.1447	-0.2700	0.000	0.290	0.000
13	0.01	0.72	82.60	180.68	-0.1610	-0.2723	0.000	0.290	0.000
14	0.01	0.78	87.34	189.21	-0.1775	-0.2746	0.000	0.290	0.000
15	0.01	0.84	92.12	197.81	-0.1941	-0.2764	0.000	0.290	0.000
16	0.02	0.90	96.96	206.53	-0.2108	-0.2780	0.000	0.290	0.000
17	0.02	0.96	101.85	215.34	-0.2275	-0.2792	0.000	0.290	0.000
18	0.02	1.02	106.77	224.19	-0.2444	-0.2805	0.000	0.290	0.000
19	0.02	1.08	111.75	233.15	-0.2613	-0.2814	0.000	0.290	0.000
20	0.02	1.14	116.76	242.16	-0.2782	-0.2824	0.000	0.290	0.000
21	0.02	1.20	121.79	251.23	-0.2952	-0.2831	0.000	0.290	0.000
22	0.02	1.26	126.87	260.37	-0.3122	-0.2839	0.000	0.290	0.000
23	0.02	1.32	131.97	269.55	-0.3293	-0.2845	0.000	0.290	0.000
24	0.02	1.38	137.10	278.78	-0.3464	-0.2849	0.000	0.290	0.000
25	0.02	1.44	142.26	288.07	-0.3635	-0.2854	0.000	0.290	0.000
26	0.03	1.50	147.44	297.40	-0.3806	-0.2855	0.000	0.290	0.000
27	0.03	1.56	152.65	306.77	-0.3978	-0.2858	0.014	0.290	0.000
28	0.03	1.62	157.89	316.19	-0.4149	-0.2860	0.042	0.290	0.000
29	0.03	1.68	163.13	325.63	-0.4321	-0.2863	0.069	0.290	0.000
30	0.03	1.74	168.40	335.13	-0.4493	-0.2863	0.097	0.290	0.000
31	0.03	1.80	173.69	344.65	-0.4665	-0.2866	0.125	0.290	0.000
32	0.03	1.86	179.01	354.21	-0.4837	-0.2866	0.153	0.290	0.000
33	0.03	1.92	184.34	363.81	-0.5009	-0.2865	0.181	0.290	0.000
34	0.03	1.98	189.68	373.43	-0.5181	-0.2863	0.209	0.290	0.000
35	0.03	2.04	195.06	383.10	-0.5352	-0.2865	0.237	0.290	0.000
36	0.04	2.10	200.43	392.78	-0.5524	-0.2863	0.265	0.290	0.000
37	0.04	2.16	205.83	402.50	-0.5696	-0.2861	0.294	0.290	0.000
38	0.04	2.22	211.23	412.22	-0.5868	-0.2860	0.322	0.290	0.000
39	0.04	2.28	216.66	421.99	-0.6039	-0.2860	0.351	0.290	0.000
40	0.04	2.34	222.09	431.77	-0.6211	-0.2859	0.379	0.290	0.000
41	0.04	2.40	227.55	441.59	-0.6382	-0.2855	0.408	0.290	0.000

42	0.04	2.46	233.01	451.42	-0.6553	-0.2853	0.437	0.290	0.000
43	0.04	2.52	238.48	461.27	-0.6724	-0.2849	0.466	0.290	0.000
44	0.04	2.58	243.97	471.14	-0.6895	-0.2849	0.495	0.290	0.000
45	0.04	2.64	249.47	481.05	-0.7066	-0.2844	0.524	0.290	0.000
46	0.05	2.70	254.98	490.96	-0.7236	-0.2843	0.553	0.290	0.000
47	0.05	2.76	260.50	500.89	-0.7407	-0.2840	0.582	0.290	0.000
48	0.05	2.82	266.03	510.85	-0.7577	-0.2836	0.611	0.290	0.000
49	0.05	2.88	271.57	520.82	-0.7747	-0.2834	0.640	0.290	0.000
50	0.05	2.94	277.11	530.80	-0.7917	-0.2830	0.669	0.290	0.000
51	0.05	3.00	282.67	540.80	-0.8086	-0.2827	0.698	0.290	0.000
52	0.05	3.06	286.81	548.26	-0.8202	-0.1937	0.720	0.290	0.000
53	0.05	3.12	289.36	552.85	-0.8259	-0.0942	0.733	0.290	0.000
54	0.05	3.18	291.13	556.03	-0.8287	-0.0465	0.743	0.290	0.000
55	0.05	3.24	292.49	558.48	-0.8300	-0.0225	0.750	0.290	0.000
56	0.06	3.30	293.61	560.51	-0.8306	-0.0094	0.756	0.290	0.000
57	0.06	3.36	294.60	562.28	-0.8307	-0.0018	0.761	0.290	0.000
58	0.06	3.42	295.48	563.87	-0.8305	0.0032	0.766	0.290	-8.037
59	0.06	3.48	296.28	565.30	-0.8301	0.0068	0.770	0.290	-7.296
60	0.06	3.54	297.03	566.65	-0.8295	0.0095	0.774	0.290	-6.963
61	0.06	3.60	297.72	567.90	-0.8288	0.0116	0.777	0.290	-6.758
62	0.06	3.66	298.37	569.07	-0.8280	0.0134	0.781	0.290	-6.614
63	0.06	3.72	298.97	570.15	-0.8271	0.0148	0.784	0.290	-6.512
64	0.06	3.78	299.56	571.20	-0.8262	0.0162	0.787	0.290	-6.428
65	0.06	3.84	300.10	572.18	-0.8251	0.0172	0.790	0.290	-6.364
66	0.07	3.90	300.61	573.10	-0.8241	0.0181	0.793	0.290	-6.313
67	0.07	3.96	301.10	573.99	-0.8229	0.0190	0.795	0.290	-6.266
68	0.07	4.02	301.58	574.85	-0.8217	0.0197	0.798	0.290	-6.232
69	0.07	4.08	302.02	575.64	-0.8205	0.0203	0.800	0.290	-6.201
70	0.07	4.14	302.45	576.41	-0.8193	0.0208	0.802	0.290	-6.175
71	0.07	4.20	302.86	577.14	-0.8180	0.0213	0.805	0.290	-6.151
72	0.07	4.26	303.26	577.87	-0.8167	0.0217	0.807	0.290	-6.132
73	0.07	4.32	303.63	578.54	-0.8154	0.0220	0.809	0.290	-6.118
74	0.07	4.38	304.00	579.20	-0.8140	0.0224	0.811	0.290	-6.103
75	0.07	4.44	304.35	579.82	-0.8127	0.0227	0.812	0.290	-6.088
76	0.08	4.50	304.69	580.44	-0.8113	0.0229	0.814	0.290	-6.080
77	0.08	4.56	305.01	581.03	-0.8099	0.0231	0.816	0.290	-6.070
78	0.08	4.62	305.32	581.58	-0.8085	0.0233	0.817	0.290	-6.060
79	0.08	4.68	305.63	582.13	-0.8071	0.0234	0.819	0.290	-6.055
80	0.08	4.74	305.93	582.67	-0.8057	0.0236	0.821	0.290	-6.049
81	0.08	4.80	306.21	583.18	-0.8043	0.0238	0.822	0.290	-6.042
82	0.08	4.86	306.49	583.68	-0.8028	0.0238	0.824	0.290	-6.040
83	0.08	4.92	306.76	584.17	-0.8014	0.0240	0.825	0.290	-6.034
84	0.08	4.98	307.03	584.65	-0.7999	0.0240	0.826	0.290	-6.033
85	0.08	5.04	307.27	585.09	-0.7985	0.0241	0.828	0.290	-6.030
86	0.09	5.10	307.52	585.54	-0.7971	0.0241	0.829	0.290	-6.027
87	0.09	5.16	307.76	585.97	-0.7956	0.0242	0.830	0.290	-6.025
88	0.09	5.22	307.99	586.39	-0.7942	0.0242	0.832	0.290	-6.025

89	0.09	5.28	308.22	586.80	-0.7927	0.0242	0.833	0.290	-6.023
90	0.09	5.34	308.44	587.19	-0.7912	0.0243	0.834	0.290	-6.021
91	0.09	5.40	308.66	587.59	-0.7898	0.0242	0.835	0.290	-6.022
92	0.09	5.46	308.87	587.97	-0.7883	0.0243	0.836	0.290	-6.020
93	0.09	5.52	309.08	588.35	-0.7869	0.0242	0.837	0.290	-6.023
94	0.09	5.58	309.29	588.71	-0.7854	0.0243	0.838	0.290	-6.021
95	0.09	5.64	309.48	589.06	-0.7840	0.0242	0.839	0.290	-6.023
96	0.10	5.70	309.67	589.41	-0.7825	0.0243	0.840	0.290	-6.021
97	0.10	5.76	309.86	589.76	-0.7811	0.0242	0.841	0.290	-6.024
98	0.10	5.82	310.05	590.08	-0.7796	0.0242	0.842	0.290	-6.025
99	0.10	5.88	310.22	590.40	-0.7782	0.0242	0.843	0.290	-6.024
100	0.10	5.94	310.40	590.72	-0.7767	0.0241	0.844	0.290	-6.027
101	0.15	8.94	316.25	601.24	-0.7079	0.0229	0.875	0.290	-6.078
102	0.20	11.94	319.48	607.07	-0.6466	0.0205	0.892	0.290	-6.192
103	0.25	14.94	321.80	611.24	-0.5912	0.0184	0.904	0.290	-6.296
104	0.30	17.94	323.72	614.69	-0.5409	0.0168	0.914	0.290	-6.390
105	0.35	20.94	325.41	617.74	-0.4950	0.0153	0.920	0.290	-6.482
106	0.40	23.94	326.92	620.46	-0.4530	0.0140	0.920	0.290	-6.571
107	0.45	26.94	328.31	622.96	-0.4145	0.0128	0.920	0.290	-6.659
108	0.50	29.94	329.58	625.24	-0.3793	0.0118	0.920	0.290	-6.746
109	0.55	32.94	330.75	627.34	-0.3469	0.0108	0.920	0.290	-6.833
110	0.60	35.94	331.81	629.26	-0.3173	0.0099	0.920	0.290	-6.919
111	0.65	38.94	332.79	631.01	-0.2901	0.0091	0.920	0.290	-7.007
112	0.70	41.94	333.69	632.64	-0.2652	0.0083	0.920	0.290	-7.093
113	0.75	44.94	334.52	634.13	-0.2423	0.0076	0.920	0.290	-7.180
114	0.80	47.94	335.27	635.49	-0.2214	0.0070	0.920	0.290	-7.268
115	0.85	50.94	335.97	636.74	-0.2022	0.0064	0.920	0.290	-7.356
116	0.90	53.94	336.60	637.89	-0.1847	0.0059	0.920	0.290	-7.443
117	0.95	56.94	337.19	638.94	-0.1686	0.0054	0.920	0.290	-7.532
118	1.00	59.94	337.72	639.90	-0.1539	0.0049	0.920	0.290	-7.621
119	1.05	62.94	338.21	640.77	-0.1404	0.0045	0.920	0.290	-7.709
120	1.10	65.94	338.65	641.58	-0.1281	0.0041	0.920	0.290	-7.799
121	1.15	68.94	339.06	642.31	-0.1169	0.0037	0.920	0.290	-7.889
122	1.20	71.94	339.44	642.99	-0.1066	0.0034	0.920	0.290	-7.978
123	1.25	74.94	339.79	643.62	-0.0972	0.0031	0.920	0.290	-8.069
124	1.30	77.94	340.10	644.17	-0.0886	0.0029	0.920	0.290	-8.159
125	1.35	80.94	340.38	644.68	-0.0808	0.0026	0.920	0.290	-8.251
126	1.40	83.94	340.65	645.17	-0.0737	0.0024	0.920	0.290	-8.342
127	1.45	86.94	340.88	645.59	-0.0671	0.0022	0.920	0.290	-8.434
128	1.50	89.94	341.10	645.99	-0.0612	0.0020	0.920	0.290	-8.524
129	1.55	92.94	341.30	646.34	-0.0557	0.0018	0.920	0.290	-8.617
130	1.60	95.94	341.47	646.65	-0.0508	0.0017	0.920	0.290	-8.709
131	1.65	98.94	341.64	646.96	-0.0463	0.0015	0.920	0.290	-8.800
132	1.70	101.94	341.80	647.23	-0.0422	0.0014	0.920	0.290	-8.894
133	1.75	104.94	341.93	647.47	-0.0384	0.0013	0.920	0.290	-8.986
134	1.80	107.94	342.06	647.72	-0.0350	0.0011	0.920	0.290	-9.079
135	1.85	110.94	342.17	647.90	-0.0319	0.0010	0.920	0.290	-9.172

136	1.90	113.94	342.28	648.10	-0.0290	0.0009	0.920	0.290	-9.264
137	1.95	116.94	342.37	648.26	-0.0264	0.0009	0.920	0.290	-9.358
138	2.00	119.94	342.46	648.43	-0.0241	0.0008	0.920	0.290	-9.450
139	2.05	122.94	342.54	648.57	-0.0219	0.0007	0.920	0.290	-9.545
140	2.10	125.94	342.61	648.70	-0.0200	0.0007	0.920	0.290	-9.637
141	2.15	128.94	342.67	648.80	-0.0182	0.0006	0.920	0.290	-9.730
142	2.20	131.94	342.73	648.91	-0.0166	0.0005	0.920	0.290	-9.825
143	2.25	134.94	342.79	649.03	-0.0151	0.0005	0.920	0.290	-9.918
144	2.30	137.94	342.84	649.11	-0.0137	0.0004	0.920	0.290	-10.013
145	2.35	140.94	342.88	649.19	-0.0125	0.0004	0.920	0.290	-10.106
146	2.40	143.94	342.92	649.26	-0.0114	0.0004	0.920	0.290	-10.127
147	2.45	146.94	342.96	649.32	-0.0104	0.0003	0.920	0.290	-10.127
148	2.50	149.94	343.00	649.39	-0.0095	0.0003	0.920	0.290	-10.127
149	2.55	152.94	343.03	649.45	-0.0086	0.0003	0.920	0.290	-10.127
150	2.60	155.94	343.05	649.50	-0.0078	0.0003	0.920	0.290	-10.127
151	2.65	158.94	343.07	649.53	-0.0072	0.0002	0.920	0.290	-10.127
152	2.70	161.94	343.10	649.59	-0.0065	0.0002	0.920	0.290	-10.127
153	2.75	164.94	343.12	649.62	-0.0059	0.0002	0.920	0.290	-10.127
154	2.80	167.94	343.14	649.65	-0.0054	0.0002	0.920	0.290	-10.127
155	2.85	170.94	343.16	649.70	-0.0049	0.0002	0.920	0.290	-10.127
156	2.90	173.94	343.18	649.72	-0.0045	0.0001	0.920	0.290	-10.127
157	2.95	176.94	343.18	649.73	-0.0041	0.0001	0.920	0.290	-10.127
158	3.00	179.94	343.20	649.76	-0.0037	0.0001	0.920	0.290	-10.127
159	3.05	182.94	343.21	649.78	-0.0034	0.0001	0.920	0.290	-10.127
160	3.10	185.94	343.22	649.80	-0.0031	0.0001	0.920	0.290	-10.127
161	3.15	188.94	343.24	649.84	-0.0028	0.0001	0.920	0.290	-10.127
162	3.20	191.94	343.25	649.84	-0.0026	0.0001	0.920	0.290	-10.127
163	3.25	194.94	343.26	649.87	-0.0024	0.0001	0.920	0.290	-10.127
164	3.30	197.94	343.26	649.87	-0.0022	0.0001	0.920	0.290	-10.127
165	3.35	200.94	343.28	649.90	-0.0020	0.0001	0.920	0.290	-10.127
166	3.40	203.94	343.27	649.89	-0.0018	0.0001	0.920	0.290	-10.127
167	3.45	206.94	343.29	649.91	-0.0017	0.0001	0.920	0.290	-10.127
168	3.50	209.94	343.28	649.91	-0.0015	0.0000	0.920	0.290	-10.127
169	3.55	212.94	343.29	649.92	-0.0014	0.0000	0.920	0.290	-10.127
170	3.60	215.94	343.30	649.93	-0.0013	0.0000	0.920	0.290	-10.127
171	3.65	218.94	343.30	649.95	-0.0012	0.0000	0.920	0.290	-10.127
172	3.70	221.94	343.31	649.95	-0.0011	0.0000	0.920	0.290	-10.127
173	3.75	224.94	343.31	649.96	-0.0010	0.0000	0.920	0.290	-10.127
174	3.80	227.94	343.31	649.95	-0.0009	0.0000	0.920	0.290	-10.127
175	3.85	230.94	343.31	649.95	-0.0008	0.0000	0.920	0.290	-10.127
176	3.90	233.94	343.31	649.97	-0.0008	0.0000	0.920	0.290	-10.127
177	3.95	236.94	343.31	649.96	-0.0007	0.0000	0.920	0.290	-10.127
178	4.00	239.94	343.31	649.96	-0.0006	0.0000	0.920	0.290	-10.127
179	4.05	242.94	106.04	222.86	0.7727	0.2578	0.000	0.290	-3.658
180	4.05	243.00	105.88	222.58	0.7728	0.0020	0.000	0.290	-8.509
181	4.05	243.06	104.70	220.46	0.7737	0.0151	0.000	0.290	-6.499
182	4.05	243.12	103.54	218.38	0.7746	0.0146	0.000	0.290	-6.532

183	4.05	243.18	102.43	216.37	0.7754	0.0131	0.000	0.290	-6.635
184	4.05	243.24	101.37	214.47	0.7760	0.0108	0.000	0.290	-6.829
185	4.06	243.30	100.37	212.67	0.7765	0.0082	0.000	0.290	-7.108
186	4.06	243.36	99.42	210.96	0.7768	0.0056	0.000	0.290	-7.494
187	4.06	243.42	98.54	209.37	0.7770	0.0031	0.000	0.290	-8.074
188	4.06	243.48	97.70	207.85	0.7771	0.0009	0.000	0.290	-9.334
189	4.06	243.54	96.90	206.43	0.7770	-0.0011	0.000	0.290	0.000
190	4.06	243.60	96.15	205.06	0.7768	-0.0030	0.000	0.290	0.000
191	4.06	243.66	95.43	203.77	0.7766	-0.0045	0.000	0.290	0.000
192	4.06	243.72	94.75	202.55	0.7762	-0.0060	0.000	0.290	0.000
193	4.06	243.78	94.09	201.37	0.7758	-0.0073	0.000	0.290	0.000
194	4.06	243.84	93.47	200.25	0.7752	-0.0085	0.000	0.290	0.000
195	4.07	243.90	92.88	199.18	0.7747	-0.0095	0.000	0.290	0.000
196	4.07	243.96	92.31	198.15	0.7740	-0.0105	0.000	0.290	0.000
197	4.07	244.02	91.75	197.15	0.7734	-0.0114	0.000	0.290	0.000
198	4.07	244.08	91.23	196.21	0.7726	-0.0121	0.000	0.290	0.000
199	4.07	244.14	90.72	195.29	0.7719	-0.0128	0.000	0.290	0.000
200	4.07	244.20	90.24	194.43	0.7711	-0.0134	0.000	0.290	0.000
201	4.07	244.26	89.76	193.56	0.7702	-0.0140	0.000	0.290	0.000
202	4.07	244.32	89.31	192.76	0.7693	-0.0146	0.000	0.290	0.000
203	4.07	244.38	88.86	191.96	0.7684	-0.0150	0.000	0.290	0.000
204	4.07	244.44	88.44	191.20	0.7675	-0.0155	0.000	0.290	0.000
205	4.08	244.50	88.03	190.45	0.7666	-0.0159	0.000	0.290	0.000
206	4.08	244.56	87.63	189.73	0.7656	-0.0162	0.000	0.290	0.000
207	4.08	244.62	87.24	189.03	0.7646	-0.0166	0.000	0.290	0.000
208	4.08	244.68	86.86	188.35	0.7636	-0.0169	0.000	0.290	0.000
209	4.08	244.74	86.50	187.69	0.7625	-0.0172	0.000	0.290	0.000
210	4.08	244.80	86.15	187.07	0.7615	-0.0175	0.000	0.290	0.000
211	4.08	244.86	85.81	186.45	0.7604	-0.0177	0.000	0.290	0.000
212	4.08	244.92	85.47	185.84	0.7594	-0.0180	0.000	0.290	0.000
213	4.08	244.98	85.14	185.25	0.7583	-0.0181	0.000	0.290	0.000
214	4.08	245.04	84.82	184.67	0.7572	-0.0184	0.000	0.290	0.000
215	4.09	245.10	84.52	184.13	0.7561	-0.0185	0.000	0.290	0.000
216	4.09	245.16	84.21	183.58	0.7549	-0.0187	0.000	0.290	0.000
217	4.09	245.22	83.92	183.05	0.7538	-0.0188	0.000	0.290	0.000
218	4.09	245.28	83.63	182.53	0.7527	-0.0190	0.000	0.290	0.000
219	4.09	245.34	83.35	182.03	0.7515	-0.0191	0.000	0.290	0.000
220	4.09	245.40	83.08	181.55	0.7504	-0.0192	0.000	0.290	0.000
221	4.09	245.46	82.81	181.07	0.7492	-0.0193	0.000	0.290	0.000
222	4.09	245.52	82.55	180.58	0.7480	-0.0194	0.000	0.290	0.000
223	4.09	245.58	82.29	180.12	0.7469	-0.0195	0.000	0.290	0.000
224	4.09	245.64	82.03	179.66	0.7457	-0.0196	0.000	0.290	0.000
225	4.10	245.70	81.79	179.23	0.7445	-0.0197	0.000	0.290	0.000
226	4.10	245.76	81.55	178.80	0.7433	-0.0197	0.000	0.290	0.000
227	4.10	245.82	81.32	178.38	0.7421	-0.0198	0.000	0.290	0.000
228	4.10	245.88	81.09	177.97	0.7409	-0.0199	0.000	0.290	0.000
229	4.10	245.94	80.86	177.55	0.7397	-0.0199	0.000	0.290	0.000

230	4.10	246.00	80.64	177.16	0.7385	-0.0200	0.000	0.290	0.000
231	4.15	249.00	73.16	163.69	0.6784	-0.0201	0.000	0.290	0.000
232	4.20	252.00	68.92	156.06	0.6219	-0.0188	0.000	0.290	0.000
233	4.25	255.00	65.86	150.55	0.5703	-0.0172	0.000	0.290	0.000
234	4.30	258.00	63.33	145.99	0.5231	-0.0157	0.000	0.290	0.000
235	4.35	261.00	61.12	142.01	0.4800	-0.0144	0.000	0.290	0.000
236	4.40	264.00	59.14	138.44	0.4407	-0.0131	0.000	0.290	0.000
237	4.45	267.00	57.34	135.21	0.4046	-0.0120	0.000	0.290	0.000
238	4.50	270.00	55.70	132.27	0.3715	-0.0110	0.000	0.290	0.000
239	4.55	273.00	54.21	129.58	0.3412	-0.0101	0.000	0.290	0.000
240	4.60	276.00	52.85	127.13	0.3133	-0.0093	0.000	0.290	0.000
241	4.65	279.00	51.60	124.88	0.2877	-0.0085	0.000	0.290	0.000
242	4.70	282.00	50.46	122.83	0.2642	-0.0078	0.000	0.290	0.000
243	4.75	285.00	49.41	120.95	0.2426	-0.0072	0.000	0.290	0.000
244	4.80	288.00	48.45	119.21	0.2227	-0.0066	0.000	0.290	0.000
245	4.85	291.00	47.57	117.62	0.2045	-0.0061	0.000	0.290	0.000
246	4.90	294.00	46.76	116.17	0.1877	-0.0056	0.000	0.290	0.000
247	4.95	297.00	46.02	114.83	0.1723	-0.0051	0.000	0.290	0.000
248	5.00	300.00	45.34	113.61	0.1581	-0.0047	0.000	0.290	0.000
249	5.05	303.00	44.71	112.47	0.1451	-0.0043	0.000	0.290	0.000
250	5.10	306.00	44.13	111.44	0.1331	-0.0040	0.000	0.290	0.000
251	5.15	309.00	43.61	110.49	0.1221	-0.0037	0.000	0.290	0.000
252	5.20	312.00	43.13	109.63	0.1120	-0.0034	0.000	0.290	0.000
253	5.25	315.00	42.69	108.83	0.1027	-0.0031	0.000	0.290	0.000
254	5.30	318.00	42.28	108.10	0.0942	-0.0028	0.000	0.290	0.000
255	5.35	321.00	41.90	107.42	0.0864	-0.0026	0.000	0.290	0.000
256	5.40	324.00	41.56	106.81	0.0792	-0.0024	0.000	0.290	0.000
257	5.45	327.00	41.25	106.25	0.0726	-0.0022	0.000	0.290	0.000
258	5.50	330.00	40.96	105.73	0.0665	-0.0020	0.000	0.290	0.000
259	5.55	333.00	40.70	105.25	0.0610	-0.0019	0.000	0.290	0.000
260	5.60	336.00	40.45	104.82	0.0559	-0.0017	0.000	0.290	0.000
261	5.65	339.00	40.23	104.42	0.0512	-0.0016	0.000	0.290	0.000
262	5.70	342.00	40.02	104.04	0.0469	-0.0014	0.000	0.290	0.000
263	5.75	345.00	39.84	103.71	0.0429	-0.0013	0.000	0.290	0.000
264	5.80	348.00	39.66	103.39	0.0393	-0.0012	0.000	0.290	0.000
265	5.85	351.00	39.51	103.12	0.0360	-0.0011	0.000	0.290	0.000
266	5.90	354.00	39.36	102.85	0.0330	-0.0010	0.000	0.290	0.000
267	5.95	357.00	39.23	102.62	0.0302	-0.0009	0.000	0.290	0.000
268	6.00	360.00	39.12	102.41	0.0276	-0.0009	0.000	0.290	0.000
269	6.05	363.00	39.00	102.21	0.0253	-0.0008	0.000	0.290	0.000
270	6.10	366.00	38.90	102.01	0.0231	-0.0007	0.000	0.290	0.000
271	6.15	369.00	38.81	101.86	0.0212	-0.0007	0.000	0.290	0.000
272	6.20	372.00	38.72	101.70	0.0194	-0.0006	0.000	0.290	0.000
273	6.25	375.00	38.64	101.55	0.0177	-0.0006	0.000	0.290	0.000
274	6.30	378.00	38.56	101.41	0.0162	-0.0005	0.000	0.290	0.000
275	6.35	381.00	38.50	101.31	0.0148	-0.0005	0.000	0.290	0.000
276	6.40	384.00	38.44	101.19	0.0135	-0.0004	0.000	0.290	0.000

277	6.45	387.00	38.39	101.10	0.0124	-0.0004	0.000	0.290	0.000
278	6.50	390.00	38.33	101.00	0.0113	-0.0004	0.000	0.290	0.000
279	6.55	393.00	38.29	100.92	0.0103	-0.0003	0.000	0.290	0.000
280	6.60	396.00	38.25	100.85	0.0094	-0.0003	0.000	0.290	0.000
281	6.65	399.00	38.21	100.77	0.0086	-0.0003	0.000	0.290	0.000
282	6.70	402.00	38.17	100.71	0.0078	-0.0003	0.000	0.290	0.000
283	6.75	405.00	38.14	100.65	0.0072	-0.0002	0.000	0.290	0.000
284	6.80	408.00	38.11	100.61	0.0065	-0.0002	0.000	0.290	0.000
285	6.85	411.00	38.09	100.55	0.0059	-0.0002	0.000	0.290	0.000
286	6.90	414.00	38.06	100.50	0.0054	-0.0002	0.000	0.290	0.000
287	6.95	417.00	38.04	100.46	0.0049	-0.0002	0.000	0.290	0.000
288	7.00	420.00	38.01	100.41	0.0045	-0.0001	0.000	0.290	0.000
289	7.05	423.00	37.99	100.39	0.0041	-0.0001	0.000	0.290	0.000
290	7.10	426.00	37.97	100.35	0.0037	-0.0001	0.000	0.290	0.000
291	7.15	429.00	37.96	100.32	0.0034	-0.0001	0.000	0.290	0.000
292	7.20	432.00	37.94	100.29	0.0030	-0.0001	0.000	0.290	0.000
293	7.25	435.00	37.93	100.28	0.0028	-0.0001	0.000	0.290	0.000
294	7.30	438.00	37.91	100.24	0.0025	-0.0001	0.000	0.290	0.000
295	7.35	441.00	37.90	100.22	0.0022	-0.0001	0.000	0.290	0.000
296	7.40	444.00	37.90	100.23	0.0020	-0.0001	0.000	0.290	0.000
297	7.45	447.00	37.89	100.19	0.0018	-0.0001	0.000	0.290	0.000
298	7.50	450.00	37.87	100.17	0.0016	-0.0001	0.000	0.290	0.000
299	7.55	453.00	37.87	100.17	0.0015	-0.0001	0.000	0.290	0.000
300	7.60	456.00	37.86	100.15	0.0013	-0.0001	0.000	0.290	0.000
301	7.65	459.00	37.86	100.14	0.0012	0.0000	0.000	0.290	0.000
302	7.70	462.00	37.85	100.13	0.0010	0.0000	0.000	0.290	0.000
303	7.75	465.00	37.84	100.11	0.0009	0.0000	0.000	0.290	0.000
304	7.80	468.00	37.83	100.10	0.0008	0.0000	0.000	0.290	0.000
305	7.85	471.00	37.84	100.11	0.0007	0.0000	0.000	0.290	0.000
306	7.90	474.00	37.84	100.10	0.0006	0.0000	0.000	0.290	0.000
307	7.95	477.00	37.83	100.09	0.0005	0.0000	0.000	0.290	0.000
308	8.00	480.00	37.82	100.08	0.0005	0.0000	0.000	0.290	0.000

– 1.920 ln(ε_a – 0.112)	240.12	Nf air Code curve:	166	cycles
ated F_{en}'s = 3.858	1.6078	Nf air with factor of 8.4:	237	cycles
		Nf env:	62	cycles

$F_{en,i}$	F_{en} Integral Based on Strain
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1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00

1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
1.000	0.000E+00
5.957	7.188E-04
5.098	1.291E-03
4.770	1.685E-03
4.589	1.990E-03
4.472	2.239E-03
4.396	2.436E-03
4.338	2.615E-03
4.298	2.761E-03
4.268	2.888E-03
4.242	3.008E-03
4.229	3.101E-03
4.216	3.189E-03
4.208	3.266E-03
4.200	3.341E-03
4.197	3.402E-03
4.198	3.452E-03
4.197	3.504E-03
4.196	3.555E-03
4.202	3.588E-03
4.204	3.627E-03
4.207	3.663E-03
4.214	3.688E-03
4.219	3.716E-03
4.223	3.746E-03
4.232	3.761E-03
4.236	3.789E-03
4.246	3.800E-03
4.252	3.819E-03
4.259	3.836E-03
4.266	3.850E-03
4.275	3.858E-03

4.282	3.873E-03
4.289	3.884E-03
4.299	3.890E-03
4.305	3.904E-03
4.316	3.903E-03
4.322	3.917E-03
4.333	3.915E-03
4.338	3.929E-03
4.349	3.927E-03
4.357	3.930E-03
4.363	3.940E-03
4.373	3.939E-03
4.675	2.000E-01
4.962	1.894E-01
5.211	1.794E-01
5.443	1.704E-01
5.638	1.610E-01
5.773	1.508E-01
5.910	1.414E-01
6.049	1.327E-01
6.190	1.245E-01
6.335	1.168E-01
6.485	1.096E-01
6.636	1.028E-01
6.791	9.652E-02
6.953	9.049E-02
7.117	8.485E-02
7.285	7.957E-02
7.459	7.459E-02
7.639	6.986E-02
7.821	6.547E-02
8.011	6.130E-02
8.205	5.740E-02
8.403	5.376E-02
8.609	5.029E-02
8.819	4.708E-02
9.036	4.402E-02
9.260	4.116E-02
9.489	3.850E-02
9.721	3.602E-02
9.964	3.365E-02
10.212	3.146E-02
10.464	2.942E-02
10.729	2.747E-02
10.995	2.568E-02
11.272	2.398E-02
11.554	2.241E-02

11.842	2.094E-02
12.143	1.955E-02
12.445	1.827E-02
12.763	1.704E-02
13.081	1.593E-02
13.410	1.488E-02
13.753	1.388E-02
14.100	1.296E-02
14.462	1.209E-02
14.825	1.130E-02
14.906	1.035E-02
14.906	9.420E-03
14.906	8.576E-03
14.906	7.788E-03
14.906	7.111E-03
14.906	6.462E-03
14.906	5.878E-03
14.906	5.350E-03
14.906	4.877E-03
14.906	4.441E-03
14.906	4.052E-03
14.906	3.671E-03
14.906	3.338E-03
14.906	3.032E-03
14.906	2.772E-03
14.906	2.531E-03
14.906	2.290E-03
14.906	2.086E-03
14.906	1.901E-03
14.906	1.734E-03
14.906	1.567E-03
14.906	1.437E-03
14.906	1.317E-03
14.906	1.168E-03
14.906	1.103E-03
14.906	9.735E-04
14.906	8.993E-04
14.906	8.252E-04
14.906	7.232E-04
14.906	6.675E-04
14.906	6.305E-04
14.906	5.470E-04
14.906	5.099E-04
1.000	4.810E-01
1.000	7.526E-05
1.000	5.616E-04
1.000	5.436E-04

1.000	4.901E-04
1.000	4.037E-04
1.000	3.054E-04
1.000	2.077E-04
1.000	1.163E-04
1.000	3.296E-05
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Test No. 1 ANL Best Fit Air Curve for SS (Eqn. (32) from NUREG/CR-6909): $\ln(N_{air}) = 6.891$

Uses OLD 6909 F_{en} Expressions Strain amplitude, ε_a = 0.8039 %, so N_{air} = 1,995 cycles; Integra

No.	Time t (min)	Time t (sec)	Temperature T (°C)	Temperature T (°F)	Strain e (%)	Strain Rate R (%/sec)	T'	O'	R'
1	0.00	0.00	37.78	100.00	0.0000	---	---	---	---
2	0.00	0.06	38.82	101.88	-0.0039	-0.0646	0.000	0.281	-6.908
3	0.00	0.12	41.18	106.12	-0.0126	-0.1460	0.000	0.281	-6.908
4	0.00	0.18	44.28	111.71	-0.0241	-0.1913	0.000	0.281	-6.908
5	0.00	0.24	47.84	118.12	-0.0372	-0.2181	0.000	0.281	-6.908
6	0.01	0.30	51.70	125.07	-0.0513	-0.2346	0.000	0.281	-6.908
7	0.01	0.36	55.77	132.39	-0.0660	-0.2454	0.000	0.281	-6.908
8	0.01	0.42	59.99	139.99	-0.0812	-0.2531	0.000	0.281	-6.908
9	0.01	0.48	64.34	147.80	-0.0967	-0.2588	0.000	0.281	-6.908
10	0.01	0.54	68.79	155.83	-0.1125	-0.2633	0.000	0.281	-6.908
11	0.01	0.60	73.31	163.97	-0.1285	-0.2668	0.000	0.281	-6.908
12	0.01	0.66	77.92	172.25	-0.1447	-0.2700	0.000	0.281	-6.908
13	0.01	0.72	82.60	180.68	-0.1610	-0.2723	0.000	0.281	-6.908
14	0.01	0.78	87.34	189.21	-0.1775	-0.2746	0.000	0.281	-6.908
15	0.01	0.84	92.12	197.81	-0.1941	-0.2764	0.000	0.281	-6.908
16	0.02	0.90	96.96	206.53	-0.2108	-0.2780	0.000	0.281	-6.908
17	0.02	0.96	101.85	215.34	-0.2275	-0.2792	0.000	0.281	-6.908
18	0.02	1.02	106.77	224.19	-0.2444	-0.2805	0.000	0.281	-6.908
19	0.02	1.08	111.75	233.15	-0.2613	-0.2814	0.000	0.281	-6.908
20	0.02	1.14	116.76	242.16	-0.2782	-0.2824	0.000	0.281	-6.908
21	0.02	1.20	121.79	251.23	-0.2952	-0.2831	0.000	0.281	-6.908
22	0.02	1.26	126.87	260.37	-0.3122	-0.2839	0.000	0.281	-6.908
23	0.02	1.32	131.97	269.55	-0.3293	-0.2845	0.000	0.281	-6.908
24	0.02	1.38	137.10	278.78	-0.3464	-0.2849	0.000	0.281	-6.908
25	0.02	1.44	142.26	288.07	-0.3635	-0.2854	0.000	0.281	-6.908
26	0.03	1.50	147.44	297.40	-0.3806	-0.2855	0.000	0.281	-6.908
27	0.03	1.56	152.65	306.77	-0.3978	-0.2858	0.015	0.281	-6.908
28	0.03	1.62	157.89	316.19	-0.4149	-0.2860	0.045	0.281	-6.908
29	0.03	1.68	163.13	325.63	-0.4321	-0.2863	0.075	0.281	-6.908
30	0.03	1.74	168.40	335.13	-0.4493	-0.2863	0.105	0.281	-6.908
31	0.03	1.80	173.69	344.65	-0.4665	-0.2866	0.135	0.281	-6.908
32	0.03	1.86	179.01	354.21	-0.4837	-0.2866	0.166	0.281	-6.908
33	0.03	1.92	184.34	363.81	-0.5009	-0.2865	0.196	0.281	-6.908
34	0.03	1.98	189.68	373.43	-0.5181	-0.2863	0.227	0.281	-6.908
35	0.03	2.04	195.06	383.10	-0.5352	-0.2865	0.257	0.281	-6.908
36	0.04	2.10	200.43	392.78	-0.5524	-0.2863	0.288	0.281	-6.908
37	0.04	2.16	205.83	402.50	-0.5696	-0.2861	0.319	0.281	-6.908
38	0.04	2.22	211.23	412.22	-0.5868	-0.2860	0.350	0.281	-6.908
39	0.04	2.28	216.66	421.99	-0.6039	-0.2860	0.381	0.281	-6.908
40	0.04	2.34	222.09	431.77	-0.6211	-0.2859	0.412	0.281	-6.908
41	0.04	2.40	227.55	441.59	-0.6382	-0.2855	0.443	0.281	-6.908

42	0.04	2.46	233.01	451.42	-0.6553	-0.2853	0.474	0.281	-6.908
43	0.04	2.52	238.48	461.27	-0.6724	-0.2849	0.506	0.281	-6.908
44	0.04	2.58	243.97	471.14	-0.6895	-0.2849	0.537	0.281	-6.908
45	0.04	2.64	249.47	481.05	-0.7066	-0.2844	0.568	0.281	-6.908
46	0.05	2.70	254.98	490.96	-0.7236	-0.2843	0.600	0.281	-6.908
47	0.05	2.76	260.50	500.89	-0.7407	-0.2840	0.631	0.281	-6.908
48	0.05	2.82	266.03	510.85	-0.7577	-0.2836	0.663	0.281	-6.908
49	0.05	2.88	271.57	520.82	-0.7747	-0.2834	0.695	0.281	-6.908
50	0.05	2.94	277.11	530.80	-0.7917	-0.2830	0.726	0.281	-6.908
51	0.05	3.00	282.67	540.80	-0.8086	-0.2827	0.758	0.281	-6.908
52	0.05	3.06	286.81	548.26	-0.8202	-0.1937	0.782	0.281	-6.908
53	0.05	3.12	289.36	552.85	-0.8259	-0.0942	0.796	0.281	-6.908
54	0.05	3.18	291.13	556.03	-0.8287	-0.0465	0.806	0.281	-6.908
55	0.05	3.24	292.49	558.48	-0.8300	-0.0225	0.814	0.281	-6.908
56	0.06	3.30	293.61	560.51	-0.8306	-0.0094	0.821	0.281	-6.908
57	0.06	3.36	294.60	562.28	-0.8307	-0.0018	0.826	0.281	-6.908
58	0.06	3.42	295.48	563.87	-0.8305	0.0032	0.831	0.281	-4.818
59	0.06	3.48	296.28	565.30	-0.8301	0.0068	0.836	0.281	-4.077
60	0.06	3.54	297.03	566.65	-0.8295	0.0095	0.840	0.281	-3.744
61	0.06	3.60	297.72	567.90	-0.8288	0.0116	0.844	0.281	-3.539
62	0.06	3.66	298.37	569.07	-0.8280	0.0134	0.848	0.281	-3.395
63	0.06	3.72	298.97	570.15	-0.8271	0.0148	0.851	0.281	-3.293
64	0.06	3.78	299.56	571.20	-0.8262	0.0162	0.855	0.281	-3.210
65	0.06	3.84	300.10	572.18	-0.8251	0.0172	0.858	0.281	-3.146
66	0.07	3.90	300.61	573.10	-0.8241	0.0181	0.861	0.281	-3.094
67	0.07	3.96	301.10	573.99	-0.8229	0.0190	0.863	0.281	-3.047
68	0.07	4.02	301.58	574.85	-0.8217	0.0197	0.866	0.281	-3.013
69	0.07	4.08	302.02	575.64	-0.8205	0.0203	0.869	0.281	-2.982
70	0.07	4.14	302.45	576.41	-0.8193	0.0208	0.871	0.281	-2.957
71	0.07	4.20	302.86	577.14	-0.8180	0.0213	0.873	0.281	-2.932
72	0.07	4.26	303.26	577.87	-0.8167	0.0217	0.876	0.281	-2.913
73	0.07	4.32	303.63	578.54	-0.8154	0.0220	0.878	0.281	-2.899
74	0.07	4.38	304.00	579.20	-0.8140	0.0224	0.880	0.281	-2.884
75	0.07	4.44	304.35	579.82	-0.8127	0.0227	0.882	0.281	-2.869
76	0.08	4.50	304.69	580.44	-0.8113	0.0229	0.884	0.281	-2.861
77	0.08	4.56	305.01	581.03	-0.8099	0.0231	0.886	0.281	-2.851
78	0.08	4.62	305.32	581.58	-0.8085	0.0233	0.888	0.281	-2.842
79	0.08	4.68	305.63	582.13	-0.8071	0.0234	0.889	0.281	-2.837
80	0.08	4.74	305.93	582.67	-0.8057	0.0236	0.891	0.281	-2.830
81	0.08	4.80	306.21	583.18	-0.8043	0.0238	0.893	0.281	-2.823
82	0.08	4.86	306.49	583.68	-0.8028	0.0238	0.894	0.281	-2.821
83	0.08	4.92	306.76	584.17	-0.8014	0.0240	0.896	0.281	-2.815
84	0.08	4.98	307.03	584.65	-0.7999	0.0240	0.897	0.281	-2.814
85	0.08	5.04	307.27	585.09	-0.7985	0.0241	0.899	0.281	-2.811
86	0.09	5.10	307.52	585.54	-0.7971	0.0241	0.900	0.281	-2.808
87	0.09	5.16	307.76	585.97	-0.7956	0.0242	0.902	0.281	-2.806
88	0.09	5.22	307.99	586.39	-0.7942	0.0242	0.903	0.281	-2.806

89	0.09	5.28	308.22	586.80	-0.7927	0.0242	0.904	0.281	-2.804
90	0.09	5.34	308.44	587.19	-0.7912	0.0243	0.905	0.281	-2.802
91	0.09	5.40	308.66	587.59	-0.7898	0.0242	0.907	0.281	-2.803
92	0.09	5.46	308.87	587.97	-0.7883	0.0243	0.908	0.281	-2.801
93	0.09	5.52	309.08	588.35	-0.7869	0.0242	0.909	0.281	-2.804
94	0.09	5.58	309.29	588.71	-0.7854	0.0243	0.910	0.281	-2.802
95	0.09	5.64	309.48	589.06	-0.7840	0.0242	0.911	0.281	-2.804
96	0.10	5.70	309.67	589.41	-0.7825	0.0243	0.912	0.281	-2.802
97	0.10	5.76	309.86	589.76	-0.7811	0.0242	0.914	0.281	-2.805
98	0.10	5.82	310.05	590.08	-0.7796	0.0242	0.915	0.281	-2.806
99	0.10	5.88	310.22	590.40	-0.7782	0.0242	0.916	0.281	-2.805
100	0.10	5.94	310.40	590.72	-0.7767	0.0241	0.917	0.281	-2.808
101	0.15	8.94	316.25	601.24	-0.7079	0.0229	0.950	0.281	-2.859
102	0.20	11.94	319.48	607.07	-0.6466	0.0205	0.968	0.281	-2.973
103	0.25	14.94	321.80	611.24	-0.5912	0.0184	0.982	0.281	-3.077
104	0.30	17.94	323.72	614.69	-0.5409	0.0168	0.993	0.281	-3.171
105	0.35	20.94	325.41	617.74	-0.4950	0.0153	1.000	0.281	-3.263
106	0.40	23.94	326.92	620.46	-0.4530	0.0140	1.000	0.281	-3.353
107	0.45	26.94	328.31	622.96	-0.4145	0.0128	1.000	0.281	-3.440
108	0.50	29.94	329.58	625.24	-0.3793	0.0118	1.000	0.281	-3.527
109	0.55	32.94	330.75	627.34	-0.3469	0.0108	1.000	0.281	-3.614
110	0.60	35.94	331.81	629.26	-0.3173	0.0099	1.000	0.281	-3.700
111	0.65	38.94	332.79	631.01	-0.2901	0.0091	1.000	0.281	-3.788
112	0.70	41.94	333.69	632.64	-0.2652	0.0083	1.000	0.281	-3.874
113	0.75	44.94	334.52	634.13	-0.2423	0.0076	1.000	0.281	-3.961
114	0.80	47.94	335.27	635.49	-0.2214	0.0070	1.000	0.281	-4.049
115	0.85	50.94	335.97	636.74	-0.2022	0.0064	1.000	0.281	-4.137
116	0.90	53.94	336.60	637.89	-0.1847	0.0059	1.000	0.281	-4.224
117	0.95	56.94	337.19	638.94	-0.1686	0.0054	1.000	0.281	-4.313
118	1.00	59.94	337.72	639.90	-0.1539	0.0049	1.000	0.281	-4.402
119	1.05	62.94	338.21	640.77	-0.1404	0.0045	1.000	0.281	-4.491
120	1.10	65.94	338.65	641.58	-0.1281	0.0041	1.000	0.281	-4.580
121	1.15	68.94	339.06	642.31	-0.1169	0.0037	1.000	0.281	-4.670
122	1.20	71.94	339.44	642.99	-0.1066	0.0034	1.000	0.281	-4.759
123	1.25	74.94	339.79	643.62	-0.0972	0.0031	1.000	0.281	-4.850
124	1.30	77.94	340.10	644.17	-0.0886	0.0029	1.000	0.281	-4.940
125	1.35	80.94	340.38	644.68	-0.0808	0.0026	1.000	0.281	-5.032
126	1.40	83.94	340.65	645.17	-0.0737	0.0024	1.000	0.281	-5.124
127	1.45	86.94	340.88	645.59	-0.0671	0.0022	1.000	0.281	-5.215
128	1.50	89.94	341.10	645.99	-0.0612	0.0020	1.000	0.281	-5.306
129	1.55	92.94	341.30	646.34	-0.0557	0.0018	1.000	0.281	-5.398
130	1.60	95.94	341.47	646.65	-0.0508	0.0017	1.000	0.281	-5.490
131	1.65	98.94	341.64	646.96	-0.0463	0.0015	1.000	0.281	-5.582
132	1.70	101.94	341.80	647.23	-0.0422	0.0014	1.000	0.281	-5.675
133	1.75	104.94	341.93	647.47	-0.0384	0.0013	1.000	0.281	-5.767
134	1.80	107.94	342.06	647.72	-0.0350	0.0011	1.000	0.281	-5.860
135	1.85	110.94	342.17	647.90	-0.0319	0.0010	1.000	0.281	-5.953

136	1.90	113.94	342.28	648.10	-0.0290	0.0009	1.000	0.281	-6.045
137	1.95	116.94	342.37	648.26	-0.0264	0.0009	1.000	0.281	-6.139
138	2.00	119.94	342.46	648.43	-0.0241	0.0008	1.000	0.281	-6.231
139	2.05	122.94	342.54	648.57	-0.0219	0.0007	1.000	0.281	-6.326
140	2.10	125.94	342.61	648.70	-0.0200	0.0007	1.000	0.281	-6.418
141	2.15	128.94	342.67	648.80	-0.0182	0.0006	1.000	0.281	-6.511
142	2.20	131.94	342.73	648.91	-0.0166	0.0005	1.000	0.281	-6.606
143	2.25	134.94	342.79	649.03	-0.0151	0.0005	1.000	0.281	-6.699
144	2.30	137.94	342.84	649.11	-0.0137	0.0004	1.000	0.281	-6.794
145	2.35	140.94	342.88	649.19	-0.0125	0.0004	1.000	0.281	-6.887
146	2.40	143.94	342.92	649.26	-0.0114	0.0004	1.000	0.281	-6.908
147	2.45	146.94	342.96	649.32	-0.0104	0.0003	1.000	0.281	-6.908
148	2.50	149.94	343.00	649.39	-0.0095	0.0003	1.000	0.281	-6.908
149	2.55	152.94	343.03	649.45	-0.0086	0.0003	1.000	0.281	-6.908
150	2.60	155.94	343.05	649.50	-0.0078	0.0003	1.000	0.281	-6.908
151	2.65	158.94	343.07	649.53	-0.0072	0.0002	1.000	0.281	-6.908
152	2.70	161.94	343.10	649.59	-0.0065	0.0002	1.000	0.281	-6.908
153	2.75	164.94	343.12	649.62	-0.0059	0.0002	1.000	0.281	-6.908
154	2.80	167.94	343.14	649.65	-0.0054	0.0002	1.000	0.281	-6.908
155	2.85	170.94	343.16	649.70	-0.0049	0.0002	1.000	0.281	-6.908
156	2.90	173.94	343.18	649.72	-0.0045	0.0001	1.000	0.281	-6.908
157	2.95	176.94	343.18	649.73	-0.0041	0.0001	1.000	0.281	-6.908
158	3.00	179.94	343.20	649.76	-0.0037	0.0001	1.000	0.281	-6.908
159	3.05	182.94	343.21	649.78	-0.0034	0.0001	1.000	0.281	-6.908
160	3.10	185.94	343.22	649.80	-0.0031	0.0001	1.000	0.281	-6.908
161	3.15	188.94	343.24	649.84	-0.0028	0.0001	1.000	0.281	-6.908
162	3.20	191.94	343.25	649.84	-0.0026	0.0001	1.000	0.281	-6.908
163	3.25	194.94	343.26	649.87	-0.0024	0.0001	1.000	0.281	-6.908
164	3.30	197.94	343.26	649.87	-0.0022	0.0001	1.000	0.281	-6.908
165	3.35	200.94	343.28	649.90	-0.0020	0.0001	1.000	0.281	-6.908
166	3.40	203.94	343.27	649.89	-0.0018	0.0001	1.000	0.281	-6.908
167	3.45	206.94	343.29	649.91	-0.0017	0.0001	1.000	0.281	-6.908
168	3.50	209.94	343.28	649.91	-0.0015	0.0000	1.000	0.281	-6.908
169	3.55	212.94	343.29	649.92	-0.0014	0.0000	1.000	0.281	-6.908
170	3.60	215.94	343.30	649.93	-0.0013	0.0000	1.000	0.281	-6.908
171	3.65	218.94	343.30	649.95	-0.0012	0.0000	1.000	0.281	-6.908
172	3.70	221.94	343.31	649.95	-0.0011	0.0000	1.000	0.281	-6.908
173	3.75	224.94	343.31	649.96	-0.0010	0.0000	1.000	0.281	-6.908
174	3.80	227.94	343.31	649.95	-0.0009	0.0000	1.000	0.281	-6.908
175	3.85	230.94	343.31	649.95	-0.0008	0.0000	1.000	0.281	-6.908
176	3.90	233.94	343.31	649.97	-0.0008	0.0000	1.000	0.281	-6.908
177	3.95	236.94	343.31	649.96	-0.0007	0.0000	1.000	0.281	-6.908
178	4.00	239.94	343.31	649.96	-0.0006	0.0000	1.000	0.281	-6.908
179	4.05	242.94	106.04	222.86	0.7727	0.2578	0.000	0.281	-0.439
180	4.05	243.00	105.88	222.58	0.7728	0.0020	0.000	0.281	-5.290
181	4.05	243.06	104.70	220.46	0.7737	0.0151	0.000	0.281	-3.280
182	4.05	243.12	103.54	218.38	0.7746	0.0146	0.000	0.281	-3.313

183	4.05	243.18	102.43	216.37	0.7754	0.0131	0.000	0.281	-3.416
184	4.05	243.24	101.37	214.47	0.7760	0.0108	0.000	0.281	-3.610
185	4.06	243.30	100.37	212.67	0.7765	0.0082	0.000	0.281	-3.889
186	4.06	243.36	99.42	210.96	0.7768	0.0056	0.000	0.281	-4.275
187	4.06	243.42	98.54	209.37	0.7770	0.0031	0.000	0.281	-4.855
188	4.06	243.48	97.70	207.85	0.7771	0.0009	0.000	0.281	-6.116
189	4.06	243.54	96.90	206.43	0.7770	-0.0011	0.000	0.281	-6.908
190	4.06	243.60	96.15	205.06	0.7768	-0.0030	0.000	0.281	-6.908
191	4.06	243.66	95.43	203.77	0.7766	-0.0045	0.000	0.281	-6.908
192	4.06	243.72	94.75	202.55	0.7762	-0.0060	0.000	0.281	-6.908
193	4.06	243.78	94.09	201.37	0.7758	-0.0073	0.000	0.281	-6.908
194	4.06	243.84	93.47	200.25	0.7752	-0.0085	0.000	0.281	-6.908
195	4.07	243.90	92.88	199.18	0.7747	-0.0095	0.000	0.281	-6.908
196	4.07	243.96	92.31	198.15	0.7740	-0.0105	0.000	0.281	-6.908
197	4.07	244.02	91.75	197.15	0.7734	-0.0114	0.000	0.281	-6.908
198	4.07	244.08	91.23	196.21	0.7726	-0.0121	0.000	0.281	-6.908
199	4.07	244.14	90.72	195.29	0.7719	-0.0128	0.000	0.281	-6.908
200	4.07	244.20	90.24	194.43	0.7711	-0.0134	0.000	0.281	-6.908
201	4.07	244.26	89.76	193.56	0.7702	-0.0140	0.000	0.281	-6.908
202	4.07	244.32	89.31	192.76	0.7693	-0.0146	0.000	0.281	-6.908
203	4.07	244.38	88.86	191.96	0.7684	-0.0150	0.000	0.281	-6.908
204	4.07	244.44	88.44	191.20	0.7675	-0.0155	0.000	0.281	-6.908
205	4.08	244.50	88.03	190.45	0.7666	-0.0159	0.000	0.281	-6.908
206	4.08	244.56	87.63	189.73	0.7656	-0.0162	0.000	0.281	-6.908
207	4.08	244.62	87.24	189.03	0.7646	-0.0166	0.000	0.281	-6.908
208	4.08	244.68	86.86	188.35	0.7636	-0.0169	0.000	0.281	-6.908
209	4.08	244.74	86.50	187.69	0.7625	-0.0172	0.000	0.281	-6.908
210	4.08	244.80	86.15	187.07	0.7615	-0.0175	0.000	0.281	-6.908
211	4.08	244.86	85.81	186.45	0.7604	-0.0177	0.000	0.281	-6.908
212	4.08	244.92	85.47	185.84	0.7594	-0.0180	0.000	0.281	-6.908
213	4.08	244.98	85.14	185.25	0.7583	-0.0181	0.000	0.281	-6.908
214	4.08	245.04	84.82	184.67	0.7572	-0.0184	0.000	0.281	-6.908
215	4.09	245.10	84.52	184.13	0.7561	-0.0185	0.000	0.281	-6.908
216	4.09	245.16	84.21	183.58	0.7549	-0.0187	0.000	0.281	-6.908
217	4.09	245.22	83.92	183.05	0.7538	-0.0188	0.000	0.281	-6.908
218	4.09	245.28	83.63	182.53	0.7527	-0.0190	0.000	0.281	-6.908
219	4.09	245.34	83.35	182.03	0.7515	-0.0191	0.000	0.281	-6.908
220	4.09	245.40	83.08	181.55	0.7504	-0.0192	0.000	0.281	-6.908
221	4.09	245.46	82.81	181.07	0.7492	-0.0193	0.000	0.281	-6.908
222	4.09	245.52	82.55	180.58	0.7480	-0.0194	0.000	0.281	-6.908
223	4.09	245.58	82.29	180.12	0.7469	-0.0195	0.000	0.281	-6.908
224	4.09	245.64	82.03	179.66	0.7457	-0.0196	0.000	0.281	-6.908
225	4.10	245.70	81.79	179.23	0.7445	-0.0197	0.000	0.281	-6.908
226	4.10	245.76	81.55	178.80	0.7433	-0.0197	0.000	0.281	-6.908
227	4.10	245.82	81.32	178.38	0.7421	-0.0198	0.000	0.281	-6.908
228	4.10	245.88	81.09	177.97	0.7409	-0.0199	0.000	0.281	-6.908
229	4.10	245.94	80.86	177.55	0.7397	-0.0199	0.000	0.281	-6.908

230	4.10	246.00	80.64	177.16	0.7385	-0.0200	0.000	0.281	-6.908
231	4.15	249.00	73.16	163.69	0.6784	-0.0201	0.000	0.281	-6.908
232	4.20	252.00	68.92	156.06	0.6219	-0.0188	0.000	0.281	-6.908
233	4.25	255.00	65.86	150.55	0.5703	-0.0172	0.000	0.281	-6.908
234	4.30	258.00	63.33	145.99	0.5231	-0.0157	0.000	0.281	-6.908
235	4.35	261.00	61.12	142.01	0.4800	-0.0144	0.000	0.281	-6.908
236	4.40	264.00	59.14	138.44	0.4407	-0.0131	0.000	0.281	-6.908
237	4.45	267.00	57.34	135.21	0.4046	-0.0120	0.000	0.281	-6.908
238	4.50	270.00	55.70	132.27	0.3715	-0.0110	0.000	0.281	-6.908
239	4.55	273.00	54.21	129.58	0.3412	-0.0101	0.000	0.281	-6.908
240	4.60	276.00	52.85	127.13	0.3133	-0.0093	0.000	0.281	-6.908
241	4.65	279.00	51.60	124.88	0.2877	-0.0085	0.000	0.281	-6.908
242	4.70	282.00	50.46	122.83	0.2642	-0.0078	0.000	0.281	-6.908
243	4.75	285.00	49.41	120.95	0.2426	-0.0072	0.000	0.281	-6.908
244	4.80	288.00	48.45	119.21	0.2227	-0.0066	0.000	0.281	-6.908
245	4.85	291.00	47.57	117.62	0.2045	-0.0061	0.000	0.281	-6.908
246	4.90	294.00	46.76	116.17	0.1877	-0.0056	0.000	0.281	-6.908
247	4.95	297.00	46.02	114.83	0.1723	-0.0051	0.000	0.281	-6.908
248	5.00	300.00	45.34	113.61	0.1581	-0.0047	0.000	0.281	-6.908
249	5.05	303.00	44.71	112.47	0.1451	-0.0043	0.000	0.281	-6.908
250	5.10	306.00	44.13	111.44	0.1331	-0.0040	0.000	0.281	-6.908
251	5.15	309.00	43.61	110.49	0.1221	-0.0037	0.000	0.281	-6.908
252	5.20	312.00	43.13	109.63	0.1120	-0.0034	0.000	0.281	-6.908
253	5.25	315.00	42.69	108.83	0.1027	-0.0031	0.000	0.281	-6.908
254	5.30	318.00	42.28	108.10	0.0942	-0.0028	0.000	0.281	-6.908
255	5.35	321.00	41.90	107.42	0.0864	-0.0026	0.000	0.281	-6.908
256	5.40	324.00	41.56	106.81	0.0792	-0.0024	0.000	0.281	-6.908
257	5.45	327.00	41.25	106.25	0.0726	-0.0022	0.000	0.281	-6.908
258	5.50	330.00	40.96	105.73	0.0665	-0.0020	0.000	0.281	-6.908
259	5.55	333.00	40.70	105.25	0.0610	-0.0019	0.000	0.281	-6.908
260	5.60	336.00	40.45	104.82	0.0559	-0.0017	0.000	0.281	-6.908
261	5.65	339.00	40.23	104.42	0.0512	-0.0016	0.000	0.281	-6.908
262	5.70	342.00	40.02	104.04	0.0469	-0.0014	0.000	0.281	-6.908
263	5.75	345.00	39.84	103.71	0.0429	-0.0013	0.000	0.281	-6.908
264	5.80	348.00	39.66	103.39	0.0393	-0.0012	0.000	0.281	-6.908
265	5.85	351.00	39.51	103.12	0.0360	-0.0011	0.000	0.281	-6.908
266	5.90	354.00	39.36	102.85	0.0330	-0.0010	0.000	0.281	-6.908
267	5.95	357.00	39.23	102.62	0.0302	-0.0009	0.000	0.281	-6.908
268	6.00	360.00	39.12	102.41	0.0276	-0.0009	0.000	0.281	-6.908
269	6.05	363.00	39.00	102.21	0.0253	-0.0008	0.000	0.281	-6.908
270	6.10	366.00	38.90	102.01	0.0231	-0.0007	0.000	0.281	-6.908
271	6.15	369.00	38.81	101.86	0.0212	-0.0007	0.000	0.281	-6.908
272	6.20	372.00	38.72	101.70	0.0194	-0.0006	0.000	0.281	-6.908
273	6.25	375.00	38.64	101.55	0.0177	-0.0006	0.000	0.281	-6.908
274	6.30	378.00	38.56	101.41	0.0162	-0.0005	0.000	0.281	-6.908
275	6.35	381.00	38.50	101.31	0.0148	-0.0005	0.000	0.281	-6.908
276	6.40	384.00	38.44	101.19	0.0135	-0.0004	0.000	0.281	-6.908

277	6.45	387.00	38.39	101.10	0.0124	-0.0004	0.000	0.281	-6.908
278	6.50	390.00	38.33	101.00	0.0113	-0.0004	0.000	0.281	-6.908
279	6.55	393.00	38.29	100.92	0.0103	-0.0003	0.000	0.281	-6.908
280	6.60	396.00	38.25	100.85	0.0094	-0.0003	0.000	0.281	-6.908
281	6.65	399.00	38.21	100.77	0.0086	-0.0003	0.000	0.281	-6.908
282	6.70	402.00	38.17	100.71	0.0078	-0.0003	0.000	0.281	-6.908
283	6.75	405.00	38.14	100.65	0.0072	-0.0002	0.000	0.281	-6.908
284	6.80	408.00	38.11	100.61	0.0065	-0.0002	0.000	0.281	-6.908
285	6.85	411.00	38.09	100.55	0.0059	-0.0002	0.000	0.281	-6.908
286	6.90	414.00	38.06	100.50	0.0054	-0.0002	0.000	0.281	-6.908
287	6.95	417.00	38.04	100.46	0.0049	-0.0002	0.000	0.281	-6.908
288	7.00	420.00	38.01	100.41	0.0045	-0.0001	0.000	0.281	-6.908
289	7.05	423.00	37.99	100.39	0.0041	-0.0001	0.000	0.281	-6.908
290	7.10	426.00	37.97	100.35	0.0037	-0.0001	0.000	0.281	-6.908
291	7.15	429.00	37.96	100.32	0.0034	-0.0001	0.000	0.281	-6.908
292	7.20	432.00	37.94	100.29	0.0030	-0.0001	0.000	0.281	-6.908
293	7.25	435.00	37.93	100.28	0.0028	-0.0001	0.000	0.281	-6.908
294	7.30	438.00	37.91	100.24	0.0025	-0.0001	0.000	0.281	-6.908
295	7.35	441.00	37.90	100.22	0.0022	-0.0001	0.000	0.281	-6.908
296	7.40	444.00	37.90	100.23	0.0020	-0.0001	0.000	0.281	-6.908
297	7.45	447.00	37.89	100.19	0.0018	-0.0001	0.000	0.281	-6.908
298	7.50	450.00	37.87	100.17	0.0016	-0.0001	0.000	0.281	-6.908
299	7.55	453.00	37.87	100.17	0.0015	-0.0001	0.000	0.281	-6.908
300	7.60	456.00	37.86	100.15	0.0013	-0.0001	0.000	0.281	-6.908
301	7.65	459.00	37.86	100.14	0.0012	0.0000	0.000	0.281	-6.908
302	7.70	462.00	37.85	100.13	0.0010	0.0000	0.000	0.281	-6.908
303	7.75	465.00	37.84	100.11	0.0009	0.0000	0.000	0.281	-6.908
304	7.80	468.00	37.83	100.10	0.0008	0.0000	0.000	0.281	-6.908
305	7.85	471.00	37.84	100.11	0.0007	0.0000	0.000	0.281	-6.908
306	7.90	474.00	37.84	100.10	0.0006	0.0000	0.000	0.281	-6.908
307	7.95	477.00	37.83	100.09	0.0005	0.0000	0.000	0.281	-6.908
308	8.00	480.00	37.82	100.08	0.0005	0.0000	0.000	0.281	-6.908

– 1.920 ln(ε_a – 0.112) 240.12

ated F_{en}'s = 4.190 1.6078

$F_{en,i}$	F_{en} Integral Based on Strain
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2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
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2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
2.146	0.000E+00
2.274	0.000E+00
2.410	0.000E+00
2.555	0.000E+00
2.710	0.000E+00
2.874	0.000E+00
3.049	0.000E+00
3.235	0.000E+00
3.434	0.000E+00
3.645	0.000E+00
3.870	0.000E+00
4.109	0.000E+00
4.364	0.000E+00
4.635	0.000E+00
4.924	0.000E+00

Average F_{en} Calculations:	
Average T =	196.1
T' =	0.264
O' =	0.281
Average R =	0.0067
R' =	-4.090
F_{en} =	2.821

Multi-Linear F_{en} Calculations:	
Slope #1:	
Average T =	317.5
T' =	0.957
O' =	0.281
R =	0.0097
R' =	-3.723
$F_{en,1}$ =	5.670
Slope #2:	
Average T =	341.8
T' =	1.000
O' =	0.281
R =	0.0005
R' =	-6.676
$F_{en,2}$ =	13.600
Slope #3:	
Average T =	224.7
T' =	0.427
O' =	0.281
R =	0.2578
R' =	-0.439
$F_{en,2}$ =	2.196
Slope #4:	
Average T =	101.9
T' =	0.000
O' =	0.281
R =	0.0081
R' =	-3.894
$F_{en,2}$ =	2.083
Strain-based F_{en} =	4.385

5.232	0.000E+00
5.559	0.000E+00
5.908	0.000E+00
6.280	0.000E+00
6.675	0.000E+00
7.097	0.000E+00
7.545	0.000E+00
8.024	0.000E+00
8.533	0.000E+00
9.075	0.000E+00
9.502	0.000E+00
9.775	0.000E+00
9.968	0.000E+00
10.119	0.000E+00
10.247	0.000E+00
10.359	0.000E+00
6.420	7.747E-04
5.428	1.374E-03
5.042	1.781E-03
4.823	2.091E-03
4.678	2.342E-03
4.581	2.538E-03
4.503	2.714E-03
4.447	2.857E-03
4.403	2.979E-03
4.364	3.094E-03
4.338	3.181E-03
4.315	3.263E-03
4.296	3.335E-03
4.279	3.404E-03
4.267	3.458E-03
4.259	3.502E-03
4.251	3.548E-03
4.242	3.594E-03
4.240	3.621E-03
4.236	3.654E-03
4.232	3.685E-03
4.233	3.704E-03
4.232	3.727E-03
4.230	3.752E-03
4.233	3.762E-03
4.231	3.785E-03
4.236	3.791E-03
4.237	3.805E-03
4.238	3.817E-03
4.241	3.827E-03
4.245	3.831E-03

4.247	3.841E-03
4.250	3.849E-03
4.255	3.851E-03
4.257	3.860E-03
4.264	3.856E-03
4.266	3.866E-03
4.272	3.861E-03
4.274	3.870E-03
4.280	3.866E-03
4.285	3.865E-03
4.287	3.872E-03
4.294	3.867E-03
4.470	1.912E-01
4.679	1.786E-01
4.868	1.676E-01
5.046	1.580E-01
5.212	1.488E-01
5.344	1.396E-01
5.478	1.311E-01
5.613	1.231E-01
5.752	1.157E-01
5.893	1.087E-01
6.040	1.021E-01
6.189	9.592E-02
6.341	9.012E-02
6.500	8.460E-02
6.662	7.943E-02
6.828	7.458E-02
7.000	7.000E-02
7.177	6.564E-02
7.358	6.159E-02
7.546	5.774E-02
7.739	5.414E-02
7.936	5.077E-02
8.141	4.755E-02
8.350	4.457E-02
8.567	4.174E-02
8.791	3.907E-02
9.019	3.659E-02
9.252	3.428E-02
9.496	3.207E-02
9.745	3.002E-02
9.998	2.811E-02
10.265	2.628E-02
10.533	2.460E-02
10.812	2.301E-02
11.098	2.152E-02

11.390	2.014E-02
11.694	1.882E-02
12.001	1.762E-02
12.325	1.646E-02
12.648	1.540E-02
12.983	1.441E-02
13.333	1.346E-02
13.688	1.258E-02
14.059	1.175E-02
14.430	1.099E-02
14.513	1.007E-02
14.513	9.171E-03
14.513	8.350E-03
14.513	7.583E-03
14.513	6.924E-03
14.513	6.292E-03
14.513	5.723E-03
14.513	5.209E-03
14.513	4.748E-03
14.513	4.324E-03
14.513	3.945E-03
14.513	3.575E-03
14.513	3.250E-03
14.513	2.952E-03
14.513	2.699E-03
14.513	2.464E-03
14.513	2.230E-03
14.513	2.031E-03
14.513	1.851E-03
14.513	1.688E-03
14.513	1.526E-03
14.513	1.399E-03
14.513	1.282E-03
14.513	1.137E-03
14.513	1.074E-03
14.513	9.478E-04
14.513	8.756E-04
14.513	8.034E-04
14.513	7.041E-04
14.513	6.499E-04
14.513	6.138E-04
14.513	5.326E-04
14.513	4.965E-04
2.083	1.002E+00
2.083	1.568E-04
2.083	1.170E-03
2.083	1.133E-03

2.083	1.021E-03
2.083	8.410E-04
2.083	6.362E-04
2.083	4.328E-04
2.083	2.423E-04
2.083	6.868E-05
2.083	0.000E+00
2.083	0.000E+00
2.083	0.000E+00
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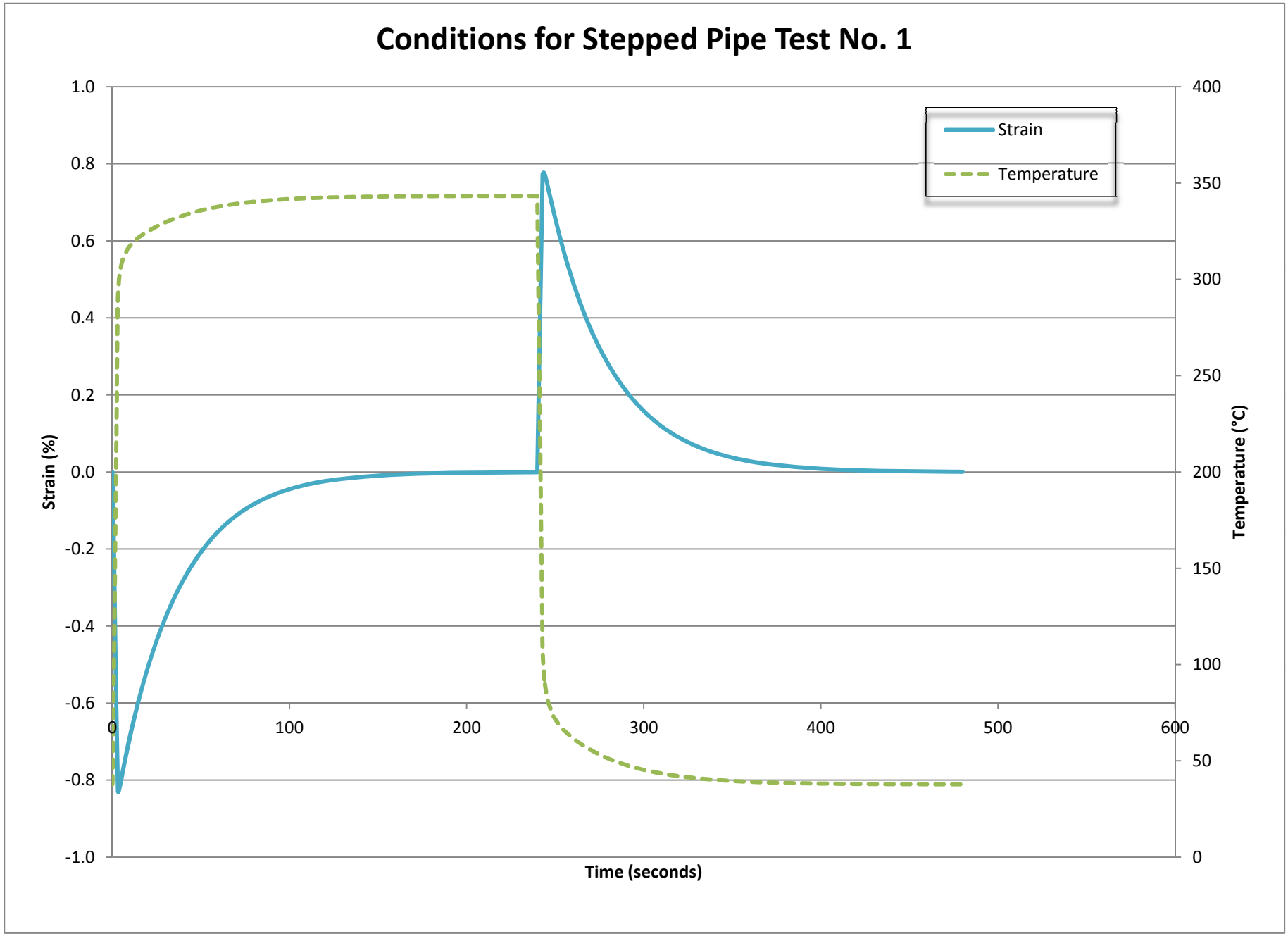
Conditions for Stepped Pipe Test No. 1
Strain
Temperature
Strain (%)
Temperature (°C)
Time (seconds)
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
400
350
300
250
200
150
100
50
0
0
100
200
300
400
500
600