2.10.2 Model AOS-050 Transport Package

This appendix presents the following information, specific to the Model AOS-050 transport package:

- Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-050
- Hypothetical Accident Conditions of Transport Summary of Damages (Stresses) – Model AOS-050
- Minimum Margins of Safety – Model AOS-050
- Free Drop – Model AOS-050

2.10.2.1 Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-050

Table 2-161 and Table 2-162 present Model AOS-050 transport package Load Cases and Load Combinations, respectively, under Normal conditions of transport:

- Table 2-163 through Table 2-180 present Load Case test case output data. Comparisons with allowable stress limits are included for Load Cases 101, 102, 103, 104, 105, and 106.
- Table 2-181 through Table 2-195 present Load Combination test case output data.

Table 2-161. Load Cases Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-050

Load Case	Description	Data
101	100°F Ambient, Maximum Decay Heat	Table 2-163
102	100°F Ambient, Maximum Decay Heat, Maximum Insolation	Table 2-164
103	-20°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-165
104	-40°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-166
105	-40°F Ambient, Maximum Decay Heat	Table 2-167
106	-20°F Ambient, Maximum Decay Heat	Table 2-168
201	Maximum Internal Pressure, 414 kPa (60 psia)	Table 2-169
202	Minimum External Pressure, 24 kPa (3.5 psia)	Table 2-170
203	Maximum Increase External Pressure, 140 kPa (20 psia)	Table 2-171
204	Additional Increased External Pressure, 2 MPa (290 psia)	Table 2-172
211	Fabrication Stress	Table 2-173
215	Compression Load (5x weight)	Table 2-174
216	Rod Drop onto Cask	Table 2-175
221	Forward 5g Vibration Inertia Load	Table 2-176
222	Lateral 5g Vibration Inertia Load	Table 2-177
223	Vertical 10g Vibration Inertia Load	Table 2-178
231	4-ft. Head-On Drop	Table 2-179
232	Impact Test, Normal Condition	Table 2-180

Table 2-162. Load Combinations Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-050

Load Combination	Load Cases	Description	Data
101	101, 201, 211	Hot Environment	Table 2-181
102	104, 201, 211	Cold Environment	Table 2-182
103	103, 201, 211	Increased External Pressure	Table 2-183
104	101, 201, 202, 211	Minimum External Pressure	Table 2-184
105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat	Table 2-185
106	101, 201, 203, 211	Maximum Pressure, Hot Environment	Table 2-186
107	105, 201, 203, 211	Maximum Pressure, Cold Environment	Table 2-187
215	215, 101, 201, 211	Compression Load	Table 2-188
216	216, 101, 201, 211	Rod Drop	Table 2-189
217	216, 104, 201, 211	Rod Drop, Cold Environment	Table 2-190
221	221, 101, 201, 211	Forward Vibration	Table 2-191
222	222, 101, 201, 211	Lateral Vibration	Table 2-192
223	223, 101, 201, 211	Vertical Vibration	Table 2-193
231	231, 102, 201, 211	4-ft. Head-On Drop	Table 2-194
232	232, 102, 201, 211	Impact Test, Normal Condition	Table 2-195

Table 2-163. Load Case 101, 100°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.0106E+01	-1.0872E+02	-1.5694E+01	1.5882E+02	2.5003E+02
	3.4547E-01	-7.4959E-01	-1.0820E-01	1.0951E+00	1.7239E+00
2	6.4898E+01	-1.4895E+02	-3.2074E+01	2.1385E+02	4.3782E+02
	4.4746E-01	-1.0270E+00	-2.2114E-01	1.4744E+00	3.0187E+00
3	5.1158E+01	-1.0124E+02	-1.0660E+01	1.5240E+02	2.3523E+02
	3.5272E-01	-6.9801E-01	-7.3495E-02	1.0507E+00	1.6219E+00
4	1.6906E+02	-8.3969E+02	-1.7097E+02	1.0088E+03	1.9864E+03
	1.1657E+00	-5.7894E+00	-1.1788E+00	6.9551E+00	1.3696E+01
5	1.7787E+02	-9.5432E+02	-5.1802E+02	1.1322E+03	1.7779E+03
	1.2264E+00	-6.5798E+00	-3.5716E+00	7.8062E+00	1.2258E+01
6	3.5060E+01	-4.6199E+02	-6.3598E+02	4.9705E+02	5.2404E+02
	2.4173E-01	-3.1853E+00	-4.3849E+00	3.4270E+00	3.6131E+00
7	-5.3747E+00	-1.5801E+02	1.0128E+01	1.5264E+02	2.1007E+02
	-3.7057E-02	-1.0894E+00	6.9830E-02	1.0524E+00	1.4483E+00
8	-5.6298E+00	-1.5784E+02	4.0431E-02	1.5221E+02	2.0957E+02
	-3.8816E-02	-1.0883E+00	2.7876E-04	1.0494E+00	1.4450E+00
9	-6.5036E+00	-1.5670E+02	-3.3586E+00	1.5020E+02	2.0458E+02
	-4.4841E-02	-1.0804E+00	-2.3157E-02	1.0356E+00	1.4105E+00
10	2.3330E+00	-2.7417E+02	8.5213E+01	2.7650E+02	5.6823E+02
	1.6085E-02	-1.8903E+00	5.8752E-01	1.9064E+00	3.9178E+00
11	-7.4155E+01	-3.9335E+02	-1.8187E+02	3.1919E+02	8.3802E+00
	-5.1128E-01	-2.7120E+00	-1.2540E+00	2.2007E+00	5.7779E-02
12	2.0987E+00	-4.7324E+02	-4.7245E+02	4.7534E+02	3.8123E+01
	1.4470E-02	-3.2629E+00	-3.2574E+00	3.2774E+00	2.6285E-01
13	-4.6704E+01	-6.1910E+02	-5.7064E+01	5.7240E+02	2.7334E+02
	-3.2201E-01	-4.2685E+00	-3.9345E-01	3.9465E+00	1.8846E+00
14	-4.4863E+01	-5.3860E+02	6.0750E+01	4.9374E+02	2.7016E+02
	-3.0932E-01	-3.7135E+00	4.1885E-01	3.4042E+00	1.8627E+00
15	5.7205E+02	-6.0092E+02	-3.3938E+01	1.1730E+03	1.9743E+03
	3.9441E+00	-4.1432E+00	-2.3399E-01	8.0873E+00	1.3612E+01

16	1.4451E+02	-2.6989E+02	-9.4064E+01	4.1440E+02	6.7564E+02
	9.9636E-01	-1.8608E+00	-6.4855E-01	2.8572E+00	4.6584E+00
17	6.4620E+01	-1.8021E+02	-1.1992E+01	2.4483E+02	4.2310E+02
	4.4554E-01	-1.2425E+00	-8.2681E-02	1.6880E+00	2.9171E+00
18	2.4933E+01	-8.5585E+01	3.8799E+02	1.1052E+02	8.4896E-02
	1.7191E-01	-5.9009E-01	2.6751E+00	7.6200E-01	5.8534E-04
19	-1.0539E+01	-1.7535E+02	4.5161E+02	1.6481E+02	2.3923E+02
	-7.2666E-02	-1.2090E+00	3.1137E+00	1.1363E+00	1.6494E+00
20	-2.6155E+01	-3.7250E+02	8.2546E+01	3.4635E+02	1.8622E+02
	-1.8033E-01	-2.5683E+00	5.6914E-01	2.3880E+00	1.2840E+00
21	1.1736E+00	-3.0654E+01	-2.8990E+01	3.1828E+01	4.4758E+01
	8.0916E-03	-2.1135E-01	-1.9988E-01	2.1945E-01	3.0859E-01
22	-3.3619E+01	-9.4572E+01	-6.2588E+01	6.0953E+01	1.5825E+02
	-2.3180E-01	-6.5205E-01	-4.3153E-01	4.2026E-01	1.0911E+00

Allowable Stress for Load Case 101

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	189.76	188.83	20.00	26.70	70.00
2	190.12	188.21	20.00	26.70	70.00
3	189.85	188.96	20.00	26.70	70.00
4	191.14	191.04	20.00	26.70	70.00
5	193.08	192.75	20.00	26.70	70.00
6	193.87	193.58	20.00	26.70	70.00
7	195.27	194.56	20.00	26.70	70.00
8	195.32	194.61	20.00	26.70	70.00
9	195.30	194.60	20.00	26.70	70.00
10	194.89	194.18	20.00	26.70	70.00
11	195.53	194.28	20.00	26.70	70.00
12	197.63	196.14	20.00	26.70	70.00
13	192.85	192.35	20.00	26.70	70.00
14	191.72	191.50	20.00	26.70	70.00
15	191.47	191.34	20.00	26.70	70.00
16	191.67	191.52	20.00	26.70	70.00
17	191.79	191.67	20.00	26.70	70.00
18	192.26	192.16	20.00	26.70	70.00
19	192.64	192.46	20.00	26.70	70.00
20	195.59	195.03	20.00	26.70	70.00
21	190.17	190.00	20.00	26.70	70.00
22	190.33	190.18	20.00	26.70	70.00

Table 2-164. Load Case 102, 100°F Ambient, Maximum Decay Heat, Maximum Insolation, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.3540E+01	-1.0264E+02	-1.3599E+01	1.4618E+02	2.2969E+02
	3.0020E-01	-7.0765E-01	-9.3760E-02	1.0079E+00	1.5837E+00
2	6.6812E+01	-1.4660E+02	-4.4473E+01	2.1341E+02	4.3859E+02
	4.6065E-01	-1.0108E+00	-3.0663E-01	1.4714E+00	3.0240E+00
3	5.3506E+01	-9.8984E+01	-6.8846E+00	1.5249E+02	2.3194E+02
	3.6891E-01	-6.8247E-01	-4.7468E-02	1.0514E+00	1.5991E+00
4	3.3625E+02	-8.6168E+02	-2.9179E+02	1.1979E+03	2.3725E+03
	2.3184E+00	-5.9411E+00	-2.0118E+00	8.2594E+00	1.6358E+01
5	2.7856E+02	-8.0113E+02	-7.3344E+02	1.0797E+03	1.6593E+03
	1.9206E+00	-5.5236E+00	-5.0569E+00	7.4442E+00	1.1441E+01
6	1.5052E+01	-5.5759E+02	-1.2845E+03	5.7264E+02	8.1827E+02
	1.0378E-01	-3.8444E+00	-8.8561E+00	3.9482E+00	5.6418E+00
7	-7.5866E+01	-2.5776E+02	-1.3792E+03	1.8190E+02	2.1236E+02
	-5.2308E-01	-1.7772E+00	-9.5094E+00	1.2541E+00	1.4642E+00
8	-7.8706E+01	-2.5509E+02	-1.3919E+03	1.7638E+02	2.0194E+02
	-5.4266E-01	-1.7588E+00	-9.5970E+00	1.2161E+00	1.3923E+00
9	-7.7495E+01	-2.5696E+02	-1.4145E+03	1.7946E+02	2.0791E+02
	-5.3431E-01	-1.7717E+00	-9.7528E+00	1.2373E+00	1.4335E+00
10	1.6198E+01	-6.0920E+02	-6.3713E+02	6.2539E+02	6.4902E+02
	1.1168E-01	-4.2003E+00	-4.3928E+00	4.3119E+00	4.4748E+00
11	-1.3405E+02	-6.7693E+02	-4.7836E+02	5.4287E+02	4.8299E+02
	-9.2427E-01	-4.6672E+00	-3.2982E+00	3.7430E+00	3.3301E+00
12	2.0778E+00	-7.4506E+02	-7.4436E+02	7.4714E+02	5.2721E+02
	1.4326E-02	-5.1370E+00	-5.1322E+00	5.1513E+00	3.6350E+00
13	-4.8947E+00	-6.0648E+02	-6.9653E+01	6.0158E+02	4.0808E+01
	-3.3748E-02	-4.1815E+00	-4.8024E-01	4.1478E+00	2.8136E-01
14	-5.9644E+01	-5.4230E+02	2.4248E+01	4.8266E+02	5.9547E+02
	-4.1123E-01	-3.7390E+00	1.6719E-01	3.3278E+00	4.1056E+00
15	8.6603E+02	-9.1777E+02	-5.9708E+01	1.7838E+03	3.0048E+03
	5.9711E+00	-6.3278E+00	-4.1167E-01	1.2299E+01	2.0718E+01

16	2.1884E+02	-4.1450E+02	-1.3124E+02	6.3334E+02	1.0301E+03
	1.5089E+00	-2.8579E+00	-9.0483E-01	4.3667E+00	7.1024E+00
17	9.6880E+01	-2.7293E+02	2.8267E+00	3.6981E+02	6.3687E+02
	6.6797E-01	-1.8818E+00	1.9490E-02	2.5498E+00	4.3911E+00
18	1.9094E+01	-1.0403E+02	3.8867E+02	1.2312E+02	5.8373E+01
	1.3165E-01	-7.1726E-01	2.6798E+00	8.4891E-01	4.0247E-01
19	-7.3628E-01	-2.0786E+02	4.3415E+02	2.0712E+02	3.2965E+02
	-5.0765E-03	-1.4331E+00	2.9934E+00	1.4281E+00	2.2728E+00
20	-3.6430E+01	-3.8090E+02	7.3453E+01	3.4447E+02	3.2013E+02
	-2.5118E-01	-2.6262E+00	5.0644E-01	2.3750E+00	2.2072E+00
21	4.5628E+00	-2.6749E+01	-2.1792E+01	3.1311E+01	5.3955E+01
	3.1460E-02	-1.8442E-01	-1.5025E-01	2.1588E-01	3.7201E-01
22	-3.8106E+01	-1.2391E+02	-6.2923E+01	8.5806E+01	2.0395E+02
	-2.6273E-01	-8.5435E-01	-4.3384E-01	5.9161E-01	1.4062E+00

Allowable Stress for Load Case 102

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	254.33	253.25	20.00	23.60	66.30
2	255.36	253.63	20.00	23.60	66.30
3	255.48	254.73	20.00	23.60	66.30
4	255.72	255.62	20.00	23.60	66.30
5	257.68	257.35	20.00	23.60	66.30
6	258.46	258.17	20.00	23.60	66.30
7	259.98	259.29	20.00	23.60	66.30
8	260.27	259.58	20.00	23.60	66.30
9	260.45	259.77	20.00	23.60	66.30
10	260.20	259.52	20.00	23.60	66.30
11	260.86	259.67	20.00	23.60	66.30
12	262.91	261.49	20.00	23.60	66.30
13	258.30	257.82	20.00	23.60	66.30
14	257.23	257.01	20.00	23.60	66.30
15	255.92	255.80	20.00	23.60	66.30
16	256.11	255.97	20.00	23.60	66.30
17	256.23	256.11	20.00	23.60	66.30
18	256.73	256.63	20.00	23.60	66.30
19	257.12	256.94	20.00	23.60	66.30
20	260.01	259.47	20.00	23.60	66.30
21	255.66	255.48	20.00	23.60	66.30
22	254.88	254.75	20.00	23.60	66.30

Table 2-165. Load Case 103, -20°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.6850E+01	-5.7642E+01	-1.2011E+01	7.4491E+01	7.4156E+01
	1.1617E-01	-3.9743E-01	-8.2811E-02	5.1360E-01	5.1129E-01
2	5.2966E+01	-7.2093E-01	-1.7049E+01	5.3686E+01	6.2906E+00
	3.6518E-01	-4.9706E-03	-1.1755E-01	3.7016E-01	4.3372E-02
3	6.3488E+01	-7.0567E+00	-1.0242E+01	7.0545E+01	8.0488E+01
	4.3774E-01	-4.8654E-02	-7.0617E-02	4.8639E-01	5.5494E-01
4	5.5406E+03	-3.3127E+03	-2.5172E+02	8.8533E+03	1.8218E+04
	3.8201E+01	-2.2840E+01	-1.7355E+00	6.1041E+01	1.2561E+02
5	8.3774E+03	-3.7199E+03	-3.7144E+02	1.2097E+04	1.6026E+04
	5.7760E+01	-2.5648E+01	-2.5610E+00	8.3408E+01	1.1049E+02
6	5.4241E+03	-3.1938E+02	1.5464E+03	5.7435E+03	9.8360E+03
	3.7398E+01	-2.2020E+00	1.0662E+01	3.9600E+01	6.7817E+01
7	2.6398E+03	2.9829E-01	-7.0236E+01	2.6395E+03	7.6393E+01
	1.8201E+01	2.0566E-03	-4.8426E-01	1.8199E+01	5.2671E-01
8	2.6366E+03	1.8166E-02	2.7199E+00	2.6365E+03	6.2703E-01
	1.8178E+01	1.2525E-04	1.8753E-02	1.8178E+01	4.3232E-03
9	2.6375E+03	-5.2561E-02	-3.8085E+01	2.6375E+03	2.2161E+01
	1.8185E+01	-3.6239E-04	-2.6259E-01	1.8185E+01	1.5279E-01
10	2.6582E+03	-2.3659E+02	1.2395E+03	2.8948E+03	1.4578E+03
	1.8328E+01	-1.6312E+00	8.5458E+00	1.9959E+01	1.0051E+01
11	7.2041E+02	-6.9588E+02	2.1569E+02	1.4163E+03	1.1990E+03
	4.9671E+00	-4.7979E+00	1.4871E+00	9.7650E+00	8.2670E+00
12	4.7851E+02	-2.1300E+02	2.6203E+02	6.9150E+02	1.2938E+03
	3.2992E+00	-1.4685E+00	1.8066E+00	4.7678E+00	8.9205E+00
13	3.6711E+03	-1.3545E+03	4.0530E+02	5.0257E+03	3.5441E+03
	2.5312E+01	-9.3392E+00	2.7945E+00	3.4651E+01	2.4436E+01
14	2.9070E+03	-1.1628E+03	3.9355E+02	4.0697E+03	4.8272E+03
	2.0043E+01	-8.0170E+00	2.7134E+00	2.8060E+01	3.3283E+01
15	2.8905E+02	-7.8743E+01	2.6000E+02	3.6779E+02	3.2041E+01
	1.9929E+00	-5.4291E-01	1.7927E+00	2.5358E+00	2.2091E-01

16	1.0613E+03	-4.3425E+02	3.7751E+02	1.4955E+03	1.9830E+03
	7.3171E+00	-2.9940E+00	2.6028E+00	1.0311E+01	1.3672E+01
17	1.1013E+03	-1.7666E+02	-7.6683E+01	1.2779E+03	2.2490E+03
	7.5931E+00	-1.2181E+00	-5.2871E-01	8.8111E+00	1.5506E+01
18	1.1521E+03	-1.8406E+02	-1.3282E+02	1.3361E+03	2.3457E+03
	7.9433E+00	-1.2690E+00	-9.1573E-01	9.2123E+00	1.6173E+01
19	1.2608E+03	-5.1856E+02	3.2010E+02	1.7794E+03	2.4779E+03
	8.6929E+00	-3.5754E+00	2.2070E+00	1.2268E+01	1.7084E+01
20	1.3175E+03	-6.5056E+02	1.6353E+02	1.9680E+03	3.6550E+03
	9.0836E+00	-4.4854E+00	1.1275E+00	1.3569E+01	2.5200E+01
21	2.2245E+02	-4.9835E+02	-4.6625E+01	7.2080E+02	1.7043E+03
	1.5338E+00	-3.4360E+00	-3.2147E-01	4.9698E+00	1.1751E+01
22	3.2992E+01	-5.9942E+01	3.3119E+01	9.2934E+01	3.3780E+00
	2.2747E-01	-4.1329E-01	2.2835E-01	6.4076E-01	2.3290E-02

Allowable Stress for Load Case 103

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	0.00	-20.00	20.00	30.00	70.00
2	0.00	-20.00	20.00	30.00	70.00
3	0.00	-20.00	20.00	30.00	70.00
4	0.00	-20.00	20.00	30.00	70.00
5	0.00	-20.00	20.00	30.00	70.00
6	0.00	-20.00	20.00	30.00	70.00
7	0.00	-20.00	20.00	30.00	70.00
8	0.00	-20.00	20.00	30.00	70.00
9	0.00	-20.00	20.00	30.00	70.00
10	0.00	-20.00	20.00	30.00	70.00
11	0.00	-20.00	20.00	30.00	70.00
12	0.00	-20.00	20.00	30.00	70.00
13	0.00	-20.00	20.00	30.00	70.00
14	0.00	-20.00	20.00	30.00	70.00
15	0.00	-20.00	20.00	30.00	70.00
16	0.00	-20.00	20.00	30.00	70.00
17	0.00	-20.00	20.00	30.00	70.00
18	0.00	-20.00	20.00	30.00	70.00
19	0.00	-20.00	20.00	30.00	70.00
20	0.00	-20.00	20.00	30.00	70.00
21	0.00	-20.00	20.00	30.00	70.00
22	0.00	-20.00	20.00	30.00	70.00

Table 2-166. Load Case 104, -40°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.0594E+01	-7.0451E+01	-1.4680E+01	9.1045E+01	9.0635E+01
	1.4199E-01	-4.8574E-01	-1.0121E-01	6.2773E-01	6.2491E-01
2	6.4736E+01	-8.8114E-01	-2.0838E+01	6.5617E+01	7.6885E+00
	4.4634E-01	-6.0752E-03	-1.4367E-01	4.5241E-01	5.3010E-02
3	7.7597E+01	-8.6248E+00	-1.2518E+01	8.6222E+01	9.8374E+01
	5.3501E-01	-5.9466E-02	-8.6310E-02	5.9448E-01	6.7826E-01
4	6.7716E+03	-4.0488E+03	-3.0745E+02	1.0820E+04	2.2265E+04
	4.6689E+01	-2.7915E+01	-2.1198E+00	7.4604E+01	1.5351E+02
5	1.0239E+04	-4.5464E+03	-4.5364E+02	1.4785E+04	1.9587E+04
	7.0595E+01	-3.1346E+01	-3.1278E+00	1.0194E+02	1.3505E+02
6	6.6294E+03	-3.9027E+02	1.8903E+03	7.0197E+03	1.2021E+04
	4.5708E+01	-2.6909E+00	1.3033E+01	4.8399E+01	8.2885E+01
7	3.2265E+03	3.6449E-01	-8.5844E+01	3.2261E+03	9.3362E+01
	2.2246E+01	2.5130E-03	-5.9188E-01	2.2243E+01	6.4371E-01
8	3.2225E+03	2.2195E-02	3.3242E+00	3.2225E+03	7.6651E-01
	2.2218E+01	1.5303E-04	2.2920E-02	2.2218E+01	5.2849E-03
9	3.2236E+03	-6.4251E-02	-4.6549E+01	3.2237E+03	2.7085E+01
	2.2226E+01	-4.4300E-04	-3.2094E-01	2.2226E+01	1.8675E-01
10	3.2489E+03	-2.8916E+02	1.5149E+03	3.5381E+03	1.7818E+03
	2.2401E+01	-1.9937E+00	1.0445E+01	2.4394E+01	1.2285E+01
11	8.8051E+02	-8.5052E+02	2.6362E+02	1.7310E+03	1.4655E+03
	6.0709E+00	-5.8641E+00	1.8176E+00	1.1935E+01	1.0104E+01
12	5.8485E+02	-2.6033E+02	3.2026E+02	8.4517E+02	1.5813E+03
	4.0324E+00	-1.7949E+00	2.2081E+00	5.8273E+00	1.0903E+01
13	4.4870E+03	-1.6556E+03	4.9537E+02	6.1425E+03	4.3317E+03
	3.0937E+01	-1.1415E+01	3.4155E+00	4.2351E+01	2.9866E+01
14	3.5530E+03	-1.4212E+03	4.8101E+02	4.9742E+03	5.9000E+03
	2.4497E+01	-9.7987E+00	3.3164E+00	3.4296E+01	4.0679E+01
15	3.5383E+02	-9.9180E+01	3.1738E+02	4.5301E+02	1.0049E+01
	2.4396E+00	-6.8382E-01	2.1882E+00	3.1234E+00	6.9287E-02

16	1.2958E+03	-5.3016E+02	4.6107E+02	1.8260E+03	2.4200E+03
	8.9345E+00	-3.6553E+00	3.1790E+00	1.2590E+01	1.6685E+01
17	1.3450E+03	-2.1565E+02	-9.3592E+01	1.5606E+03	2.7464E+03
	9.2732E+00	-1.4868E+00	-6.4530E-01	1.0760E+01	1.8936E+01
18	1.4090E+03	-2.2572E+02	-1.6263E+02	1.6347E+03	2.8697E+03
	9.7147E+00	-1.5563E+00	-1.1213E+00	1.1271E+01	1.9786E+01
19	1.5420E+03	-6.3407E+02	3.9162E+02	2.1761E+03	3.0303E+03
	1.0632E+01	-4.3718E+00	2.7001E+00	1.5004E+01	2.0893E+01
20	1.6114E+03	-7.9560E+02	2.0012E+02	2.4070E+03	4.4702E+03
	1.1110E+01	-5.4855E+00	1.3797E+00	1.6595E+01	3.0821E+01
21	2.7189E+02	-6.0909E+02	-5.6986E+01	8.8098E+02	2.0830E+03
	1.8746E+00	-4.1996E+00	-3.9290E-01	6.0741E+00	1.4362E+01
22	4.0429E+01	-7.4955E+01	4.0488E+01	1.1538E+02	5.8085E-01
	2.7875E-01	-5.1680E-01	2.7915E-01	7.9555E-01	4.0048E-03

Allowable Stress for Load Case 104

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	0.00	-40.00	20.00	30.00	70.00
2	0.00	-40.00	20.00	30.00	70.00
3	0.00	-40.00	20.00	30.00	70.00
4	0.00	-40.00	20.00	30.00	70.00
5	0.00	-40.00	20.00	30.00	70.00
6	0.00	-40.00	20.00	30.00	70.00
7	0.00	-40.00	20.00	30.00	70.00
8	0.00	-40.00	20.00	30.00	70.00
9	0.00	-40.00	20.00	30.00	70.00
10	0.00	-40.00	20.00	30.00	70.00
11	0.00	-40.00	20.00	30.00	70.00
12	0.00	-40.00	20.00	30.00	70.00
13	0.00	-40.00	20.00	30.00	70.00
14	0.00	-40.00	20.00	30.00	70.00
15	0.00	-40.00	20.00	30.00	70.00
16	0.00	-40.00	20.00	30.00	70.00
17	0.00	-40.00	20.00	30.00	70.00
18	0.00	-40.00	20.00	30.00	70.00
19	0.00	-40.00	20.00	30.00	70.00
20	0.00	-40.00	20.00	30.00	70.00
21	0.00	-40.00	20.00	30.00	70.00
22	0.00	-40.00	20.00	30.00	70.00

Table 2-167. Load Case 105, -40°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.4217E+01	-1.2220E+02	-1.8444E+01	1.7642E+02	2.8110E+02
	3.7381E-01	-8.4256E-01	-1.2717E-01	1.2164E+00	1.9381E+00
2	7.3067E+01	-1.5874E+02	-3.2152E+01	2.3181E+02	4.7200E+02
	5.0378E-01	-1.0945E+00	-2.2168E-01	1.5983E+00	3.2543E+00
3	5.8903E+01	-1.0722E+02	-1.2310E+01	1.6612E+02	2.4642E+02
	4.0612E-01	-7.3926E-01	-8.4876E-02	1.1454E+00	1.6990E+00
4	-4.5068E+01	-4.5399E+02	-2.0624E+02	4.0892E+02	1.3789E+02
	-3.1073E-01	-3.1302E+00	-1.4220E+00	2.8194E+00	9.5070E-01
5	4.2682E+01	-4.0418E+02	-5.9209E+02	4.4687E+02	1.8172E+02
	2.9428E-01	-2.7868E+00	-4.0823E+00	3.0810E+00	1.2529E+00
6	1.6967E+02	-1.3854E+02	-5.3604E+02	3.0822E+02	3.9557E+02
	1.1699E+00	-9.5523E-01	-3.6958E+00	2.1251E+00	2.7273E+00
7	9.8382E+01	-3.4805E+01	4.3555E+00	1.3319E+02	2.2052E+02
	6.7832E-01	-2.3997E-01	3.0030E-02	9.1829E-01	1.5204E+00
8	9.9397E+01	-3.6230E+01	3.0307E-01	1.3563E+02	2.2674E+02
	6.8532E-01	-2.4979E-01	2.0896E-03	9.3511E-01	1.5633E+00
9	9.8324E+01	-3.4822E+01	-6.7383E+00	1.3315E+02	2.2004E+02
	6.7792E-01	-2.4009E-01	-4.6459E-02	9.1800E-01	1.5171E+00
10	1.9415E+02	-2.6702E+02	2.0380E+02	4.6117E+02	7.5455E+02
	1.3386E+00	-1.8410E+00	1.4051E+00	3.1797E+00	5.2025E+00
11	-8.2861E+01	-4.2183E+02	-1.8002E+02	3.3897E+02	1.1667E+02
	-5.7131E-01	-2.9084E+00	-1.2412E+00	2.3371E+00	8.0440E-01
12	3.1220E+00	-4.8045E+02	-4.7943E+02	4.8357E+02	9.6135E+01
	2.1526E-02	-3.3126E+00	-3.3056E+00	3.3341E+00	6.6283E-01
13	1.3244E+01	-5.2479E+02	-2.9774E+01	5.3804E+02	3.0506E+01
	9.1317E-02	-3.6183E+00	-2.0529E-01	3.7096E+00	2.1033E-01
14	-2.6008E+01	-4.4569E+02	9.9820E+01	4.1968E+02	1.8854E+02
	-1.7932E-01	-3.0729E+00	6.8824E-01	2.8936E+00	1.3000E+00
15	4.3371E+01	-8.9936E+00	4.0504E+01	5.2365E+01	6.7944E-02
	2.9903E-01	-6.2009E-02	2.7927E-01	3.6104E-01	4.6845E-04

16	1.1436E+02	-4.1631E+01	1.5165E+01	1.5599E+02	2.0873E+02
	7.8851E-01	-2.8703E-01	1.0456E-01	1.0755E+00	1.4392E+00
17	1.0925E+02	-1.6289E+01	-4.8824E+01	1.2554E+02	2.1571E+02
	7.5328E-01	-1.1231E-01	-3.3663E-01	8.6559E-01	1.4873E+00
18	1.1867E+02	-5.6698E+01	3.9630E+02	1.7536E+02	2.7176E+02
	8.1818E-01	-3.9092E-01	2.7324E+00	1.2091E+00	1.8737E+00
19	3.1035E+01	-1.3785E+02	5.2277E+02	1.6889E+02	2.3641E+01
	2.1398E-01	-9.5045E-01	3.6044E+00	1.1644E+00	1.6300E-01
20	1.2489E+01	-3.5526E+02	1.1280E+02	3.6775E+02	2.0966E+02
	8.6110E-02	-2.4494E+00	7.7770E-01	2.5356E+00	1.4456E+00
21	2.2821E+01	-1.0608E+02	-4.2144E+01	1.2890E+02	3.0853E+02
	1.5734E-01	-7.3142E-01	-2.9057E-01	8.8877E-01	2.1273E+00
22	-6.5549E+00	-6.4606E+01	-6.3226E+01	5.8052E+01	4.6241E+01
	-4.5194E-02	-4.4545E-01	-4.3593E-01	4.0025E-01	3.1882E-01

Allowable Stress for Load Case 105

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	56.40	55.40	20.00	30.00	70.00
2	56.79	54.70	20.00	30.00	70.00
3	56.47	55.50	20.00	30.00	70.00
4	57.92	57.81	20.00	30.00	70.00
5	60.04	59.68	20.00	30.00	70.00
6	60.90	60.59	20.00	30.00	70.00
7	62.56	61.80	20.00	30.00	70.00
8	62.60	61.84	20.00	30.00	70.00
9	62.58	61.82	20.00	30.00	70.00
10	62.01	61.23	20.00	30.00	70.00
11	62.62	61.25	20.00	30.00	70.00
12	64.83	63.21	20.00	30.00	70.00
13	59.70	59.14	20.00	30.00	70.00
14	58.46	58.22	20.00	30.00	70.00
15	58.48	58.34	20.00	30.00	70.00
16	58.69	58.54	20.00	30.00	70.00
17	58.83	58.69	20.00	30.00	70.00
18	59.27	59.17	20.00	30.00	70.00
19	59.65	59.47	20.00	30.00	70.00
20	62.81	62.20	20.00	30.00	70.00
21	56.82	56.63	20.00	30.00	70.00
22	57.03	56.87	20.00	30.00	70.00

Table 2-168. Load Case 106, -20°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.4308E+01	-1.1729E+02	-1.6877E+01	1.7160E+02	2.6983E+02
	3.7444E-01	-8.0871E-01	-1.1637E-01	1.1832E+00	1.8604E+00
2	6.9368E+01	-1.5934E+02	-3.0832E+01	2.2871E+02	4.6762E+02
	4.7827E-01	-1.0986E+00	-2.1258E-01	1.5769E+00	3.2241E+00
3	5.4906E+01	-1.0859E+02	-1.0904E+01	1.6349E+02	2.5204E+02
	3.7857E-01	-7.4868E-01	-7.5179E-02	1.1272E+00	1.7377E+00
4	1.9168E+02	-9.2691E+02	-1.9145E+02	1.1186E+03	2.2001E+03
	1.3216E+00	-6.3908E+00	-1.3200E+00	7.7124E+00	1.5169E+01
5	2.0194E+02	-1.0502E+03	-5.6477E+02	1.2522E+03	1.9703E+03
	1.3923E+00	-7.2410E+00	-3.8940E+00	8.6333E+00	1.3585E+01
6	4.0776E+01	-5.0779E+02	-6.9187E+02	5.4856E+02	5.8038E+02
	2.8114E-01	-3.5011E+00	-4.7703E+00	3.7822E+00	4.0016E+00
7	-6.0251E+00	-1.7029E+02	1.1230E+01	1.6426E+02	2.2520E+02
	-4.1542E-02	-1.1741E+00	7.7428E-02	1.1325E+00	1.5527E+00
8	-6.4168E+00	-1.6996E+02	3.0674E-02	1.6354E+02	2.2408E+02
	-4.4243E-02	-1.1718E+00	2.1149E-04	1.1276E+00	1.5450E+00
9	-7.2060E+00	-1.6892E+02	-3.0639E+00	1.6172E+02	2.1955E+02
	-4.9683E-02	-1.1647E+00	-2.1125E-02	1.1150E+00	1.5137E+00
10	2.1398E-01	-2.8940E+02	8.3881E+01	2.8962E+02	5.9901E+02
	1.4753E-03	-1.9954E+00	5.7834E-01	1.9968E+00	4.1300E+00
11	-7.7562E+01	-4.1641E+02	-1.9547E+02	3.3884E+02	4.5007E+00
	-5.3477E-01	-2.8710E+00	-1.3478E+00	2.3362E+00	3.1031E-02
12	2.2401E+00	-4.9948E+02	-4.9885E+02	5.0172E+02	3.6314E+01
	1.5445E-02	-3.4438E+00	-3.4395E+00	3.4592E+00	2.5038E-01
13	-5.0937E+01	-6.6237E+02	-6.2409E+01	6.1144E+02	3.0295E+02
	-3.5120E-01	-4.5669E+00	-4.3029E-01	4.2157E+00	2.0887E+00
14	-4.7477E+01	-5.7619E+02	6.4925E+01	5.2871E+02	2.8494E+02
	-3.2734E-01	-3.9727E+00	4.4764E-01	3.6453E+00	1.9646E+00
15	3.1127E+01	-2.2652E+01	1.1749E+01	5.3779E+01	8.3051E+01
	2.1462E-01	-1.5618E-01	8.1005E-02	3.7080E-01	5.7262E-01

16	1.0463E+01	-8.7520E+00	-2.6504E+01	1.9215E+01	3.2273E+01
	7.2139E-02	-6.0343E-02	-1.8274E-01	1.3248E-01	2.2251E-01
17	7.2413E+00	-1.3891E+01	-3.9246E+01	2.1133E+01	3.6146E+01
	4.9927E-02	-9.5777E-02	-2.7059E-01	1.4570E-01	2.4922E-01
18	4.7309E+01	-6.6739E+01	3.9725E+02	1.1405E+02	1.0071E+02
	3.2618E-01	-4.6015E-01	2.7389E+00	7.8633E-01	6.9438E-01
19	-5.7935E+00	-1.4543E+02	4.9279E+02	1.3963E+02	9.0647E+01
	-3.9945E-02	-1.0027E+00	3.3976E+00	9.6273E-01	6.2499E-01
20	-4.4185E+00	-3.7146E+02	9.5354E+01	3.6704E+02	3.8113E+01
	-3.0464E-02	-2.5611E+00	6.5744E-01	2.5306E+00	2.6278E-01
21	6.5368E-01	-3.4932E+01	-3.3699E+01	3.5585E+01	4.6521E+01
	4.5069E-03	-2.4084E-01	-2.3235E-01	2.4535E-01	3.2075E-01
22	-3.5050E+00	-6.6075E+01	-6.5117E+01	6.2570E+01	5.1011E+01
	-2.4166E-02	-4.5557E-01	-4.4896E-01	4.3140E-01	3.5171E-01

Allowable Stress for Load Case 106

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	75.91	74.93	20.00	30.00	70.00
2	76.30	74.24	20.00	30.00	70.00
3	75.99	75.03	20.00	30.00	70.00
4	77.41	77.30	20.00	30.00	70.00
5	79.50	79.14	20.00	30.00	70.00
6	80.35	80.04	20.00	30.00	70.00
7	81.97	81.21	20.00	30.00	70.00
8	82.01	81.26	20.00	30.00	70.00
9	81.99	81.23	20.00	30.00	70.00
10	81.45	80.68	20.00	30.00	70.00
11	82.06	80.71	20.00	30.00	70.00
12	84.25	82.66	20.00	30.00	70.00
13	79.18	78.63	20.00	30.00	70.00
14	77.96	77.72	20.00	30.00	70.00
15	77.93	77.79	20.00	30.00	70.00
16	78.14	77.98	20.00	30.00	70.00
17	78.27	78.14	20.00	30.00	70.00
18	78.72	78.62	20.00	30.00	70.00
19	79.10	78.92	20.00	30.00	70.00
20	82.23	81.63	20.00	30.00	70.00
21	76.33	76.15	20.00	30.00	70.00
22	76.53	76.37	20.00	30.00	70.00

Table 2-169. Load Case 201, Maximum Internal Pressure, 414 kPa (60 psia), Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-9.9637E+00	-1.4964E+01	-3.4826E+01	5.0003E+00	1.7422E+00
	-6.8698E-02	-1.0317E-01	-2.4012E-01	3.4476E-02	1.2012E-02
2	-9.3770E+00	-1.4507E+01	-3.4263E+01	5.1301E+00	2.0523E-02
	-6.4652E-02	-1.0002E-01	-2.3623E-01	3.5371E-02	1.4150E-04
3	-1.0205E+01	-1.5403E+01	-3.3406E+01	5.1980E+00	1.0146E+00
	-7.0362E-02	-1.0620E-01	-2.3033E-01	3.5839E-02	6.9954E-03
4	2.1308E+02	-8.4345E+01	2.0480E+02	2.9742E+02	4.5758E+02
	1.4691E+00	-5.8154E-01	1.4121E+00	2.0507E+00	3.1549E+00
5	1.0676E+02	-8.0446E+01	2.2057E+02	1.8721E+02	3.0364E+02
	7.3612E-01	-5.5466E-01	1.5208E+00	1.2908E+00	2.0935E+00
6	1.1886E+01	-3.5988E+01	2.5276E+02	4.7874E+01	2.5236E+01
	8.1950E-02	-2.4813E-01	1.7427E+00	3.3008E-01	1.7399E-01
7	-2.0116E+01	-3.4486E+01	2.2998E+02	1.4370E+01	2.4817E-01
	-1.3870E-01	-2.3777E-01	1.5857E+00	9.9075E-02	1.7111E-03
8	-2.0060E+01	-3.4547E+01	2.2980E+02	1.4487E+01	1.4077E-02
	-1.3831E-01	-2.3819E-01	1.5844E+00	9.9882E-02	9.7059E-05
9	-2.0262E+01	-3.4384E+01	2.3562E+02	1.4122E+01	1.2728E+00
	-1.3970E-01	-2.3707E-01	1.6245E+00	9.7370E-02	8.7756E-03
10	8.0771E+01	-7.8965E+01	3.7800E+01	1.5974E+02	1.6498E+02
	5.5690E-01	-5.4444E-01	2.6062E-01	1.1013E+00	1.1375E+00
11	5.4384E+01	-3.4294E+01	1.9712E+01	8.8678E+01	3.7104E+01
	3.7496E-01	-2.3645E-01	1.3591E-01	6.1141E-01	2.5582E-01
12	-1.1232E+01	-1.5844E+02	-7.9868E+00	1.4721E+02	1.8325E+01
	-7.7443E-02	-1.0924E+00	-5.5067E-02	1.0150E+00	1.2635E-01
13	2.0214E+01	-1.2905E+02	-1.9451E+01	1.4927E+02	1.2676E+02
	1.3937E-01	-8.8979E-01	-1.3411E-01	1.0292E+00	8.7397E-01
14	2.0505E+01	-1.0978E+02	-2.0240E+01	1.3028E+02	1.3482E+02
	1.4138E-01	-7.5688E-01	-1.3955E-01	8.9826E-01	9.2955E-01
15	3.4270E+02	-1.6295E+02	-1.4325E+02	5.0564E+02	5.7893E+02
	2.3628E+00	-1.1235E+00	-9.8765E-01	3.4863E+00	3.9916E+00

16	8.4824E+00	-3.2435E+02	-2.0810E+02	3.3283E+02	4.6608E+02
	5.8484E-02	-2.2363E+00	-1.4348E+00	2.2948E+00	3.2135E+00
17	-2.3511E+01	-2.6230E+02	-2.3195E+02	2.3879E+02	3.1791E+02
	-1.6211E-01	-1.8085E+00	-1.5993E+00	1.6464E+00	2.1919E+00
18	-7.4818E+00	-3.0591E+02	-2.0375E+02	2.9842E+02	4.3205E+02
	-5.1585E-02	-2.1092E+00	-1.4048E+00	2.0576E+00	2.9789E+00
19	6.0670E+01	-4.1318E+02	-2.0065E+02	4.7385E+02	7.3127E+02
	4.1830E-01	-2.8488E+00	-1.3835E+00	3.2671E+00	5.0419E+00
20	2.0599E+01	-3.2032E+02	-1.5665E+02	3.4092E+02	6.1980E+02
	1.4203E-01	-2.2085E+00	-1.0801E+00	2.3506E+00	4.2734E+00
21	-1.0848E+01	-1.0589E+02	-1.3598E+01	9.5043E+01	1.0176E+02
	-7.4791E-02	-7.3009E-01	-9.3757E-02	6.5530E-01	7.0159E-01
22	1.7178E+02	-7.3973E+00	7.2357E+01	1.7918E+02	1.2413E+02
	1.1844E+00	-5.1002E-02	4.9889E-01	1.2354E+00	8.5586E-01

Table 2-170. Load Case 202, Minimum External Pressure, 24 kPa (3.5 psia), Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-2.3776E+00	-3.5614E+00	-8.2912E+00	1.1839E+00	4.2463E-01
	-1.6393E-02	-2.4555E-02	-5.7166E-02	8.1624E-03	2.9278E-03
2	-2.2321E+00	-3.4436E+00	-8.1611E+00	1.2115E+00	1.9912E-03
	-1.5390E-02	-2.3743E-02	-5.6269E-02	8.3529E-03	1.3729E-05
3	-2.4296E+00	-3.6560E+00	-7.9521E+00	1.2264E+00	2.2792E-01
	-1.6751E-02	-2.5207E-02	-5.4828E-02	8.4556E-03	1.5714E-03
4	5.3650E+01	-2.1226E+01	5.0491E+01	7.4876E+01	1.1577E+02
	3.6990E-01	-1.4635E-01	3.4812E-01	5.1625E-01	7.9822E-01
5	2.7425E+01	-2.0098E+01	5.4283E+01	4.7524E+01	7.7386E+01
	1.8909E-01	-1.3857E-01	3.7427E-01	3.2766E-01	5.3356E-01
6	3.5221E+00	-8.6393E+00	6.2349E+01	1.2161E+01	7.3443E+00
	2.4284E-02	-5.9566E-02	4.2988E-01	8.3850E-02	5.0637E-02
7	-4.7350E+00	-8.2580E+00	5.6335E+01	3.5229E+00	5.6483E-02
	-3.2647E-02	-5.6937E-02	3.8842E-01	2.4290E-02	3.8944E-04
8	-4.7226E+00	-8.2719E+00	5.6301E+01	3.5493E+00	3.0827E-03
	-3.2561E-02	-5.7033E-02	3.8818E-01	2.4472E-02	2.1254E-05
9	-4.7763E+00	-8.2282E+00	5.7728E+01	3.4519E+00	3.1828E-01
	-3.2932E-02	-5.6731E-02	3.9802E-01	2.3800E-02	2.1944E-03
10	2.0028E+01	-1.9130E+01	9.2455E+00	3.9157E+01	4.0700E+01
	1.3809E-01	-1.3190E-01	6.3746E-02	2.6998E-01	2.8062E-01
11	1.3447E+01	-8.3763E+00	4.8736E+00	2.1824E+01	9.2090E+00
	9.2715E-02	-5.7753E-02	3.3602E-02	1.5047E-01	6.3494E-02
12	-2.6943E+00	-3.8340E+01	-1.8871E+00	3.5645E+01	3.6784E+00
	-1.8577E-02	-2.6434E-01	-1.3011E-02	2.4577E-01	2.5361E-02
13	4.9184E+00	-3.1373E+01	-4.6707E+00	3.6291E+01	3.0661E+01
	3.3911E-02	-2.1631E-01	-3.2204E-02	2.5022E-01	2.1140E-01
14	5.0053E+00	-2.6701E+01	-4.8796E+00	3.1706E+01	3.2957E+01
	3.4511E-02	-1.8410E-01	-3.3644E-02	2.1861E-01	2.2723E-01
15	8.5421E+01	-3.9614E+01	-3.4938E+01	1.2503E+02	1.4257E+02
	5.8896E-01	-2.7313E-01	-2.4089E-01	8.6208E-01	9.8298E-01

16	2.0120E+00	-7.9314E+01	-5.0964E+01	8.1326E+01	1.1389E+02
	1.3872E-02	-5.4685E-01	-3.5138E-01	5.6072E-01	7.8523E-01
17	-5.7662E+00	-6.4115E+01	-5.6869E+01	5.8349E+01	7.7560E+01
	-3.9756E-02	-4.4206E-01	-3.9210E-01	4.0230E-01	5.3476E-01
18	-1.8090E+00	-7.4860E+01	-4.9901E+01	7.3051E+01	1.0570E+02
	-1.2473E-02	-5.1614E-01	-3.4405E-01	5.0367E-01	7.2876E-01
19	1.4857E+01	-1.0116E+02	-4.9100E+01	1.1601E+02	1.7915E+02
	1.0244E-01	-6.9746E-01	-3.3853E-01	7.9989E-01	1.2352E+00
20	5.0682E+00	-7.8519E+01	-3.8307E+01	8.3588E+01	1.5189E+02
	3.4944E-02	-5.4137E-01	-2.6412E-01	5.7632E-01	1.0473E+00
21	-2.5780E+00	-2.5274E+01	-3.2441E+00	2.2696E+01	2.4499E+01
	-1.7775E-02	-1.7426E-01	-2.2367E-02	1.5649E-01	1.6891E-01
22	4.2655E+01	-1.7449E+00	1.7863E+01	4.4400E+01	3.0631E+01
	2.9409E-01	-1.2031E-02	1.2316E-01	3.0612E-01	2.1120E-01

Table 2-171. Load Case 203, Maximum Increase External Pressure, 140 kPa (20 psia), Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.2540E+01	-2.0150E+01	-4.7181E+01	7.6097E+00	4.5725E-01
	-8.6459E-02	-1.3893E-01	-3.2530E-01	5.2467E-02	3.1526E-03
2	-1.2778E+01	-2.0895E+01	-4.6164E+01	8.1166E+00	2.9930E-01
	-8.8101E-02	-1.4406E-01	-3.1829E-01	5.5962E-02	2.0636E-03
3	-1.3847E+01	-2.2191E+01	-4.5381E+01	8.3448E+00	3.1926E+00
	-9.5470E-02	-1.5300E-01	-3.1289E-01	5.7535E-02	2.2012E-02
4	6.8813E+01	-1.6936E+02	4.5984E+00	2.3817E+02	4.3118E+02
	4.7445E-01	-1.1677E+00	3.1705E-02	1.6422E+00	2.9729E+00
5	6.3656E+01	-1.9258E+02	1.8359E+01	2.5623E+02	3.6937E+02
	4.3889E-01	-1.3278E+00	1.2658E-01	1.7667E+00	2.5467E+00
6	-1.5294E+01	-1.1635E+02	-1.9555E+00	1.0106E+02	1.6920E+02
	-1.0545E-01	-8.0222E-01	-1.3483E-02	6.9678E-01	1.1666E+00
7	-6.6334E+00	-7.1881E+01	5.7740E+01	6.5247E+01	7.3452E-01
	-4.5736E-02	-4.9560E-01	3.9810E-01	4.4986E-01	5.0643E-03
8	-6.6350E+00	-7.1852E+01	5.6277E+01	6.5217E+01	6.2788E-02
	-4.5747E-02	-4.9540E-01	3.8802E-01	4.4965E-01	4.3291E-04
9	-6.6170E+00	-7.1819E+01	5.7419E+01	6.5203E+01	7.2927E-01
	-4.5622E-02	-4.9518E-01	3.9589E-01	4.4956E-01	5.0282E-03
10	-2.9634E+00	-7.3126E+01	1.0679E+01	7.0162E+01	4.2061E+00
	-2.0432E-02	-5.0418E-01	7.3629E-02	4.8375E-01	2.9000E-02
11	4.6213E+00	-2.4193E+01	-2.6994E+00	2.8815E+01	1.1263E+01
	3.1863E-02	-1.6681E-01	-1.8612E-02	1.9867E-01	7.7656E-02
12	-9.5967E+00	-1.1993E+02	-1.3685E+01	1.1033E+02	1.3594E+02
	-6.6167E-02	-8.2690E-01	-9.4354E-02	7.6073E-01	9.3725E-01
13	1.3364E+01	-7.6836E+01	-2.0824E+01	9.0200E+01	9.8887E+01
	9.2145E-02	-5.2976E-01	-1.4358E-01	6.2191E-01	6.8180E-01
14	9.9218E+00	-6.2354E+01	-1.8430E+01	7.2276E+01	4.9187E+01
	6.8408E-02	-4.2991E-01	-1.2707E-01	4.9832E-01	3.3913E-01
15	-9.2832E+01	-2.7126E+02	-7.2167E+01	1.7843E+02	1.1370E+02
	-6.4006E-01	-1.8703E+00	-4.9757E-01	1.2302E+00	7.8393E-01

16	1.1254E+01	-1.0328E+02	-5.4667E+01	1.1454E+02	1.5876E+02
	7.7592E-02	-7.1210E-01	-3.7691E-01	7.8969E-01	1.0946E+00
17	-6.0309E+00	-8.7812E+01	-5.1732E+01	8.1781E+01	1.2528E+02
	-4.1581E-02	-6.0544E-01	-3.5668E-01	5.6386E-01	8.6376E-01
18	-1.8069E+00	-9.8323E+01	-5.2057E+01	9.6516E+01	1.5327E+02
	-1.2458E-02	-6.7791E-01	-3.5892E-01	6.6545E-01	1.0568E+00
19	2.0858E+01	-1.2553E+02	-6.3299E+01	1.4639E+02	2.0466E+02
	1.4381E-01	-8.6549E-01	-4.3643E-01	1.0093E+00	1.4111E+00
20	1.1169E+01	-8.5757E+01	-5.3655E+01	9.6926E+01	1.7056E+02
	7.7007E-02	-5.9127E-01	-3.6994E-01	6.6828E-01	1.1760E+00
21	-1.5260E+01	-1.3431E+02	-1.7384E+01	1.1905E+02	9.5926E+01
	-1.0522E-01	-9.2603E-01	-1.1986E-01	8.2081E-01	6.6139E-01
22	-2.5216E+00	-7.5985E+01	-3.5531E+00	7.3463E+01	2.8480E+01
	-1.7386E-02	-5.2389E-01	-2.4498E-02	5.0651E-01	1.9636E-01

Table 2-172. Load Case 204, Additional Increased External Pressure, 2 MPa (290 psia), Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.7897E+02	-2.9203E+02	-6.8423E+02	1.1305E+02	2.0488E+00
	-1.2340E+00	-2.0135E+00	-4.7176E+00	7.7948E-01	1.4126E-02
2	-1.8533E+02	-3.0584E+02	-6.6821E+02	1.2050E+02	5.1960E+00
	-1.2778E+00	-2.1087E+00	-4.6071E+00	8.3085E-01	3.5825E-02
3	-2.0060E+02	-3.2485E+02	-6.5786E+02	1.2425E+02	5.0674E+01
	-1.3831E+00	-2.2398E+00	-4.5358E+00	8.5670E-01	3.4938E-01
4	1.4297E+03	-3.5578E+03	-6.7935E+02	4.9875E+03	8.7446E+03
	9.8572E+00	-2.4530E+01	-4.6840E+00	3.4388E+01	6.0292E+01
5	1.2332E+03	-3.4653E+03	-5.2014E+02	4.6984E+03	7.1641E+03
	8.5023E+00	-2.3892E+01	-3.5862E+00	3.2395E+01	4.9395E+01
6	-2.4249E+02	-1.9408E+03	-9.9559E+02	1.6983E+03	2.8135E+03
	-1.6719E+00	-1.3381E+01	-6.8644E+00	1.1710E+01	1.9398E+01
7	-6.8967E+00	-1.1877E+03	7.7235E+01	1.1808E+03	1.1018E+01
	-4.7551E-02	-8.1889E+00	5.3251E-01	8.1413E+00	7.5968E-02
8	-6.8962E+00	-1.1873E+03	5.3832E+01	1.1804E+03	1.0414E+00
	-4.7548E-02	-8.1859E+00	3.7116E-01	8.1384E+00	7.1800E-03
9	-6.6293E+00	-1.1865E+03	5.0562E+01	1.1799E+03	1.7881E+01
	-4.5707E-02	-8.1807E+00	3.4862E-01	8.1350E+00	1.2328E-01
10	-1.4409E+02	-1.2350E+03	1.8382E+01	1.0909E+03	7.2991E+02
	-9.9348E-01	-8.5148E+00	1.2674E-01	7.5213E+00	5.0325E+00
11	1.2791E+02	-5.5687E+02	-1.3223E+02	6.8478E+02	3.6345E+02
	8.8194E-01	-3.8395E+00	-9.1167E-01	4.7214E+00	2.5059E+00
12	-1.0473E+02	-1.4921E+03	-2.1354E+02	1.3873E+03	2.3063E+03
	-7.2209E-01	-1.0287E+01	-1.4723E+00	9.5654E+00	1.5901E+01
13	1.7994E+02	-8.8841E+02	-2.9578E+02	1.0683E+03	1.2740E+03
	1.2406E+00	-6.1254E+00	-2.0393E+00	7.3660E+00	8.7837E+00
14	1.1494E+02	-7.0107E+02	-2.5025E+02	8.1601E+02	3.7610E+02
	7.9249E-01	-4.8337E+00	-1.7254E+00	5.6262E+00	2.5931E+00
15	-1.3860E+03	-6.0918E+03	-7.2401E+02	4.7057E+03	2.2382E+02
	-9.5564E+00	-4.2001E+01	-4.9919E+00	3.2445E+01	1.5432E+00

16	1.4912E+02	-5.0348E+02	-1.2405E+02	6.5260E+02	8.4995E+02
	1.0281E+00	-3.4714E+00	-8.5532E-01	4.4995E+00	5.8602E+00
17	-1.4252E+01	-5.0311E+02	1.0876E+01	4.8886E+02	8.4925E+02
	-9.8267E-02	-3.4688E+00	7.4990E-02	3.3706E+00	5.8553E+00
18	5.4514E+01	-6.3618E+02	-8.8589E+01	6.9070E+02	1.2132E+03
	3.7586E-01	-4.3863E+00	-6.1080E-01	4.7622E+00	8.3646E+00
19	2.1856E+02	-7.3199E+02	-3.5686E+02	9.5055E+02	1.0213E+03
	1.5069E+00	-5.0469E+00	-2.4605E+00	6.5538E+00	7.0418E+00
20	4.6757E+02	-6.3862E+02	-3.6205E+02	1.1062E+03	9.5716E+02
	3.2238E+00	-4.4031E+00	-2.4962E+00	7.6269E+00	6.5994E+00
21	-2.2209E+02	-1.9226E+03	-2.4916E+02	1.7005E+03	1.2828E+03
	-1.5312E+00	-1.3256E+01	-1.7179E+00	1.1724E+01	8.8449E+00
22	-2.7064E+02	-1.8039E+03	-3.2746E+02	1.5333E+03	3.0855E+02
	-1.8660E+00	-1.2438E+01	-2.2578E+00	1.0572E+01	2.1274E+00

Table 2-173. Load Case 211, Fabrication Stress, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	9.7351E+02	-2.1563E+02	8.5266E+01	1.1891E+03	1.7001E+03
	6.7121E+00	-1.4867E+00	5.8789E-01	8.1988E+00	1.1722E+01
2	1.3459E+01	-5.8805E+01	6.7805E+01	7.2264E+01	5.2992E+01
	9.2798E-02	-4.0544E-01	4.6750E-01	4.9824E-01	3.6536E-01
3	1.4657E+00	-2.8786E+01	9.1236E+00	3.0252E+01	1.2115E+01
	1.0106E-02	-1.9847E-01	6.2905E-02	2.0858E-01	8.3530E-02
4	9.5184E+02	-4.5862E+02	2.1372E+01	1.4105E+03	2.2342E+03
	6.5627E+00	-3.1621E+00	1.4736E-01	9.7248E+00	1.5405E+01
5	9.9352E+02	-4.6663E+02	-5.1619E+01	1.4601E+03	2.2298E+03
	6.8501E+00	-3.2173E+00	-3.5590E-01	1.0067E+01	1.5374E+01
6	6.1320E+02	5.0514E+01	1.8716E+02	5.6268E+02	9.9432E+02
	4.2278E+00	3.4828E-01	1.2904E+00	3.8795E+00	6.8556E+00
7	3.2774E+02	1.7666E+00	7.7846E+00	3.2597E+02	1.0225E+00
	2.2597E+00	1.2180E-02	5.3673E-02	2.2475E+00	7.0498E-03
8	3.2770E+02	1.6260E+00	1.4504E+01	3.2608E+02	3.1287E-01
	2.2594E+00	1.1211E-02	1.0000E-01	2.2482E+00	2.1572E-03
9	3.2766E+02	1.5739E+00	1.1271E+01	3.2609E+02	6.1901E-01
	2.2592E+00	1.0852E-02	7.7709E-02	2.2483E+00	4.2679E-03
10	3.2876E+02	-4.3942E+00	1.2904E+02	3.3315E+02	4.9381E+01
	2.2667E+00	-3.0297E-02	8.8969E-01	2.2970E+00	3.4047E-01
11	1.3106E+02	-4.8099E+01	8.5113E+01	1.7916E+02	1.2564E+02
	9.0360E-01	-3.3163E-01	5.8683E-01	1.2352E+00	8.6628E-01
12	1.4923E+02	6.3354E+01	9.8866E+01	8.5875E+01	9.1623E+01
	1.0289E+00	4.3681E-01	6.8166E-01	5.9209E-01	6.3172E-01
13	5.8070E+02	-8.9612E+01	1.7635E+02	6.7031E+02	7.6593E+02
	4.0038E+00	-6.1785E-01	1.2159E+00	4.6216E+00	5.2809E+00
14	5.8048E+02	-9.9058E+01	1.8936E+02	6.7954E+02	5.0988E+02
	4.0023E+00	-6.8298E-01	1.3056E+00	4.6852E+00	3.5155E+00
15	1.0967E+03	2.4792E+02	1.3063E+02	8.4879E+02	6.8606E+01
	7.5616E+00	1.7094E+00	9.0068E-01	5.8522E+00	4.7302E-01

16	3.7161E+01	6.6692E+00	1.4060E+01	3.0492E+01	3.1036E+00
	2.5621E-01	4.5982E-02	9.6941E-02	2.1023E-01	2.1398E-02
17	4.8153E+01	3.7694E+00	-3.7879E+01	4.4383E+01	3.0663E+01
	3.3200E-01	2.5989E-02	-2.6116E-01	3.0601E-01	2.1142E-01
18	1.5031E+02	-6.3520E+01	-9.5799E+01	2.1383E+02	3.8267E+02
	1.0363E+00	-4.3795E-01	-6.6051E-01	1.4743E+00	2.6384E+00
19	1.5796E+02	-1.1219E+02	1.9872E+01	2.7015E+02	2.3392E+02
	1.0891E+00	-7.7349E-01	1.3701E-01	1.8626E+00	1.6128E+00
20	1.7985E+02	-2.1071E+02	2.8922E+01	3.9057E+02	3.9100E+02
	1.2401E+00	-1.4528E+00	1.9941E-01	2.6929E+00	2.6958E+00
21	5.3589E+01	-2.4012E+01	-3.4314E+00	7.7601E+01	1.8597E+02
	3.6948E-01	-1.6556E-01	-2.3659E-02	5.3504E-01	1.2822E+00
22	7.6580E+02	2.2399E+02	7.1270E+02	5.4181E+02	2.3627E+02
	5.2800E+00	1.5444E+00	4.9139E+00	3.7357E+00	1.6291E+00

Table 2-174. Load Case 215, Compression Load (5x weight), Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.7737E-01	-4.9388E+01	-6.0180E+00	4.9966E+01	7.5302E+01
	3.9808E-03	-3.4052E-01	-4.1493E-02	3.4450E-01	5.1919E-01
2	7.0633E-01	-3.7938E+01	4.6417E+00	3.8644E+01	4.5930E-01
	4.8700E-03	-2.6157E-01	3.2003E-02	2.6644E-01	3.1667E-03
3	-1.1803E+00	-4.4937E+01	1.8430E+00	4.3757E+01	1.4219E+01
	-8.1378E-03	-3.0983E-01	1.2707E-02	3.0169E-01	9.8037E-02
4	8.2310E+01	-1.0083E+02	2.6066E+01	1.8314E+02	2.9935E+02
	5.6751E-01	-6.9520E-01	1.7972E-01	1.2627E+00	2.0640E+00
5	7.6367E+01	-1.0972E+02	2.3677E+01	1.8609E+02	2.4852E+02
	5.2653E-01	-7.5649E-01	1.6324E-01	1.2830E+00	1.7135E+00
6	-2.4978E+01	-1.1070E+02	-1.9859E+01	8.5721E+01	5.6052E+01
	-1.7222E-01	-7.6325E-01	-1.3692E-01	5.9103E-01	3.8646E-01
7	-1.6309E-01	-6.5507E+01	-9.9100E-01	6.5344E+01	7.0906E-01
	-1.1244E-03	-4.5166E-01	-6.8327E-03	4.5053E-01	4.8888E-03
8	-1.5331E-01	-4.8553E+01	-1.0858E+00	4.8400E+01	1.8763E-02
	-1.0570E-03	-3.3476E-01	-7.4862E-03	3.3371E-01	1.2937E-04
9	-1.5978E-01	-4.4312E+01	-8.9560E-01	4.4152E+01	3.3139E-01
	-1.1016E-03	-3.0552E-01	-6.1749E-03	3.0442E-01	2.2848E-03
10	-2.7901E+00	-5.1374E+01	-1.1372E+01	4.8584E+01	7.4042E+00
	-1.9237E-02	-3.5421E-01	-7.8404E-02	3.3498E-01	5.1050E-02
11	3.9413E+00	-1.6358E+01	-6.7732E+00	2.0299E+01	2.0387E+01
	2.7174E-02	-1.1278E-01	-4.6699E-02	1.3996E-01	1.4056E-01
12	-6.4195E+00	-3.7165E+01	-8.7322E+00	3.0746E+01	4.6183E+01
	-4.4261E-02	-2.5624E-01	-6.0206E-02	2.1198E-01	3.1842E-01
13	1.5462E+01	-5.9348E+01	-1.3661E+01	7.4810E+01	7.3800E+01
	1.0661E-01	-4.0919E-01	-9.4189E-02	5.1580E-01	5.0883E-01
14	1.2875E+01	-4.9940E+01	-1.2834E+01	6.2816E+01	5.2521E+01
	8.8771E-02	-3.4433E-01	-8.8490E-02	4.3310E-01	3.6212E-01
15	-2.3274E+02	-1.0080E+03	-1.2400E+02	7.7522E+02	5.0131E+01
	-1.6047E+00	-6.9496E+00	-8.5498E-01	5.3450E+00	3.4564E-01

16	5.1994E+01	-1.2631E+02	-1.7060E+01	1.7830E+02	2.1931E+02
	3.5849E-01	-8.7087E-01	-1.1762E-01	1.2294E+00	1.5121E+00
17	-3.5352E+01	-1.5673E+02	-2.4889E+01	1.2138E+02	1.2895E+02
	-2.4374E-01	-1.0806E+00	-1.7161E-01	8.3690E-01	8.8911E-01
18	-1.7438E+01	-8.8221E+01	-1.3197E+01	7.0783E+01	6.4424E+01
	-1.2023E-01	-6.0826E-01	-9.0989E-02	4.8803E-01	4.4419E-01
19	4.7761E+01	-7.1870E+01	-7.0427E+00	1.1963E+02	1.4840E+02
	3.2930E-01	-4.9553E-01	-4.8558E-02	8.2483E-01	1.0232E+00
20	6.6913E+01	-7.4620E+01	-1.5204E+01	1.4153E+02	2.1604E+02
	4.6135E-01	-5.1448E-01	-1.0483E-01	9.7583E-01	1.4896E+00
21	-5.6018E+00	-5.9604E+01	-5.7909E+00	5.4002E+01	2.6864E+01
	-3.8623E-02	-4.1096E-01	-3.9927E-02	3.7233E-01	1.8522E-01
22	-9.8956E+01	-2.9360E+02	-1.1571E+02	1.9464E+02	1.1784E+02
	-6.8228E-01	-2.0243E+00	-7.9778E-01	1.3420E+00	8.1249E-01

Table 2-175. Load Case 216, Rod Drop onto Cask, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.0128E+00	-3.4996E+01	3.4381E+01	4.1009E+01	7.4128E+00
	4.1457E-02	-2.4129E-01	2.3705E-01	2.8275E-01	5.1109E-02
2	6.6301E-01	-4.7880E+01	2.3677E+00	4.8543E+01	8.2856E+00
	4.5713E-03	-3.3012E-01	1.6325E-02	3.3469E-01	5.7127E-02
3	4.0621E+00	-5.5420E+01	2.1008E+00	5.9482E+01	9.1137E+00
	2.8007E-02	-3.8211E-01	1.4485E-02	4.1011E-01	6.2837E-02
4	2.4213E+02	-5.9020E+01	1.4799E+02	3.0115E+02	3.1184E+02
	1.6694E+00	-4.0693E-01	1.0203E+00	2.0764E+00	2.1501E+00
5	1.4716E+02	-5.6493E+01	1.1162E+02	2.0366E+02	8.6632E+01
	1.0147E+00	-3.8951E-01	7.6957E-01	1.4042E+00	5.9731E-01
6	8.3499E+00	-2.5064E+02	3.9998E+01	2.5899E+02	1.7881E+02
	5.7570E-02	-1.7281E+00	2.7578E-01	1.7857E+00	1.2328E+00
7	-3.7530E-01	-1.5764E+02	-4.4316E+00	1.5727E+02	2.7131E+00
	-2.5876E-03	-1.0869E+00	-3.0555E-02	1.0843E+00	1.8706E-02
8	-3.4867E-01	-1.0875E+02	-2.6529E+00	1.0840E+02	7.3605E-03
	-2.4040E-03	-7.4979E-01	-1.8291E-02	7.4739E-01	5.0749E-05
9	-3.5785E-01	-9.1469E+01	-1.8711E+00	9.1111E+01	3.7831E-01
	-2.4673E-03	-6.3066E-01	-1.2901E-02	6.2819E-01	2.6083E-03
10	-2.7665E+00	-9.7854E+01	-2.6456E+01	9.5087E+01	1.1502E+00
	-1.9075E-02	-6.7468E-01	-1.8241E-01	6.5560E-01	7.9301E-03
11	1.1182E+01	-2.7357E+01	-9.4279E+00	3.8538E+01	4.3518E+01
	7.7095E-02	-1.8862E-01	-6.5003E-02	2.6571E-01	3.0005E-01
12	-1.0499E+01	-5.7361E+01	-1.3335E+01	4.6862E+01	6.0782E+01
	-7.2387E-02	-3.9549E-01	-9.1941E-02	3.2310E-01	4.1908E-01
13	3.7841E+01	-1.1954E+02	-2.0092E+01	1.5738E+02	1.4582E+02
	2.6091E-01	-8.2419E-01	-1.3853E-01	1.0851E+00	1.0054E+00
14	3.5440E+01	-1.0578E+02	-1.9362E+01	1.4122E+02	1.2539E+02
	2.4435E-01	-7.2934E-01	-1.3349E-01	9.7369E-01	8.6450E-01
15	-1.5498E+03	-8.9484E+03	-5.5378E+02	7.3986E+03	5.1908E+02
	-1.0685E+01	-6.1697E+01	-3.8182E+00	5.1012E+01	3.5789E+00

16	2.6415E+02	-5.7786E+02	1.9940E+01	8.4201E+02	1.1822E+03
	1.8212E+00	-3.9842E+00	1.3748E-01	5.8055E+00	8.1508E+00
17	-8.1330E+00	-5.2492E+02	8.4131E+01	5.1679E+02	8.6061E+02
	-5.6075E-02	-3.6192E+00	5.8006E-01	3.5631E+00	5.9337E+00
18	2.0368E+01	-2.3514E+02	-6.0621E+01	2.5551E+02	2.0031E+02
	1.4043E-01	-1.6212E+00	-4.1797E-01	1.7617E+00	1.3811E+00
19	1.1106E+02	-5.8661E+01	3.1414E+01	1.6973E+02	6.5121E+01
	7.6577E-01	-4.0446E-01	2.1660E-01	1.1702E+00	4.4899E-01
20	1.8874E+02	-1.0375E+02	-2.0971E+01	2.9249E+02	1.1620E+02
	1.3013E+00	-7.1533E-01	-1.4459E-01	2.0167E+00	8.0115E-01
21	-4.7431E+00	-6.3174E+01	-4.8991E+00	5.8431E+01	2.8481E+01
	-3.2702E-02	-4.3557E-01	-3.3778E-02	4.0286E-01	1.9637E-01
22	3.0369E+02	-3.5143E+03	-8.4829E+02	3.8180E+03	3.1088E+03
	2.0938E+00	-2.4230E+01	-5.8488E+00	2.6324E+01	2.1434E+01

Table 2-176. Load Case 221, Forward 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.5594E+00	6.5199E-02	-2.6309E-01	2.8874E+00	2.1486E-01
	1.7647E-02	4.4953E-04	-1.8139E-03	1.9908E-02	1.4814E-03
2	1.7153E+01	8.4179E-01	-1.5859E-01	2.8213E+01	1.0572E+01
	1.1827E-01	5.8040E-03	-1.0934E-03	1.9452E-01	7.2893E-02
3	6.5185E-01	-4.0180E-02	-5.9030E-01	3.3605E+00	2.6550E-01
	4.4943E-03	-2.7703E-04	-4.0700E-03	2.3170E-02	1.8306E-03
4	2.1651E+00	2.4331E-01	-1.0445E+00	3.0400E+00	9.7822E-01
	1.4928E-02	1.6775E-03	-7.2015E-03	2.0960E-02	6.7446E-03
5	1.4906E+00	3.6330E-01	-9.6784E-01	1.9708E+00	3.2863E-01
	1.0277E-02	2.5049E-03	-6.6730E-03	1.3588E-02	2.2658E-03
6	1.3738E+00	5.1298E-01	-7.5014E-01	1.8293E+00	3.2418E-01
	9.4723E-03	3.5369E-03	-5.1720E-03	1.2612E-02	2.2351E-03
7	1.8265E+00	4.9163E-01	1.6403E-01	1.6625E+00	1.7502E-01
	1.2593E-02	3.3896E-03	1.1309E-03	1.1462E-02	1.2068E-03
8	2.3570E-01	1.2144E-01	-5.6140E-02	2.9184E-01	2.2589E-02
	1.6251E-03	8.3728E-04	-3.8707E-04	2.0122E-03	1.5574E-04
9	1.0951E+00	6.3192E-01	-1.4645E+00	1.3401E+00	1.7463E-01
	7.5503E-03	4.3569E-03	-1.0098E-02	9.2395E-03	1.2040E-03
10	6.2327E-01	-3.3924E-01	-1.6030E+00	2.9510E+00	2.1315E-01
	4.2973E-03	-2.3390E-03	-1.1053E-02	2.0347E-02	1.4696E-03
11	8.5383E-01	-7.9848E-02	-1.0001E+00	2.5520E+00	1.2451E+00
	5.8870E-03	-5.5053E-04	-6.8956E-03	1.7595E-02	8.5845E-03
12	6.1722E-01	-1.8181E-02	-8.5238E-01	1.4706E+00	9.5249E-02
	4.2556E-03	-1.2536E-04	-5.8769E-03	1.0139E-02	6.5672E-04
13	7.5886E-01	-3.0248E-01	-7.7816E-01	2.0781E+00	9.3071E-01
	5.2321E-03	-2.0855E-03	-5.3653E-03	1.4328E-02	6.4170E-03
14	9.2273E-01	4.1445E-01	-6.3067E-01	2.5459E+00	9.3791E-01
	6.3620E-03	2.8575E-03	-4.3483E-03	1.7554E-02	6.4667E-03
15	1.0708E+00	1.5366E-01	-2.9247E-01	1.3626E+00	5.2208E-02
	7.3831E-03	1.0595E-03	-2.0165E-03	9.3950E-03	3.5996E-04

16	1.6440E+00	7.4727E-02	-8.5402E-01	2.0891E+00	2.9699E-01
	1.1335E-02	5.1522E-04	-5.8883E-03	1.4404E-02	2.0477E-03
17	1.0119E+00	2.2855E-01	-4.2909E-01	1.7503E+00	7.7622E-01
	6.9766E-03	1.5758E-03	-2.9585E-03	1.2068E-02	5.3518E-03
18	8.5158E-01	2.7634E-01	-4.0972E-01	1.3546E+00	5.3856E-01
	5.8714E-03	1.9053E-03	-2.8249E-03	9.3396E-03	3.7133E-03
19	2.5479E+00	7.2354E-02	-1.1760E+00	2.7848E+00	1.9720E-01
	1.7567E-02	4.9887E-04	-8.1084E-03	1.9201E-02	1.3597E-03
20	1.4724E+00	3.4914E-01	-6.2237E-01	1.7632E+00	7.0566E-02
	1.0152E-02	2.4072E-03	-4.2911E-03	1.2157E-02	4.8654E-04
21	3.6068E-01	-8.7838E-02	-1.5325E+00	1.8935E+00	3.8318E-01
	2.4868E-03	-6.0562E-04	-1.0566E-02	1.3055E-02	2.6420E-03
22	1.4228E+00	6.8912E-02	-2.6709E-01	1.6903E+00	2.4883E-01
	9.8099E-03	4.7513E-04	-1.8415E-03	1.1654E-02	1.7156E-03

Table 2-177. Load Case 222, Lateral 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.1755E+00	7.1739E-01	-1.4765E+00	3.6536E+00	1.1937E+00
	1.4999E-02	4.9462E-03	-1.0180E-02	2.5191E-02	8.2304E-03
2	4.8766E+01	8.3613E-01	-1.6977E+00	6.8006E+01	7.6067E+00
	3.3623E-01	5.7649E-03	-1.1705E-02	4.6889E-01	5.2446E-02
3	1.0900E+00	4.2966E-01	-7.9839E-01	1.8652E+00	1.1856E+00
	7.5152E-03	2.9624E-03	-5.5047E-03	1.2860E-02	8.1744E-03
4	1.4541E+01	-4.8519E+00	-1.4541E+01	1.8319E+01	9.9574E+00
	1.0026E-01	-3.3453E-02	-1.0026E-01	1.2631E-01	6.8654E-02
5	8.5141E+00	-4.9379E+00	-8.5141E+00	6.2110E+00	4.1391E+00
	5.8703E-02	-3.4046E-02	-5.8703E-02	4.2823E-02	2.8538E-02
6	1.1370E+01	-4.0574E+00	-1.1370E+01	1.4500E+01	1.4989E+00
	7.8395E-02	-2.7975E-02	-7.8395E-02	9.9976E-02	1.0334E-02
7	5.2259E-01	-2.7835E-01	-5.2265E-01	8.3949E-01	2.6080E-01
	3.6031E-03	-1.9192E-03	-3.6036E-03	5.7881E-03	1.7981E-03
8	1.0259E+00	2.0936E-01	-9.6503E-01	1.9745E+00	1.4788E-01
	7.0730E-03	1.4435E-03	-6.6536E-03	1.3614E-02	1.0196E-03
9	1.4081E+00	-1.5207E-01	-8.4723E-01	2.1766E+00	5.3422E-02
	9.7085E-03	-1.0485E-03	-5.8415E-03	1.5007E-02	3.6833E-04
10	9.6896E+00	4.6102E+00	2.6270E+00	1.0674E+01	3.3591E+00
	6.6807E-02	3.1786E-02	1.8112E-02	7.3594E-02	2.3160E-02
11	9.4606E+00	2.1207E+00	-1.3342E+00	1.0795E+01	9.1635E+00
	6.5229E-02	1.4621E-02	-9.1991E-03	7.4428E-02	6.3180E-02
12	1.8875E+00	8.1970E-02	-1.5046E+00	3.3921E+00	1.6050E-01
	1.3014E-02	5.6516E-04	-1.0374E-02	2.3387E-02	1.1066E-03
13	5.3753E+00	1.6858E+00	-5.3753E+00	6.4201E+00	2.5726E+00
	3.7061E-02	1.1623E-02	-3.7061E-02	4.4265E-02	1.7737E-02
14	8.9618E+00	2.3943E+00	-1.1430E+00	1.0105E+01	3.4165E+00
	6.1789E-02	1.6508E-02	-7.8805E-03	6.9670E-02	2.3556E-02
15	2.0582E+00	-4.6713E-02	-1.9819E+00	4.0409E+00	1.6012E-02
	1.4191E-02	-3.2208E-04	-1.3665E-02	2.7861E-02	1.1040E-04

16	4.0303E+00	5.5710E-01	-1.4633E+00	5.4936E+00	5.5686E+00
	2.7788E-02	3.8410E-03	-1.0089E-02	3.7877E-02	3.8394E-02
17	4.1571E+00	-8.6294E-01	-1.8570E+00	6.0141E+00	2.2789E+00
	2.8662E-02	-5.9498E-03	-1.2804E-02	4.1466E-02	1.5713E-02
18	5.3747E+00	2.4367E+00	-5.3746E+00	4.1775E+00	2.4195E+00
	3.7057E-02	1.6801E-02	-3.7057E-02	2.8803E-02	1.6682E-02
19	1.0273E+01	-2.1564E+00	-1.0273E+01	1.5300E+01	6.6194E+00
	7.0827E-02	-1.4868E-02	-7.0827E-02	1.0549E-01	4.5639E-02
20	9.1820E+00	-2.3316E+00	-9.1820E+00	1.1134E+01	8.0416E-01
	6.3308E-02	-1.6076E-02	-6.3308E-02	7.6763E-02	5.5445E-03
21	1.3937E+00	2.2040E-03	-1.3937E+00	2.7467E+00	3.0302E-01
	9.6090E-03	1.5196E-05	-9.6092E-03	1.8938E-02	2.0893E-03
22	1.3901E+00	2.2259E-02	-1.1824E+00	2.5725E+00	1.4326E-01
	9.5846E-03	1.5347E-04	-8.1524E-03	1.7737E-02	9.8772E-04

Table 2-178. Load Case 223, Vertical 10g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.1655E+01	8.9970E+00	-3.0968E+01	6.6784E+01	1.0353E+01
	2.8720E-01	6.2032E-02	-2.1352E-01	4.6046E-01	7.1384E-02
2	9.8773E+02	1.1794E+02	-3.8886E+01	1.3841E+03	1.5539E+02
	6.8102E+00	8.1317E-01	-2.6811E-01	9.5432E+00	1.0714E+00
3	2.9887E+01	3.3797E+00	-2.1259E+01	4.7661E+01	1.5746E+01
	2.0606E-01	2.3302E-02	-1.4657E-01	3.2861E-01	1.0857E-01
4	9.7574E+01	-7.2602E+00	-5.5289E+01	1.5286E+02	1.2919E+02
	6.7275E-01	-5.0057E-02	-3.8121E-01	1.0540E+00	8.9076E-01
5	1.0372E+02	3.0619E+01	-3.0562E+01	1.8440E+02	1.0264E+02
	7.1515E-01	2.1111E-01	-2.1072E-01	1.2714E+00	7.0767E-01
6	8.6167E+01	8.6049E+00	-3.9484E+01	1.6855E+02	3.3306E+01
	5.9410E-01	5.9329E-02	-2.7223E-01	1.1621E+00	2.2964E-01
7	3.3533E+01	2.6405E-01	-8.7054E+00	5.4151E+01	4.8837E+00
	2.3120E-01	1.8206E-03	-6.0022E-02	3.7336E-01	3.3672E-02
8	1.8977E+01	1.9077E-01	-2.4618E+00	2.2215E+01	1.5634E+00
	1.3084E-01	1.3153E-03	-1.6974E-02	1.5317E-01	1.0779E-02
9	3.3447E+01	3.9609E+00	5.1454E-01	3.2932E+01	5.2915E+00
	2.3061E-01	2.7309E-02	3.5476E-03	2.2706E-01	3.6484E-02
10	7.4371E+01	1.3187E+01	-6.0836E-01	1.2920E+02	3.8798E+01
	5.1277E-01	9.0919E-02	-4.1945E-03	8.9084E-01	2.6750E-01
11	4.0061E+01	2.8006E+00	-1.3929E+01	6.6543E+01	7.0348E+01
	2.7621E-01	1.9310E-02	-9.6039E-02	4.5880E-01	4.8503E-01
12	3.7826E+01	1.2994E+00	-1.6029E+01	5.3856E+01	3.2049E+01
	2.6080E-01	8.9594E-03	-1.1052E-01	3.7132E-01	2.2097E-01
13	3.1850E+01	-6.7201E+00	-1.7047E+01	5.4743E+01	5.0138E+01
	2.1960E-01	-4.6334E-02	-1.1754E-01	3.7744E-01	3.4569E-01
14	4.8574E+01	4.1545E+00	-1.2372E+01	6.0947E+01	4.1460E+01
	3.3491E-01	2.8644E-02	-8.5301E-02	4.2021E-01	2.8586E-01
15	5.1164E+01	-1.4824E+00	-5.0086E+01	1.0125E+02	7.4234E+01
	3.5277E-01	-1.0221E-02	-3.4533E-01	6.9810E-01	5.1183E-01

16	3.4183E+01	-6.5471E+00	-2.3041E+01	5.7712E+01	5.8029E+01
	2.3568E-01	-4.5140E-02	-1.5886E-01	3.9791E-01	4.0009E-01
17	2.9347E+01	3.6288E+00	-1.5097E+01	4.4444E+01	3.9585E+01
	2.0234E-01	2.5020E-02	-1.0409E-01	3.0643E-01	2.7293E-01
18	2.3535E+01	1.2986E+01	-2.3534E+01	2.2223E+01	8.4856E+00
	1.6227E-01	8.9535E-02	-1.6226E-01	1.5323E-01	5.8506E-02
19	4.9880E+01	3.6201E+00	-2.5292E+01	7.5172E+01	8.1527E+01
	3.4391E-01	2.4960E-02	-1.7438E-01	5.1829E-01	5.6211E-01
20	5.0373E+01	1.3164E+01	-2.2894E+01	7.3268E+01	8.8671E+01
	3.4731E-01	9.0762E-02	-1.5785E-01	5.0516E-01	6.1136E-01
21	3.5960E+00	1.4618E-01	-3.2989E+00	6.8949E+00	5.3145E-01
	2.4793E-02	1.0078E-03	-2.2745E-02	4.7539E-02	3.6642E-03
22	1.9548E+01	5.2274E-01	-1.0843E+01	3.0391E+01	1.2652E+01
	1.3478E-01	3.6041E-03	-7.4757E-02	2.0954E-01	8.7230E-02

Table 2-179. Load Case 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.4160E+01	-9.4867E+02	-1.7374E+02	9.3451E+02	3.7254E+02
	-9.7632E-02	-6.5409E+00	-1.1979E+00	6.4432E+00	2.5686E+00
2	1.0878E+01	-5.5364E+02	-3.4301E+01	5.6452E+02	2.9487E+01
	7.5003E-02	-3.8172E+00	-2.3649E-01	3.8922E+00	2.0331E-01
3	7.6461E+00	-3.9375E+02	-7.5554E+00	4.0140E+02	5.4123E+01
	5.2718E-02	-2.7148E+00	-5.2093E-02	2.7675E+00	3.7317E-01
4	2.5995E+02	-1.4964E+03	-4.7174E+02	1.7564E+03	1.2814E+03
	1.7923E+00	-1.0317E+01	-3.2525E+00	1.2110E+01	8.8349E+00
5	4.7098E+01	-5.6378E+02	-2.2978E+02	6.1088E+02	8.7363E+02
	3.2473E-01	-3.8871E+00	-1.5843E+00	4.2118E+00	6.0235E+00
6	-1.0476E+02	-4.0963E+02	-2.0651E+02	3.0487E+02	1.3274E+02
	-7.2227E-01	-2.8243E+00	-1.4238E+00	2.1020E+00	9.1520E-01
7	-2.0241E+00	-2.8169E+02	-1.6789E+01	2.7967E+02	4.9096E+00
	-1.3956E-02	-1.9422E+00	-1.1576E-01	1.9282E+00	3.3850E-02
8	-1.2750E+00	-2.7733E+02	-1.2152E+01	2.7605E+02	1.7166E-01
	-8.7909E-03	-1.9121E+00	-8.3784E-02	1.9033E+00	1.1835E-03
9	-1.0662E+00	-2.8667E+02	-8.4347E+00	2.8560E+02	6.2595E-01
	-7.3511E-03	-1.9765E+00	-5.8155E-02	1.9692E+00	4.3158E-03
10	-5.9602E+01	-5.1391E+02	-3.8096E+01	4.5431E+02	2.6163E+02
	-4.1094E-01	-3.5433E+00	-2.6266E-01	3.1323E+00	1.8039E+00
11	7.6399E+01	-2.6191E+02	-1.8334E+01	3.3831E+02	1.2735E+02
	5.2675E-01	-1.8058E+00	-1.2641E-01	2.3325E+00	8.7804E-01
12	6.8281E+01	-8.9030E+01	5.5041E+01	1.5731E+02	3.1255E+02
	4.7078E-01	-6.1384E-01	3.7949E-01	1.0846E+00	2.1550E+00
13	9.9614E+01	-3.0168E+02	-2.0618E+01	4.0130E+02	3.0231E+02
	6.8682E-01	-2.0800E+00	-1.4216E-01	2.7669E+00	2.0843E+00
14	9.9790E+01	-2.5114E+02	6.2975E-01	3.5093E+02	1.5339E+02
	6.8802E-01	-1.7315E+00	4.3420E-03	2.4196E+00	1.0576E+00
15	2.2170E+02	4.1329E+01	2.7023E+01	1.8037E+02	6.1242E+00
	1.5286E+00	2.8495E-01	1.8632E-01	1.2436E+00	4.2225E-02

16	7.1643E+01	-2.6277E+02	-1.3414E+02	3.3441E+02	1.5070E+02
	4.9396E-01	-1.8117E+00	-9.2488E-01	2.3057E+00	1.0391E+00
17	1.2580E+02	-2.5270E+02	-1.5053E+02	3.7850E+02	3.2213E+02
	8.6735E-01	-1.7423E+00	-1.0379E+00	2.6096E+00	2.2210E+00
18	1.1667E+02	-4.1356E+02	-8.9182E+01	5.3023E+02	6.1650E+02
	8.0443E-01	-2.8514E+00	-6.1489E-01	3.6558E+00	4.2506E+00
19	1.1809E+02	-4.2165E+02	-1.5895E+02	5.3974E+02	3.7488E+02
	8.1419E-01	-2.9072E+00	-1.0959E+00	3.7214E+00	2.5847E+00
20	-1.9261E+01	-2.8931E+02	-1.8255E+02	2.7005E+02	4.2077E+02
	-1.3280E-01	-1.9947E+00	-1.2586E+00	1.8619E+00	2.9011E+00
21	-2.2694E+01	-1.5788E+02	-2.1315E+01	1.3519E+02	5.7642E+01
	-1.5647E-01	-1.0885E+00	-1.4696E-01	9.3208E-01	3.9743E-01
22	1.4007E+02	2.9237E+01	8.7158E+01	1.1084E+02	9.2924E+01
	9.6576E-01	2.0158E-01	6.0093E-01	7.6418E-01	6.4069E-01

Table 2-180. Load Case 232, Impact Test, Normal Condition, Normal Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-4.3851E+01	-3.2062E+03	-5.9694E+02	3.1624E+03	1.2779E+03
	-3.0234E-01	-2.2106E+01	-4.1157E+00	2.1804E+01	8.8110E+00
2	3.6608E+01	-1.7299E+03	-1.0905E+02	1.7665E+03	8.2715E+01
	2.5240E-01	-1.1927E+01	-7.5189E-01	1.2180E+01	5.7030E-01
3	1.4808E+01	-1.0201E+03	-3.7223E+01	1.0349E+03	8.9395E+01
	1.0210E-01	-7.0335E+00	-2.5664E-01	7.1356E+00	6.1636E-01
4	8.7090E+02	-5.1268E+03	-1.6448E+03	5.9977E+03	4.3668E+03
	6.0047E+00	-3.5348E+01	-1.1341E+01	4.1353E+01	3.0108E+01
5	1.4694E+02	-1.9133E+03	-8.0020E+02	2.0603E+03	2.9578E+03
	1.0131E+00	-1.3192E+01	-5.5172E+00	1.4205E+01	2.0393E+01
6	-3.3587E+02	-1.3042E+03	-6.9110E+02	9.6830E+02	5.0009E+02
	-2.3157E+00	-8.9919E+00	-4.7650E+00	6.6762E+00	3.4480E+00
7	-6.4298E+00	-8.8189E+02	-5.5845E+01	8.7546E+02	1.6685E+01
	-4.4332E-02	-6.0804E+00	-3.8504E-01	6.0361E+00	1.1504E-01
8	-3.9646E+00	-8.4322E+02	-3.9722E+01	8.3925E+02	8.5101E-01
	-2.7335E-02	-5.8138E+00	-2.7387E-01	5.7864E+00	5.8675E-03
9	-3.2081E+00	-8.1085E+02	-2.7565E+01	8.0765E+02	5.7717E-01
	-2.2119E-02	-5.5906E+00	-1.9006E-01	5.5685E+00	3.9795E-03
10	-1.5792E+02	-1.3134E+03	-9.6320E+01	1.1555E+03	6.8283E+02
	-1.0888E+00	-9.0557E+00	-6.6410E-01	7.9668E+00	4.7080E+00
11	2.0361E+02	-6.7121E+02	-4.4778E+01	8.7482E+02	3.1955E+02
	1.4038E+00	-4.6278E+00	-3.0873E-01	6.0316E+00	2.2032E+00
12	1.9175E+02	-1.8880E+02	1.4942E+02	3.8055E+02	7.7647E+02
	1.3221E+00	-1.3018E+00	1.0302E+00	2.6238E+00	5.3536E+00
13	2.5373E+02	-7.1035E+02	-3.8245E+01	9.6407E+02	6.7407E+02
	1.7494E+00	-4.8977E+00	-2.6369E-01	6.6471E+00	4.6476E+00
14	2.4952E+02	-5.6415E+02	2.2970E+01	8.1367E+02	3.5190E+02
	1.7204E+00	-3.8897E+00	1.5837E-01	5.6101E+00	2.4263E+00
15	8.3614E+02	1.8534E+02	1.3136E+02	6.5081E+02	2.3281E+01
	5.7650E+00	1.2778E+00	9.0573E-01	4.4872E+00	1.6052E-01

16	2.8958E+02	-9.1798E+02	-4.4126E+02	1.2076E+03	5.6522E+02
	1.9966E+00	-6.3292E+00	-3.0424E+00	8.3258E+00	3.8970E+00
17	4.9047E+02	-8.8069E+02	-4.9980E+02	1.3712E+03	1.1635E+03
	3.3817E+00	-6.0722E+00	-3.4460E+00	9.4538E+00	8.0221E+00
18	4.6270E+02	-1.4211E+03	-2.9977E+02	1.8838E+03	2.1661E+03
	3.1902E+00	-9.7984E+00	-2.0668E+00	1.2989E+01	1.4935E+01
19	4.0197E+02	-1.4487E+03	-5.6530E+02	1.8507E+03	1.2611E+03
	2.7715E+00	-9.9885E+00	-3.8976E+00	1.2760E+01	8.6948E+00
20	-9.7709E+01	-9.6214E+02	-6.2784E+02	8.6443E+02	1.4123E+03
	-6.7368E-01	-6.6337E+00	-4.3288E+00	5.9600E+00	9.7373E+00
21	1.6604E+02	1.2645E+00	-3.2787E-01	1.6478E+02	9.0540E+00
	1.1448E+00	8.7186E-03	-2.2606E-03	1.1361E+00	6.2425E-02
22	5.3497E+02	1.2521E+02	3.5320E+02	4.0975E+02	3.3572E+02
	3.6885E+00	8.6331E-01	2.4353E+00	2.8252E+00	2.3147E+00

Table 2-181. Load Combination 101, Hot Environment, Normal Conditions of Transport – Model AOS-050

Load Cases: 101, 201, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.19	1.70	0.16	2.90	3.05	20.00	70.00	9.36
	8.23	11.73	1.10	19.97	21.06	137.90	482.63	
2	0.08	0.05	0.21	0.13	0.34	20.00	70.00	>10
	0.53	0.37	1.47	0.90	2.37	137.90	482.63	
3	0.04	0.01	0.15	0.05	0.20	20.00	70.00	>10
	0.24	0.09	1.05	0.33	1.39	137.90	482.63	
4	1.71	2.69	1.01	4.40	5.41	20.00	70.00	5.82
	11.78	18.56	6.96	30.33	37.29	137.90	482.63	
5	1.65	2.53	1.13	4.18	5.31	20.00	70.00	6.18
	11.36	17.47	7.81	28.83	36.63	137.90	482.63	
6	0.61	1.02	0.50	1.63	2.13	20.00	70.00	>10
	4.21	7.03	3.43	11.24	14.67	137.90	482.63	
7	0.34	0.00	0.15	0.34	0.49	20.00	70.00	>10
	2.35	0.01	1.05	2.36	3.41	137.90	482.63	
8	0.34	0.00	0.15	0.34	0.49	20.00	70.00	>10
	2.35	0.00	1.05	2.35	3.40	137.90	482.63	
9	0.34	0.00	0.15	0.34	0.49	20.00	70.00	>10
	2.35	0.01	1.04	2.36	3.39	137.90	482.63	
10	0.49	0.21	0.28	0.71	0.98	20.00	70.00	>10
	3.40	1.48	1.91	4.88	6.78	137.90	482.63	
11	0.27	0.16	0.32	0.43	0.75	20.00	70.00	>10
	1.85	1.12	2.20	2.97	5.17	137.90	482.63	
12	0.23	0.11	0.48	0.34	0.82	20.00	70.00	>10
	1.61	0.76	3.28	2.37	5.64	137.90	482.63	
13	0.82	0.89	0.57	1.71	2.28	20.00	70.00	>10
	5.65	6.15	3.95	11.81	15.75	137.90	482.63	

14	0.81	0.64	0.49	1.45	1.95	20.00	70.00	>10
	5.58	4.45	3.40	10.03	13.43	137.90	482.63	
15	1.35	0.65	1.17	2.00	3.17	20.00	70.00	>10
	9.34	4.46	8.09	13.80	21.89	137.90	482.63	
16	0.36	0.47	0.41	0.83	1.25	20.00	70.00	>10
	2.51	3.23	2.86	5.74	8.60	137.90	482.63	
17	0.28	0.35	0.24	0.63	0.88	20.00	70.00	>10
	1.95	2.40	1.69	4.36	6.04	137.90	482.63	
18	0.51	0.81	0.11	1.33	1.44	20.00	70.00	>10
	3.53	5.62	0.76	9.15	9.91	137.90	482.63	
19	0.74	0.97	0.16	1.71	1.87	20.00	70.00	>10
	5.13	6.65	1.14	11.78	12.92	137.90	482.63	
20	0.73	1.01	0.35	1.74	2.09	20.00	70.00	>10
	5.04	6.97	2.39	12.01	14.40	137.90	482.63	
21	0.17	0.29	0.03	0.46	0.49	20.00	70.00	>10
	1.19	1.98	0.22	3.17	3.39	137.90	482.63	
22	0.72	0.36	0.06	1.08	1.14	20.00	70.00	>10
	4.97	2.48	0.42	7.46	7.88	137.90	482.63	

Min MS: 5.819, Location: 4, Combination: Pm+Pb

Table 2-182. Load Combination 102, Cold Environment, Normal Conditions of Transport – Model AOS-050

Load Cases: 104, 201, 211
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.19	1.70	0.09	2.90	2.99	20.00	70.00	9.36
	8.23	11.73	0.63	19.97	20.59	137.90	482.63	
2	0.08	0.05	0.07	0.13	0.20	20.00	70.00	>10
	0.53	0.37	0.45	0.90	1.35	137.90	482.63	
3	0.04	0.01	0.09	0.05	0.13	20.00	70.00	>10
	0.24	0.09	0.59	0.33	0.93	137.90	482.63	
4	1.71	2.69	10.82	4.40	15.22	20.00	70.00	2.94
	11.78	18.56	74.60	30.33	104.94	137.90	482.63	
5	1.65	2.53	14.79	4.18	18.97	20.00	70.00	2.16
	11.36	17.47	101.94	28.83	130.76	137.90	482.63	
6	0.61	1.02	7.02	1.63	8.65	20.00	70.00	5.94
	4.21	7.03	48.40	11.24	59.64	137.90	482.63	
7	0.34	0.00	3.23	0.34	3.57	20.00	70.00	>10
	2.35	0.01	22.24	2.36	24.60	137.90	482.63	
8	0.34	0.00	3.22	0.34	3.56	20.00	70.00	>10
	2.35	0.00	22.22	2.35	24.57	137.90	482.63	
9	0.34	0.00	3.22	0.34	3.57	20.00	70.00	>10
	2.35	0.01	22.23	2.36	24.59	137.90	482.63	
10	0.49	0.21	3.54	0.71	4.25	20.00	70.00	>10
	3.40	1.48	24.39	4.88	29.27	137.90	482.63	
11	0.27	0.16	1.73	0.43	2.16	20.00	70.00	>10
	1.85	1.12	11.93	2.97	14.90	137.90	482.63	
12	0.23	0.11	0.85	0.34	1.19	20.00	70.00	>10
	1.61	0.76	5.83	2.37	8.19	137.90	482.63	
13	0.82	0.89	6.14	1.71	7.85	20.00	70.00	6.64
	5.65	6.15	42.35	11.81	54.16	137.90	482.63	

14	0.81	0.64	4.97	1.45	6.43	20.00	70.00	8.33
	5.58	4.45	34.30	10.03	44.32	137.90	482.63	
15	1.35	0.65	0.45	2.00	2.45	20.00	70.00	>10
	9.34	4.46	3.12	13.80	16.93	137.90	482.63	
16	0.36	0.47	1.83	0.83	2.66	20.00	70.00	>10
	2.51	3.23	12.59	5.74	18.33	137.90	482.63	
17	0.28	0.35	1.56	0.63	2.19	20.00	70.00	>10
	1.95	2.40	10.76	4.36	15.12	137.90	482.63	
18	0.51	0.81	1.63	1.33	2.96	20.00	70.00	>10
	3.53	5.62	11.27	9.15	20.42	137.90	482.63	
19	0.74	0.97	2.18	1.71	3.89	20.00	70.00	>10
	5.13	6.65	15.00	11.78	26.79	137.90	482.63	
20	0.73	1.01	2.41	1.74	4.15	20.00	70.00	>10
	5.04	6.97	16.60	12.01	28.61	137.90	482.63	
21	0.17	0.29	0.88	0.46	1.34	20.00	70.00	>10
	1.19	1.98	6.07	3.17	9.25	137.90	482.63	
22	0.72	0.36	0.12	1.08	1.20	20.00	70.00	>10
	4.97	2.48	0.80	7.46	8.25	137.90	482.63	

Min MS: 2.164, Location: 5, Combination: Pm+Pb+Q

Table 2-183. Load Combination 103, Increased External Pressure, Normal Conditions of Transport – Model AOS-050

Load Cases: 103, 201, 211
-20°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.19	1.70	0.07	2.90	2.97	20.00	70.00	9.36
	8.23	11.73	0.51	19.97	20.48	137.90	482.63	
2	0.08	0.05	0.05	0.13	0.18	20.00	70.00	>10
	0.53	0.37	0.37	0.90	1.27	137.90	482.63	
3	0.04	0.01	0.07	0.05	0.12	20.00	70.00	>10
	0.24	0.09	0.49	0.33	0.82	137.90	482.63	
4	1.71	2.69	8.85	4.40	13.25	20.00	70.00	3.53
	11.78	18.56	61.04	30.33	91.38	137.90	482.63	
5	1.65	2.53	12.10	4.18	16.28	20.00	70.00	2.69
	11.36	17.47	83.41	28.83	112.23	137.90	482.63	
6	0.61	1.02	5.74	1.63	7.37	20.00	70.00	7.14
	4.21	7.03	39.60	11.24	50.84	137.90	482.63	
7	0.34	0.00	2.64	0.34	2.98	20.00	70.00	>10
	2.35	0.01	18.20	2.36	20.55	137.90	482.63	
8	0.34	0.00	2.64	0.34	2.98	20.00	70.00	>10
	2.35	0.00	18.18	2.35	20.53	137.90	482.63	
9	0.34	0.00	2.64	0.34	2.98	20.00	70.00	>10
	2.35	0.01	18.18	2.36	20.54	137.90	482.63	
10	0.49	0.21	2.89	0.71	3.60	20.00	70.00	>10
	3.40	1.48	19.96	4.88	24.84	137.90	482.63	
11	0.27	0.16	1.42	0.43	1.85	20.00	70.00	>10
	1.85	1.12	9.77	2.97	12.73	137.90	482.63	
12	0.23	0.11	0.69	0.34	1.03	20.00	70.00	>10
	1.61	0.76	4.77	2.37	7.13	137.90	482.63	
13	0.82	0.89	5.03	1.71	6.74	20.00	70.00	7.90
	5.65	6.15	34.65	11.81	46.46	137.90	482.63	

14	0.81	0.64	4.07	1.45	5.52	20.00	70.00	9.86
	5.58	4.45	28.06	10.03	38.09	137.90	482.63	
15	1.35	0.65	0.37	2.00	2.37	20.00	70.00	>10
	9.34	4.46	2.54	13.80	16.34	137.90	482.63	
16	0.36	0.47	1.50	0.83	2.33	20.00	70.00	>10
	2.51	3.23	10.31	5.74	16.05	137.90	482.63	
17	0.28	0.35	1.28	0.63	1.91	20.00	70.00	>10
	1.95	2.40	8.81	4.36	13.17	137.90	482.63	
18	0.51	0.81	1.34	1.33	2.66	20.00	70.00	>10
	3.53	5.62	9.21	9.15	18.36	137.90	482.63	
19	0.74	0.97	1.78	1.71	3.49	20.00	70.00	>10
	5.13	6.65	12.27	11.78	24.05	137.90	482.63	
20	0.73	1.01	1.97	1.74	3.71	20.00	70.00	>10
	5.04	6.97	13.57	12.01	25.58	137.90	482.63	
21	0.17	0.29	0.72	0.46	1.18	20.00	70.00	>10
	1.19	1.98	4.97	3.17	8.14	137.90	482.63	
22	0.72	0.36	0.09	1.08	1.17	20.00	70.00	>10
	4.97	2.48	0.64	7.46	8.10	137.90	482.63	

Min MS: 2.686, Location: 5, Combination: Pm+Pb+Q

Table 2-184. Load Combination 104, Minimum External Pressure, Normal Conditions of Transport – Model AOS-050

Load Cases: 101, 201, 202, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.20	1.70	0.16	2.90	3.06	20.00	70.00	9.35
	8.24	11.74	1.10	19.98	21.07	137.90	482.63	
2	0.08	0.05	0.21	0.13	0.35	20.00	70.00	>10
	0.54	0.37	1.47	0.91	2.38	137.90	482.63	
3	0.04	0.01	0.15	0.05	0.20	20.00	70.00	>10
	0.25	0.09	1.05	0.34	1.40	137.90	482.63	
4	1.78	2.81	1.01	4.59	5.60	20.00	70.00	5.54
	12.29	19.36	6.96	31.65	38.60	137.90	482.63	
5	1.69	2.61	1.13	4.31	5.44	20.00	70.00	5.97
	11.69	18.00	7.81	29.69	37.49	137.90	482.63	
6	0.62	1.03	0.50	1.65	2.15	20.00	70.00	>10
	4.29	7.08	3.43	11.37	14.80	137.90	482.63	
7	0.34	0.00	0.15	0.35	0.50	20.00	70.00	>10
	2.37	0.01	1.05	2.38	3.43	137.90	482.63	
8	0.34	0.00	0.15	0.34	0.50	20.00	70.00	>10
	2.37	0.00	1.05	2.37	3.42	137.90	482.63	
9	0.34	0.00	0.15	0.35	0.50	20.00	70.00	>10
	2.37	0.02	1.04	2.38	3.42	137.90	482.63	
10	0.53	0.26	0.28	0.79	1.06	20.00	70.00	>10
	3.67	1.76	1.91	5.43	7.33	137.90	482.63	
11	0.29	0.17	0.32	0.46	0.78	20.00	70.00	>10
	2.00	1.19	2.20	3.18	5.38	137.90	482.63	
12	0.27	0.11	0.48	0.38	0.86	20.00	70.00	>10
	1.85	0.78	3.28	2.64	5.91	137.90	482.63	

13	0.86	0.92	0.57	1.78	2.35	20.00	70.00	>10
	5.90	6.37	3.95	12.27	16.21	137.90	482.63	
14	0.84	0.68	0.49	1.52	2.01	20.00	70.00	>10
	5.80	4.67	3.40	10.47	13.88	137.90	482.63	
15	1.48	0.79	1.17	2.27	3.44	20.00	70.00	>10
	10.20	5.45	8.09	15.65	23.74	137.90	482.63	
16	0.44	0.58	0.41	1.03	1.44	20.00	70.00	>10
	3.07	4.02	2.86	7.09	9.94	137.90	482.63	
17	0.34	0.43	0.24	0.77	1.01	20.00	70.00	>10
	2.35	2.94	1.69	5.29	6.98	137.90	482.63	
18	0.59	0.92	0.11	1.51	1.62	20.00	70.00	>10
	4.04	6.35	0.76	10.38	11.14	137.90	482.63	
19	0.86	1.14	0.16	2.00	2.17	20.00	70.00	>10
	5.93	7.89	1.14	13.82	14.96	137.90	482.63	
20	0.82	1.16	0.35	1.98	2.32	20.00	70.00	>10
	5.62	8.02	2.39	13.64	16.02	137.90	482.63	
21	0.20	0.31	0.03	0.51	0.54	20.00	70.00	>10
	1.35	2.15	0.22	3.50	3.72	137.90	482.63	
22	0.77	0.39	0.06	1.16	1.22	20.00	70.00	>10
	5.28	2.70	0.42	7.97	8.39	137.90	482.63	

Min MS: 5.535, Location: 4, Combination: Pm+Pb

Table 2-185. Load Combination 105, Cold Environment with Maximum Decay Heat, Normal Conditions of Transport – Model AOS-050

Load Cases: 105, 201, 202, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	1.20	1.70	0.18	2.90	3.07	20.00	70.00	9.35
	8.24	11.74	1.22	19.98	21.19	137.90	482.63	
2	0.08	0.05	0.23	0.13	0.36	20.00	70.00	>10
	0.54	0.37	1.60	0.91	2.51	137.90	482.63	
3	0.04	0.01	0.17	0.05	0.22	20.00	70.00	>10
	0.25	0.09	1.15	0.34	1.49	137.90	482.63	
4	1.78	2.81	0.41	4.59	5.00	20.00	70.00	5.54
	12.29	19.36	2.82	31.65	34.47	137.90	482.63	
5	1.69	2.61	0.45	4.31	4.75	20.00	70.00	5.97
	11.69	18.00	3.08	29.69	32.77	137.90	482.63	
6	0.62	1.03	0.31	1.65	1.96	20.00	70.00	>10
	4.29	7.08	2.13	11.37	13.50	137.90	482.63	
7	0.34	0.00	0.13	0.35	0.48	20.00	70.00	>10
	2.37	0.01	0.92	2.38	3.30	137.90	482.63	
8	0.34	0.00	0.14	0.34	0.48	20.00	70.00	>10
	2.37	0.00	0.94	2.37	3.31	137.90	482.63	
9	0.34	0.00	0.13	0.35	0.48	20.00	70.00	>10
	2.37	0.02	0.92	2.38	3.30	137.90	482.63	
10	0.53	0.26	0.46	0.79	1.25	20.00	70.00	>10
	3.67	1.76	3.18	5.43	8.61	137.90	482.63	
11	0.29	0.17	0.34	0.46	0.80	20.00	70.00	>10
	2.00	1.19	2.34	3.18	5.52	137.90	482.63	
12	0.27	0.11	0.48	0.38	0.87	20.00	70.00	>10
	1.85	0.78	3.33	2.64	5.97	137.90	482.63	

13	0.86	0.92	0.54	1.78	2.32	20.00	70.00	>10
	5.90	6.37	3.71	12.27	15.98	137.90	482.63	
14	0.84	0.68	0.42	1.52	1.94	20.00	70.00	>10
	5.80	4.67	2.89	10.47	13.37	137.90	482.63	
15	1.48	0.79	0.05	2.27	2.32	20.00	70.00	>10
	10.20	5.45	0.36	15.65	16.01	137.90	482.63	
16	0.44	0.58	0.16	1.03	1.18	20.00	70.00	>10
	3.07	4.02	1.08	7.09	8.16	137.90	482.63	
17	0.34	0.43	0.13	0.77	0.89	20.00	70.00	>10
	2.35	2.94	0.87	5.29	6.16	137.90	482.63	
18	0.59	0.92	0.18	1.51	1.68	20.00	70.00	>10
	4.04	6.35	1.21	10.38	11.59	137.90	482.63	
19	0.86	1.14	0.17	2.00	2.17	20.00	70.00	>10
	5.93	7.89	1.16	13.82	14.98	137.90	482.63	
20	0.82	1.16	0.37	1.98	2.35	20.00	70.00	>10
	5.62	8.02	2.54	13.64	16.17	137.90	482.63	
21	0.20	0.31	0.13	0.51	0.64	20.00	70.00	>10
	1.35	2.15	0.89	3.50	4.39	137.90	482.63	
22	0.77	0.39	0.06	1.16	1.21	20.00	70.00	>10
	5.28	2.70	0.40	7.97	8.37	137.90	482.63	

Min MS: 5.535, Location: 4, Combination: Pm+Pb

Table 2-186. Load Combination 106, Maximum Pressure, Hot Environment, Normal Conditions of Transport – Model AOS-050

Load Cases: 101, 201, 203, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Maximum Increase External Pressure, 140 kPa (20 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
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1	1.20	1.70	0.16	2.90	3.06	20.00	70.00	9.33
	8.29	11.74	1.10	20.02	21.12	137.90	482.63	
2	0.09	0.05	0.21	0.14	0.35	20.00	70.00	>10
	0.59	0.37	1.47	0.96	2.43	137.90	482.63	
3	0.04	0.02	0.15	0.06	0.21	20.00	70.00	>10
	0.30	0.11	1.05	0.41	1.47	137.90	482.63	
4	1.95	3.12	1.01	5.07	6.08	20.00	70.00	4.92
	13.42	21.53	6.96	34.95	41.91	137.90	482.63	
5	1.90	2.90	1.13	4.81	5.94	20.00	70.00	5.24
	13.12	20.01	7.81	33.14	40.94	137.90	482.63	
6	0.71	1.19	0.50	1.90	2.40	20.00	70.00	>10
	4.91	8.20	3.43	13.10	16.53	137.90	482.63	
7	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.01	1.05	2.81	3.86	137.90	482.63	
8	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.00	1.05	2.80	3.85	137.90	482.63	
9	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.02	1.04	2.81	3.85	137.90	482.63	
10	0.56	0.22	0.28	0.78	1.06	20.00	70.00	>10
	3.88	1.51	1.91	5.39	7.30	137.90	482.63	
11	0.30	0.17	0.32	0.47	0.79	20.00	70.00	>10
	2.05	1.20	2.20	3.25	5.45	137.90	482.63	
12	0.34	0.25	0.48	0.59	1.06	20.00	70.00	>10
	2.37	1.70	3.28	4.06	7.34	137.90	482.63	

13	0.91	0.99	0.57	1.90	2.47	20.00	70.00	>10
	6.27	6.84	3.95	13.11	17.06	137.90	482.63	
14	0.88	0.69	0.49	1.58	2.07	20.00	70.00	>10
	6.08	4.78	3.40	10.87	14.27	137.90	482.63	
15	1.53	0.76	1.17	2.29	3.47	20.00	70.00	>10
	10.57	5.25	8.09	15.82	23.90	137.90	482.63	
16	0.48	0.63	0.41	1.11	1.52	20.00	70.00	>10
	3.29	4.33	2.86	7.62	10.48	137.90	482.63	
17	0.36	0.47	0.24	0.84	1.08	20.00	70.00	>10
	2.52	3.27	1.69	5.78	7.47	137.90	482.63	
18	0.61	0.97	0.11	1.58	1.69	20.00	70.00	>10
	4.20	6.67	0.76	10.87	11.63	137.90	482.63	
19	0.89	1.17	0.16	2.06	2.23	20.00	70.00	>10
	6.14	8.07	1.14	14.20	15.34	137.90	482.63	
20	0.83	1.18	0.35	2.01	2.36	20.00	70.00	>10
	5.71	8.15	2.39	13.86	16.24	137.90	482.63	
21	0.29	0.38	0.03	0.68	0.71	20.00	70.00	>10
	2.01	2.65	0.22	4.66	4.88	137.90	482.63	
22	0.79	0.39	0.06	1.18	1.24	20.00	70.00	>10
	5.48	2.68	0.42	8.16	8.58	137.90	482.63	

Min MS: 4.918, Location: 4, Combination: Pm+Pb

Table 2-187. Load Combination 107, Maximum Pressure, Cold Environment, Normal Conditions of Transport – Model AOS-050

Load Cases: 105, 201, 203, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Maximum Increase External Pressure, 140 kPa (20 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.20	1.70	0.18	2.90	3.08	20.00	70.00	9.33
	8.29	11.74	1.22	20.02	21.24	137.90	482.63	
2	0.09	0.05	0.23	0.14	0.37	20.00	70.00	>10
	0.59	0.37	1.60	0.96	2.56	137.90	482.63	
3	0.04	0.02	0.17	0.06	0.23	20.00	70.00	>10
	0.30	0.11	1.15	0.41	1.56	137.90	482.63	
4	1.95	3.12	0.41	5.07	5.48	20.00	70.00	4.92
	13.42	21.53	2.82	34.95	37.77	137.90	482.63	
5	1.90	2.90	0.45	4.81	5.25	20.00	70.00	5.24
	13.12	20.01	3.08	33.14	36.22	137.90	482.63	
6	0.71	1.19	0.31	1.90	2.21	20.00	70.00	>10
	4.91	8.20	2.13	13.10	15.23	137.90	482.63	
7	0.41	0.00	0.13	0.41	0.54	20.00	70.00	>10
	2.80	0.01	0.92	2.81	3.73	137.90	482.63	
8	0.41	0.00	0.14	0.41	0.54	20.00	70.00	>10
	2.80	0.00	0.94	2.80	3.74	137.90	482.63	
9	0.41	0.00	0.13	0.41	0.54	20.00	70.00	>10
	2.80	0.02	0.92	2.81	3.73	137.90	482.63	
10	0.56	0.22	0.46	0.78	1.24	20.00	70.00	>10
	3.88	1.51	3.18	5.39	8.57	137.90	482.63	
11	0.30	0.17	0.34	0.47	0.81	20.00	70.00	>10
	2.05	1.20	2.34	3.25	5.58	137.90	482.63	
12	0.34	0.25	0.48	0.59	1.07	20.00	70.00	>10
	2.37	1.70	3.33	4.06	7.40	137.90	482.63	

13	0.91	0.99	0.54	1.90	2.44	20.00	70.00	>10
	6.27	6.84	3.71	13.11	16.82	137.90	482.63	
14	0.88	0.69	0.42	1.58	2.00	20.00	70.00	>10
	6.08	4.78	2.89	10.87	13.76	137.90	482.63	
15	1.53	0.76	0.05	2.29	2.35	20.00	70.00	>10
	10.57	5.25	0.36	15.82	16.18	137.90	482.63	
16	0.48	0.63	0.16	1.11	1.26	20.00	70.00	>10
	3.29	4.33	1.08	7.62	8.70	137.90	482.63	
17	0.36	0.47	0.13	0.84	0.96	20.00	70.00	>10
	2.52	3.27	0.87	5.78	6.65	137.90	482.63	
18	0.61	0.97	0.18	1.58	1.75	20.00	70.00	>10
	4.20	6.67	1.21	10.87	12.08	137.90	482.63	
19	0.89	1.17	0.17	2.06	2.23	20.00	70.00	>10
	6.14	8.07	1.16	14.20	15.37	137.90	482.63	
20	0.83	1.18	0.37	2.01	2.38	20.00	70.00	>10
	5.71	8.15	2.54	13.86	16.39	137.90	482.63	
21	0.29	0.38	0.13	0.68	0.80	20.00	70.00	>10
	2.01	2.65	0.89	4.66	5.55	137.90	482.63	
22	0.79	0.39	0.06	1.18	1.24	20.00	70.00	>10
	5.48	2.68	0.40	8.16	8.56	137.90	482.63	

Min MS: 4.918, Location: 4, Combination: Pm+Pb

Table 2-188. Load Combination 215, Compression Load, Normal Conditions of Transport – Model AOS-050

Load Cases: 215, 101, 201, 211
Compression Load (5x weight)
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	1.24	1.78	0.16	3.02	3.18	20.00	70.00	8.93
	8.58	12.25	1.10	20.83	21.93	137.90	482.63	
2	0.12	0.05	0.21	0.17	0.38	20.00	70.00	>10
	0.80	0.37	1.47	1.17	2.64	137.90	482.63	
3	0.08	0.03	0.15	0.11	0.26	20.00	70.00	>10
	0.55	0.19	1.05	0.73	1.79	137.90	482.63	
4	1.89	2.99	1.01	4.88	5.89	20.00	70.00	5.14
	13.04	20.62	6.96	33.66	40.62	137.90	482.63	
5	1.83	2.78	1.13	4.62	5.75	20.00	70.00	5.50
	12.64	19.18	7.81	31.82	39.63	137.90	482.63	
6	0.70	1.08	0.50	1.77	2.27	20.00	70.00	>10
	4.80	7.42	3.43	12.22	15.64	137.90	482.63	
7	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.01	1.05	2.81	3.86	137.90	482.63	
8	0.39	0.00	0.15	0.39	0.54	20.00	70.00	>10
	2.68	0.00	1.05	2.68	3.73	137.90	482.63	
9	0.38	0.00	0.15	0.39	0.54	20.00	70.00	>10
	2.65	0.02	1.04	2.67	3.70	137.90	482.63	
10	0.54	0.22	0.28	0.76	1.04	20.00	70.00	>10
	3.73	1.53	1.91	5.26	7.17	137.90	482.63	
11	0.29	0.18	0.32	0.47	0.79	20.00	70.00	>10
	1.99	1.26	2.20	3.25	5.45	137.90	482.63	
12	0.26	0.16	0.48	0.42	0.90	20.00	70.00	>10
	1.82	1.08	3.28	2.90	6.17	137.90	482.63	

13	0.89	0.97	0.57	1.86	2.43	20.00	70.00	>10
	6.17	6.66	3.95	12.83	16.78	137.90	482.63	
14	0.87	0.70	0.49	1.57	2.06	20.00	70.00	>10
	6.02	4.81	3.40	10.82	14.23	137.90	482.63	
15	2.13	0.70	1.17	2.83	4.00	20.00	70.00	8.39
	14.68	4.81	8.09	19.49	27.58	137.90	482.63	
16	0.54	0.69	0.41	1.23	1.64	20.00	70.00	>10
	3.73	4.75	2.86	8.48	11.34	137.90	482.63	
17	0.40	0.48	0.24	0.88	1.13	20.00	70.00	>10
	2.79	3.29	1.69	6.08	7.77	137.90	482.63	
18	0.58	0.88	0.11	1.46	1.57	20.00	70.00	>10
	4.02	6.06	0.76	10.08	10.84	137.90	482.63	
19	0.86	1.11	0.16	1.98	2.14	20.00	70.00	>10
	5.95	7.68	1.14	13.63	14.77	137.90	482.63	
20	0.87	1.23	0.35	2.10	2.45	20.00	70.00	>10
	6.02	8.46	2.39	14.48	16.87	137.90	482.63	
21	0.23	0.31	0.03	0.54	0.57	20.00	70.00	>10
	1.56	2.17	0.22	3.73	3.95	137.90	482.63	
22	0.92	0.48	0.06	1.39	1.45	20.00	70.00	>10
	6.31	3.30	0.42	9.61	10.03	137.90	482.63	

Min MS: 5.145, Location: 4, Combination: Pm+Pb

Table 2-189. Load Combination 216, Rod Drop, Normal Conditions of Transport – Model AOS-050

Load Cases: 216, 101, 201, 211
Rod Drop onto Cask
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.24	1.71	0.16	2.94	3.10	20.00	70.00	9.19
	8.52	11.78	1.10	20.30	21.40	137.90	482.63	
2	0.13	0.06	0.21	0.19	0.40	20.00	70.00	>10
	0.87	0.42	1.47	1.29	2.77	137.90	482.63	
3	0.09	0.02	0.15	0.12	0.27	20.00	70.00	>10
	0.65	0.15	1.05	0.81	1.86	137.90	482.63	
4	2.01	3.00	1.01	5.01	6.02	20.00	70.00	4.98
	13.85	20.71	6.96	34.56	41.52	137.90	482.63	
5	1.85	2.62	1.13	4.47	5.60	20.00	70.00	5.71
	12.76	18.06	7.81	30.83	38.63	137.90	482.63	
6	0.87	1.20	0.50	2.07	2.56	20.00	70.00	>10
	6.00	8.26	3.43	14.26	17.68	137.90	482.63	
7	0.50	0.00	0.15	0.50	0.65	20.00	70.00	>10
	3.43	0.03	1.05	3.46	4.51	137.90	482.63	
8	0.45	0.00	0.15	0.45	0.60	20.00	70.00	>10
	3.10	0.00	1.05	3.10	4.15	137.90	482.63	
9	0.43	0.00	0.15	0.43	0.58	20.00	70.00	>10
	2.97	0.02	1.04	2.99	4.03	137.90	482.63	
10	0.59	0.22	0.28	0.80	1.08	20.00	70.00	>10
	4.05	1.49	1.91	5.54	7.45	137.90	482.63	
11	0.31	0.21	0.32	0.51	0.83	20.00	70.00	>10
	2.11	1.42	2.20	3.53	5.74	137.90	482.63	
12	0.28	0.17	0.48	0.45	0.93	20.00	70.00	>10
	1.93	1.18	3.28	3.11	6.38	137.90	482.63	
13	0.98	1.04	0.57	2.02	2.59	20.00	70.00	>10
	6.74	7.16	3.95	13.90	17.84	137.90	482.63	

14	0.95	0.77	0.49	1.72	2.21	20.00	70.00	>10
	6.56	5.31	3.40	11.87	15.27	137.90	482.63	
15	8.75	1.17	1.17	9.92	11.09	20.00	70.00	1.28
	60.35	8.04	8.09	68.39	76.48	137.90	482.63	
16	1.21	1.65	0.41	2.86	3.27	20.00	70.00	9.50
	8.31	11.39	2.86	19.70	22.55	137.90	482.63	
17	0.80	1.21	0.24	2.01	2.25	20.00	70.00	>10
	5.52	8.34	1.69	13.85	15.54	137.90	482.63	
18	0.77	1.02	0.11	1.78	1.89	20.00	70.00	>10
	5.29	7.00	0.76	12.29	13.05	137.90	482.63	
19	0.91	1.03	0.16	1.94	2.11	20.00	70.00	>10
	6.30	7.10	1.14	13.40	14.54	137.90	482.63	
20	1.02	1.13	0.35	2.15	2.50	20.00	70.00	>10
	7.06	7.77	2.39	14.83	17.22	137.90	482.63	
21	0.23	0.32	0.03	0.55	0.58	20.00	70.00	>10
	1.59	2.18	0.22	3.77	3.99	137.90	482.63	
22	4.54	3.47	0.06	8.01	8.07	20.00	70.00	2.75
	31.30	23.92	0.42	55.21	55.63	137.90	482.63	

Min MS: 1.285, Location: 15, Combination: Pm

Table 2-190. Load Combination 217, Rod Drop, Cold Environment, Normal Conditions of Transport – Model AOS-050

Load Cases: 216, 104, 201, 211
Rod Drop onto Cask
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	1.24	1.71	0.09	2.94	3.04	20.00	70.00	9.19
	8.52	11.78	0.63	20.30	20.93	137.90	482.63	
2	0.13	0.06	0.07	0.19	0.25	20.00	70.00	>10
	0.87	0.42	0.45	1.29	1.74	137.90	482.63	
3	0.09	0.02	0.09	0.12	0.20	20.00	70.00	>10
	0.65	0.15	0.59	0.81	1.40	137.90	482.63	
4	2.01	3.00	10.82	5.01	15.83	20.00	70.00	2.79
	13.85	20.71	74.60	34.56	109.16	137.90	482.63	
5	1.85	2.62	14.79	4.47	19.26	20.00	70.00	2.12
	12.76	18.06	101.94	30.83	132.77	137.90	482.63	
6	0.87	1.20	7.02	2.07	9.09	20.00	70.00	5.60
	6.00	8.26	48.40	14.26	62.66	137.90	482.63	
7	0.50	0.00	3.23	0.50	3.73	20.00	70.00	>10
	3.43	0.03	22.24	3.46	25.70	137.90	482.63	
8	0.45	0.00	3.22	0.45	3.67	20.00	70.00	>10
	3.10	0.00	22.22	3.10	25.32	137.90	482.63	
9	0.43	0.00	3.22	0.43	3.66	20.00	70.00	>10
	2.97	0.02	22.23	2.99	25.22	137.90	482.63	
10	0.59	0.22	3.54	0.80	4.34	20.00	70.00	>10
	4.05	1.49	24.39	5.54	29.93	137.90	482.63	
11	0.31	0.21	1.73	0.51	2.24	20.00	70.00	>10
	2.11	1.42	11.93	3.53	15.47	137.90	482.63	
12	0.28	0.17	0.85	0.45	1.30	20.00	70.00	>10
	1.93	1.18	5.83	3.11	8.93	137.90	482.63	

13	0.98	1.04	6.14	2.02	8.16	20.00	70.00	6.35
	6.74	7.16	42.35	13.90	56.25	137.90	482.63	
14	0.95	0.77	4.97	1.72	6.70	20.00	70.00	7.96
	6.56	5.31	34.30	11.87	46.16	137.90	482.63	
15	8.75	1.17	0.45	9.92	10.37	20.00	70.00	1.28
	60.35	8.04	3.12	68.39	71.52	137.90	482.63	
16	1.21	1.65	1.83	2.86	4.68	20.00	70.00	9.50
	8.31	11.39	12.59	19.70	32.29	137.90	482.63	
17	0.80	1.21	1.56	2.01	3.57	20.00	70.00	>10
	5.52	8.34	10.76	13.85	24.61	137.90	482.63	
18	0.77	1.02	1.63	1.78	3.42	20.00	70.00	>10
	5.29	7.00	11.27	12.29	23.56	137.90	482.63	
19	0.91	1.03	2.18	1.94	4.12	20.00	70.00	>10
	6.30	7.10	15.00	13.40	28.41	137.90	482.63	
20	1.02	1.13	2.41	2.15	4.56	20.00	70.00	>10
	7.06	7.77	16.60	14.83	31.43	137.90	482.63	
21	0.23	0.32	0.88	0.55	1.43	20.00	70.00	>10
	1.59	2.18	6.07	3.77	9.85	137.90	482.63	
22	4.54	3.47	0.12	8.01	8.12	20.00	70.00	2.75
	31.30	23.92	0.80	55.21	56.01	137.90	482.63	

Min MS: 1.285, Location: 15, Combination: Pm

Table 2-191. Load Combination 221, Forward Vibration, Normal Conditions of Transport – Model AOS-050

Load Cases: 221, 101, 201, 211
Forward 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.20	1.70	0.16	2.90	3.06	20.00	70.00	9.35
	8.25	11.74	1.10	19.99	21.08	137.90	482.63	
2	0.11	0.06	0.21	0.17	0.38	20.00	70.00	>10
	0.73	0.44	1.47	1.17	2.64	137.90	482.63	
3	0.04	0.01	0.15	0.05	0.20	20.00	70.00	>10
	0.27	0.09	1.05	0.36	1.41	137.90	482.63	
4	1.71	2.69	1.01	4.40	5.41	20.00	70.00	5.81
	11.80	18.57	6.96	30.36	37.32	137.90	482.63	
5	1.65	2.53	1.13	4.18	5.32	20.00	70.00	6.17
	11.37	17.47	7.81	28.84	36.65	137.90	482.63	
6	0.61	1.02	0.50	1.63	2.13	20.00	70.00	>10
	4.22	7.03	3.43	11.25	14.68	137.90	482.63	
7	0.34	0.00	0.15	0.34	0.50	20.00	70.00	>10
	2.36	0.01	1.05	2.37	3.42	137.90	482.63	
8	0.34	0.00	0.15	0.34	0.49	20.00	70.00	>10
	2.35	0.00	1.05	2.35	3.40	137.90	482.63	
9	0.34	0.00	0.15	0.34	0.49	20.00	70.00	>10
	2.35	0.01	1.04	2.37	3.40	137.90	482.63	
10	0.50	0.21	0.28	0.71	0.99	20.00	70.00	>10
	3.42	1.48	1.91	4.90	6.80	137.90	482.63	
11	0.27	0.16	0.32	0.43	0.75	20.00	70.00	>10
	1.86	1.13	2.20	2.99	5.20	137.90	482.63	
12	0.23	0.11	0.48	0.34	0.82	20.00	70.00	>10
	1.62	0.76	3.28	2.38	5.65	137.90	482.63	

13	0.82	0.89	0.57	1.72	2.29	20.00	70.00	>10
	5.67	6.16	3.95	11.83	15.77	137.90	482.63	
14	0.81	0.65	0.49	1.46	1.95	20.00	70.00	>10
	5.60	4.45	3.40	10.05	13.46	137.90	482.63	
15	1.36	0.65	1.17	2.00	3.18	20.00	70.00	>10
	9.35	4.46	8.09	13.81	21.90	137.90	482.63	
16	0.37	0.47	0.41	0.83	1.25	20.00	70.00	>10
	2.52	3.24	2.86	5.76	8.61	137.90	482.63	
17	0.28	0.35	0.24	0.63	0.88	20.00	70.00	>10
	1.96	2.41	1.69	4.37	6.06	137.90	482.63	
18	0.51	0.82	0.11	1.33	1.44	20.00	70.00	>10
	3.54	5.62	0.76	9.16	9.92	137.90	482.63	
19	0.75	0.97	0.16	1.71	1.88	20.00	70.00	>10
	5.15	6.66	1.14	11.81	12.94	137.90	482.63	
20	0.73	1.01	0.35	1.74	2.09	20.00	70.00	>10
	5.06	6.97	2.39	12.03	14.41	137.90	482.63	
21	0.17	0.29	0.03	0.46	0.49	20.00	70.00	>10
	1.20	1.99	0.22	3.19	3.41	137.90	482.63	
22	0.72	0.36	0.06	1.08	1.14	20.00	70.00	>10
	4.98	2.49	0.42	7.47	7.89	137.90	482.63	

Min MS: 5.812, Location: 4, Combination: Pm+Pb

Table 2-192. Load Combination 222, Lateral Vibration, Normal Conditions of Transport – Model AOS-050

Load Cases: 222, 101, 201, 211
Lateral 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.20	1.70	0.16	2.90	3.06	20.00	70.00	9.34
	8.26	11.74	1.10	20.00	21.10	137.90	482.63	
2	0.15	0.06	0.21	0.21	0.42	20.00	70.00	>10
	1.00	0.42	1.47	1.42	2.89	137.90	482.63	
3	0.04	0.01	0.15	0.05	0.20	20.00	70.00	>10
	0.26	0.10	1.05	0.36	1.41	137.90	482.63	
4	1.73	2.70	1.01	4.43	5.44	20.00	70.00	5.78
	11.90	18.63	6.96	30.53	37.49	137.90	482.63	
5	1.65	2.54	1.13	4.19	5.32	20.00	70.00	6.16
	11.40	17.50	7.81	28.90	36.70	137.90	482.63	
6	0.63	1.02	0.50	1.65	2.14	20.00	70.00	>10
	4.31	7.04	3.43	11.35	14.78	137.90	482.63	
7	0.34	0.00	0.15	0.34	0.50	20.00	70.00	>10
	2.35	0.01	1.05	2.36	3.42	137.90	482.63	
8	0.34	0.00	0.15	0.34	0.50	20.00	70.00	>10
	2.36	0.00	1.05	2.37	3.41	137.90	482.63	
9	0.34	0.00	0.15	0.34	0.49	20.00	70.00	>10
	2.36	0.01	1.04	2.37	3.41	137.90	482.63	
10	0.50	0.22	0.28	0.72	1.00	20.00	70.00	>10
	3.47	1.50	1.91	4.97	6.88	137.90	482.63	
11	0.28	0.17	0.32	0.45	0.77	20.00	70.00	>10
	1.92	1.19	2.20	3.11	5.31	137.90	482.63	
12	0.24	0.11	0.48	0.35	0.82	20.00	70.00	>10
	1.63	0.76	3.28	2.39	5.67	137.90	482.63	

13	0.83	0.90	0.57	1.72	2.29	20.00	70.00	>10
	5.70	6.17	3.95	11.87	15.81	137.90	482.63	
14	0.82	0.65	0.49	1.47	1.96	20.00	70.00	>10
	5.65	4.47	3.40	10.12	13.53	137.90	482.63	
15	1.36	0.65	1.17	2.01	3.18	20.00	70.00	>10
	9.37	4.46	8.09	13.83	21.92	137.90	482.63	
16	0.37	0.47	0.41	0.84	1.26	20.00	70.00	>10
	2.54	3.27	2.86	5.82	8.67	137.90	482.63	
17	0.29	0.35	0.24	0.64	0.88	20.00	70.00	>10
	1.99	2.42	1.69	4.41	6.10	137.90	482.63	
18	0.52	0.82	0.11	1.33	1.44	20.00	70.00	>10
	3.56	5.63	0.76	9.19	9.96	137.90	482.63	
19	0.76	0.97	0.16	1.73	1.90	20.00	70.00	>10
	5.24	6.70	1.14	11.94	13.07	137.90	482.63	
20	0.74	1.01	0.35	1.75	2.10	20.00	70.00	>10
	5.12	6.97	2.39	12.09	14.48	137.90	482.63	
21	0.18	0.29	0.03	0.46	0.50	20.00	70.00	>10
	1.21	1.99	0.22	3.20	3.41	137.90	482.63	
22	0.72	0.36	0.06	1.08	1.15	20.00	70.00	>10
	4.99	2.49	0.42	7.47	7.89	137.90	482.63	

Min MS: 5.775, Location: 4, Combination: Pm+Pb

Table 2-193. Load Combination 223, Vertical Vibration, Normal Conditions of Transport – Model AOS-050

Load Cases: 223, 101, 201, 211
Vertical 10g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.26	1.71	0.16	2.97	3.13	20.00	70.00	9.09
	8.69	11.81	1.10	20.50	21.59	137.90	482.63	
2	1.46	0.21	0.21	1.67	1.88	20.00	70.00	>10
	10.08	1.44	1.47	11.51	12.99	137.90	482.63	
3	0.08	0.03	0.15	0.11	0.26	20.00	70.00	>10
	0.57	0.20	1.05	0.77	1.82	137.90	482.63	
4	1.86	2.82	1.01	4.68	5.69	20.00	70.00	5.41
	12.83	19.45	6.96	32.28	39.23	137.90	482.63	
5	1.83	2.64	1.13	4.47	5.60	20.00	70.00	5.71
	12.63	18.18	7.81	30.80	38.61	137.90	482.63	
6	0.78	1.05	0.50	1.83	2.33	20.00	70.00	>10
	5.37	7.26	3.43	12.63	16.06	137.90	482.63	
7	0.39	0.01	0.15	0.40	0.55	20.00	70.00	>10
	2.72	0.04	1.05	2.76	3.81	137.90	482.63	
8	0.36	0.00	0.15	0.36	0.52	20.00	70.00	>10
	2.50	0.01	1.05	2.51	3.56	137.90	482.63	
9	0.37	0.01	0.15	0.38	0.53	20.00	70.00	>10
	2.57	0.05	1.04	2.62	3.66	137.90	482.63	
10	0.62	0.25	0.28	0.88	1.15	20.00	70.00	>10
	4.29	1.75	1.91	6.03	7.94	137.90	482.63	
11	0.33	0.23	0.32	0.57	0.89	20.00	70.00	>10
	2.31	1.61	2.20	3.91	6.11	137.90	482.63	
12	0.29	0.14	0.48	0.43	0.90	20.00	70.00	>10
	1.98	0.98	3.28	2.96	6.23	137.90	482.63	

13	0.87	0.94	0.57	1.82	2.39	20.00	70.00	>10
	6.03	6.50	3.95	12.53	16.48	137.90	482.63	
14	0.87	0.69	0.49	1.56	2.05	20.00	70.00	>10
	6.00	4.73	3.40	10.73	14.14	137.90	482.63	
15	1.46	0.72	1.17	2.18	3.35	20.00	70.00	>10
	10.04	4.98	8.09	15.01	23.10	137.90	482.63	
16	0.42	0.53	0.41	0.95	1.36	20.00	70.00	>10
	2.90	3.64	2.86	6.54	9.40	137.90	482.63	
17	0.33	0.39	0.24	0.72	0.96	20.00	70.00	>10
	2.26	2.68	1.69	4.94	6.62	137.90	482.63	
18	0.53	0.82	0.11	1.36	1.47	20.00	70.00	>10
	3.69	5.68	0.76	9.36	10.12	137.90	482.63	
19	0.82	1.05	0.16	1.87	2.03	20.00	70.00	>10
	5.65	7.22	1.14	12.86	14.00	137.90	482.63	
20	0.80	1.10	0.35	1.90	2.25	20.00	70.00	>10
	5.55	7.58	2.39	13.13	15.52	137.90	482.63	
21	0.18	0.29	0.03	0.47	0.50	20.00	70.00	>10
	1.24	1.99	0.22	3.23	3.44	137.90	482.63	
22	0.75	0.37	0.06	1.12	1.19	20.00	70.00	>10
	5.18	2.57	0.42	7.75	8.17	137.90	482.63	

Min MS: 5.408, Location: 4, Combination: Pm+Pb

Table 2-194. Load Combination 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-050

Load Cases: 231, 102, 201, 211
4-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	2.13	2.07	0.15	4.20	4.35	20.00	66.30	6.14
	14.68	14.30	1.01	28.98	29.99	137.90	457.12	
2	0.64	0.08	0.21	0.72	0.94	20.00	66.30	>10
	4.43	0.57	1.47	4.99	6.47	137.90	457.12	
3	0.44	0.07	0.15	0.50	0.66	20.00	66.30	>10
	3.01	0.46	1.05	3.48	4.53	137.90	457.12	
4	3.46	3.97	1.20	7.44	8.64	20.00	66.30	3.03
	23.89	27.39	8.26	51.28	59.54	137.90	457.12	
5	2.26	3.41	1.08	5.67	6.74	20.00	66.30	4.30
	15.57	23.49	7.44	39.06	46.50	137.90	457.12	
6	0.92	1.15	0.57	2.07	2.64	20.00	66.30	>10
	6.31	7.94	3.95	14.26	18.20	137.90	457.12	
7	0.62	0.01	0.18	0.63	0.81	20.00	66.30	>10
	4.27	0.04	1.25	4.32	5.57	137.90	457.12	
8	0.62	0.00	0.18	0.62	0.79	20.00	66.30	>10
	4.25	0.00	1.22	4.25	5.47	137.90	457.12	
9	0.63	0.00	0.18	0.63	0.81	20.00	66.30	>10
	4.31	0.02	1.24	4.33	5.57	137.90	457.12	
10	0.95	0.48	0.63	1.42	2.05	20.00	66.30	>10
	6.53	3.28	4.31	9.81	14.12	137.90	457.12	
11	0.61	0.29	0.54	0.90	1.44	20.00	66.30	>10
	4.18	2.00	3.74	6.18	9.92	137.90	457.12	
12	0.39	0.42	0.75	0.81	1.56	20.00	66.30	>10
	2.69	2.91	5.15	5.60	10.76	137.90	457.12	

13	1.22	1.20	0.60	2.42	3.02	20.00	66.30	>10
	8.42	8.24	4.15	16.66	20.80	137.90	457.12	
14	1.16	0.80	0.48	1.96	2.44	20.00	66.30	>10
	8.00	5.50	3.33	13.51	16.83	137.90	457.12	
15	1.53	0.65	1.78	2.19	3.97	20.00	66.30	>10
	10.58	4.51	12.30	15.09	27.39	137.90	457.12	
16	0.70	0.62	0.63	1.32	1.95	20.00	66.30	>10
	4.81	4.27	4.37	9.08	13.45	137.90	457.12	
17	0.66	0.67	0.37	1.33	1.70	20.00	66.30	>10
	4.56	4.62	2.55	9.19	11.74	137.90	457.12	
18	1.04	1.43	0.12	2.47	2.60	20.00	66.30	>10
	7.19	9.87	0.85	17.06	17.90	137.90	457.12	
19	1.28	1.34	0.21	2.62	2.83	20.00	66.30	>10
	8.85	9.24	1.43	18.09	19.52	137.90	457.12	
20	1.00	1.43	0.34	2.43	2.78	20.00	66.30	>10
	6.91	9.87	2.38	16.78	19.15	137.90	457.12	
21	0.31	0.35	0.03	0.65	0.68	20.00	66.30	>10
	2.12	2.38	0.22	4.50	4.72	137.90	457.12	
22	0.83	0.45	0.09	1.29	1.37	20.00	66.30	>10
	5.74	3.13	0.59	8.86	9.45	137.90	457.12	

Min MS: 3.034, Location: 4, Combination: Pm+Pb

Table 2-195. Load Combination 232, Impact Test, Normal Condition, Normal Conditions of Transport – Model AOS-050

Load Cases: 232, 102, 201, 211
Impact Test, Normal Condition
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	4.36	2.98	0.15	7.34	7.48	20.00	66.30	3.09
	30.04	20.54	1.01	50.58	51.59	137.90	457.12	
2	1.84	0.14	0.21	1.98	2.19	20.00	66.30	9.85
	12.71	0.94	1.47	13.65	15.12	137.90	457.12	
3	1.07	0.10	0.15	1.17	1.33	20.00	66.30	>10
	7.38	0.71	1.05	8.09	9.14	137.90	457.12	
4	7.71	7.06	1.20	14.76	15.96	20.00	66.30	1.03
	53.13	48.67	8.26	101.80	110.05	137.90	457.12	
5	3.71	5.49	1.08	9.20	10.28	20.00	66.30	2.26
	25.56	37.86	7.44	63.42	70.87	137.90	457.12	
6	1.58	1.52	0.57	3.10	3.67	20.00	66.30	8.68
	10.89	10.48	3.95	21.36	25.31	137.90	457.12	
7	1.22	0.02	0.18	1.23	1.42	20.00	66.30	>10
	8.38	0.12	1.25	8.51	9.76	137.90	457.12	
8	1.18	0.00	0.18	1.18	1.36	20.00	66.30	>10
	8.13	0.01	1.22	8.14	9.36	137.90	457.12	
9	1.15	0.00	0.18	1.15	1.33	20.00	66.30	>10
	7.91	0.02	1.24	7.93	9.17	137.90	457.12	
10	1.65	0.90	0.63	2.55	3.17	20.00	66.30	>10
	11.37	6.19	4.31	17.55	21.86	137.90	457.12	
11	1.14	0.48	0.54	1.62	2.17	20.00	66.30	>10
	7.88	3.33	3.74	11.20	14.95	137.90	457.12	
12	0.61	0.89	0.75	1.50	2.25	20.00	66.30	>10
	4.23	6.11	5.15	10.34	15.49	137.90	457.12	
13	1.78	1.57	0.60	3.35	3.95	20.00	66.30	7.95
	12.30	10.80	4.15	23.10	27.25	137.90	457.12	

14	1.62	1.00	0.48	2.62	3.10	20.00	66.30	>10
	11.19	6.87	3.33	18.06	21.39	137.90	457.12	
15	2.01	0.67	1.78	2.68	4.46	20.00	66.30	8.97
	13.83	4.63	12.30	18.45	30.75	137.90	457.12	
16	1.57	1.03	0.63	2.61	3.24	20.00	66.30	>10
	10.83	7.13	4.37	17.96	22.33	137.90	457.12	
17	1.65	1.51	0.37	3.17	3.54	20.00	66.30	8.47
	11.41	10.43	2.55	21.83	24.38	137.90	457.12	
18	2.40	2.98	0.12	5.38	5.50	20.00	66.30	4.58
	16.52	20.55	0.85	37.07	37.92	137.90	457.12	
19	2.59	2.23	0.21	4.82	5.03	20.00	66.30	5.22
	17.89	15.35	1.43	33.24	34.67	137.90	457.12	
20	1.60	2.42	0.34	4.02	4.36	20.00	66.30	6.46
	11.00	16.71	2.38	27.71	30.09	137.90	457.12	
21	0.34	0.30	0.03	0.63	0.67	20.00	66.30	>10
	2.33	2.05	0.22	4.37	4.59	137.90	457.12	
22	1.13	0.70	0.09	1.83	1.91	20.00	66.30	>10
	7.80	4.80	0.59	12.60	13.19	137.90	457.12	

Min MS: 1.032, Location: 4, Combination: Pm+Pb

2.10.2.2 Hypothetical Accident Conditions of Transport Summary of Damages (Stresses) – Model AOS-050

Table 2-196 and Table 2-197 present Model AOS-050 transport package Load Cases and Load Combinations, respectively, under Hypothetical Accident conditions of transport:

- Table 2-198 through Table 2-210 present Load Case test case output data. Comparisons with allowable stress limits are included for Load Cases 111, 112, 113, 114, 115, and 116.
- Table 2-211 through Table 2-225 present Load Combination test case output data.

Table 2-196. Load Cases Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-050

Load Case	Description	Data
111	Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat	Table 2-198
112	Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-199
113	Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-200
114	Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-201
115	Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-202
116	Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-203
301	30-ft. Head-On Drop	Table 2-204
302	30-ft. Side Drop	Table 2-205
303	30-ft. Cg/Corner Drop	Table 2-206
304	30-ft. Head-On Drop at -40°F	Table 2-207
305	30-ft. Side Drop at -40°F	Table 2-208
306	30-ft. Cg/Corner Drop at -40°F	Table 2-209
311	4-ft. Drop onto Rod	Table 2-210

Table 2-197. Load Combinations Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-050

Load Combination	Load Cases[1]	Description	Data
301	301, 102, 201, 211	Head-On Orientation	Table 2-211
302	302, 102, 201, 211	Side Drop Orientation	Table 2-212
303	303, 102, 201, 211	Cg/Corner Orientation	Table 2-213
304	304, 105, 202, 211	Head-On Orientation at -40°F	Table 2-214
305	305, 105, 202, 211	Side Drop Orientation at -40°F	Table 2-215
306	306, 105, 202, 211	Cg/Corner Orientation at -40°F	Table 2-216
310	204, 101, 211	Additional Increase Evaluation Pressure	Table 2-217
311	311, 101, 201, 211	4-ft. Drop onto Rod	Table 2-218
312	311, 104, 201, 211	4-ft. Drop onto Rod at -40°F	Table 2-219
350	111, 201, 211	Fire at 30 Minutes	Table 2-220
351	112, 201, 211	Fire at 60 Minutes	Table 2-221
352	113, 201, 211	Fire at 90 Minutes	Table 2-222
353	114, 201, 211	Fire at 120 Minutes	Table 2-223
354	115, 201, 211	Fire at 150 Minutes	Table 2-224
355	116, 201, 211	Fire at 180 Minutes	Table 2-225

1. Some Normal conditions of transport Load Cases are included in Hypothetical Accident conditions of transport Load Combinations, to meet regulatory requirements

Table 2-198. Load Case 111, Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.6692E+03	-1.2307E+03	3.2539E+03	3.8999E+03	7.6198E+03
	1.8403E+01	-8.4854E+00	2.2435E+01	2.6889E+01	5.2536E+01
2	2.4133E+03	-3.7308E+02	-4.0158E+03	2.7864E+03	1.2437E+03
	1.6639E+01	-2.5723E+00	-2.7688E+01	1.9212E+01	8.5749E+00
3	2.3433E+03	-1.4955E+03	3.2752E+03	3.8388E+03	6.8830E+03
	1.6156E+01	-1.0311E+01	2.2582E+01	2.6468E+01	4.7457E+01
4	4.2101E+04	-2.0645E+04	8.1316E+03	6.2746E+04	1.2152E+05
	2.9028E+02	-1.4234E+02	5.6065E+01	4.3262E+02	8.3786E+02
5	4.5548E+04	-1.9540E+04	2.9580E+03	6.5088E+04	1.0081E+05
	3.1404E+02	-1.3472E+02	2.0394E+01	4.4877E+02	6.9503E+02
6	2.3894E+04	-2.9723E+03	8.0643E+03	2.6866E+04	4.0723E+04
	1.6474E+02	-2.0493E+01	5.5601E+01	1.8524E+02	2.8078E+02
7	8.3283E+03	-4.9597E+02	-4.6033E+03	8.8242E+03	2.4199E+01
	5.7421E+01	-3.4196E+00	-3.1739E+01	6.0841E+01	1.6685E-01
8	8.3161E+03	-5.3388E+02	-4.6853E+03	8.8500E+03	3.1028E+02
	5.7337E+01	-3.6810E+00	-3.2304E+01	6.1018E+01	2.1393E+00
9	8.3197E+03	-4.9709E+02	-4.3921E+03	8.8167E+03	2.2387E+02
	5.7362E+01	-3.4273E+00	-3.0283E+01	6.0789E+01	1.5435E+00
10	8.3430E+03	-6.8313E+02	5.5174E+02	9.0261E+03	2.7357E+03
	5.7523E+01	-4.7100E+00	3.8041E+00	6.2233E+01	1.8862E+01
11	2.6663E+03	-1.9368E+03	5.2818E+01	4.6030E+03	4.7666E+03
	1.8383E+01	-1.3354E+01	3.6417E-01	3.1737E+01	3.2864E+01
12	2.2979E+03	-5.7633E+02	1.6688E+03	2.8743E+03	4.9650E+03
	1.5844E+01	-3.9736E+00	1.1506E+01	1.9817E+01	3.4233E+01
13	1.3456E+04	-3.8916E+03	2.6066E+03	1.7348E+04	1.4941E+04
	9.2777E+01	-2.6832E+01	1.7972E+01	1.1961E+02	1.0301E+02
14	1.2147E+04	-3.5889E+03	4.3751E+03	1.5736E+04	1.5896E+04
	8.3752E+01	-2.4744E+01	3.0165E+01	1.0850E+02	1.0960E+02
15	4.6538E+02	-3.2532E+02	3.3979E+02	7.9071E+02	1.1898E+03
	3.2087E+00	-2.2430E+00	2.3428E+00	5.4517E+00	8.2036E+00

16	2.3113E+02	-4.1203E+01	-4.1367E+02	2.7233E+02	3.9458E+02
	1.5936E+00	-2.8409E-01	-2.8522E+00	1.8776E+00	2.7205E+00
17	8.1404E+01	-3.8451E+01	-5.3011E+02	1.1985E+02	7.4426E+01
	5.6126E-01	-2.6511E-01	-3.6550E+00	8.2636E-01	5.1315E-01
18	3.4338E+02	-3.5857E+02	1.5183E+03	7.0194E+02	9.0346E+02
	2.3675E+00	-2.4722E+00	1.0468E+01	4.8397E+00	6.2291E+00
19	3.2476E+01	-5.5096E+02	1.4406E+03	5.8343E+02	1.5854E+02
	2.2391E-01	-3.7987E+00	9.9323E+00	4.0226E+00	1.0931E+00
20	1.8338E+02	-1.0158E+03	-8.8045E+02	1.1992E+03	1.2315E+03
	1.2643E+00	-7.0039E+00	-6.0705E+00	8.2682E+00	8.4912E+00
21	2.0506E+02	-4.8783E+02	-2.7781E+02	6.9289E+02	1.3037E+03
	1.4138E+00	-3.3635E+00	-1.9155E+00	4.7773E+00	8.9890E+00
22	7.3220E+02	5.8320E+00	7.3306E+02	7.2637E+02	1.2128E+02
	5.0483E+00	4.0210E-02	5.0543E+00	5.0081E+00	8.3620E-01

Allowable Stress for Load Case 111

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	357.92	352.47	20.00	22.40	61.80
2	705.58	566.86	17.40	19.40	59.20
3	358.48	352.52	20.00	22.40	61.80
4	332.02	328.13	20.00	22.40	61.80
5	349.07	344.86	20.00	22.40	61.80
6	355.63	351.64	20.00	22.40	61.80
7	406.39	405.47	18.70	20.70	59.70
8	418.36	417.96	18.70	20.70	59.70
9	405.45	404.47	18.70	20.70	59.70
10	366.53	359.60	20.00	22.40	61.80
11	350.90	337.54	20.00	22.40	61.80
12	330.52	327.95	20.00	22.40	61.80
13	335.13	327.61	20.00	22.40	61.80
14	324.59	319.45	20.00	22.40	61.80
15	277.63	276.51	20.00	23.60	66.30
16	281.96	280.87	20.00	23.60	66.30
17	282.92	282.33	20.00	23.60	66.30
18	295.86	293.44	20.00	23.60	66.30
19	300.16	298.15	20.00	23.60	66.30
20	312.96	310.11	20.00	22.40	61.80
21	279.74	275.85	20.00	23.60	66.30
22	270.22	269.32	20.00	23.60	66.30

Table 2-199. Load Case 112, Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.6573E+02	-7.2448E+02	2.7432E+02	1.1902E+03	1.4872E+03
	3.2111E+00	-4.9951E+00	1.8914E+00	8.2062E+00	1.0254E+01
2	7.1030E+02	-1.1879E+03	-4.2169E+02	1.8982E+03	3.7709E+03
	4.8974E+00	-8.1901E+00	-2.9075E+00	1.3087E+01	2.5999E+01
3	4.6560E+02	-6.8587E+02	2.3944E+02	1.1515E+03	1.4545E+03
	3.2102E+00	-4.7289E+00	1.6509E+00	7.9391E+00	1.0028E+01
4	1.2431E+03	-2.7774E+03	-3.7977E+02	4.0205E+03	7.8831E+03
	8.5705E+00	-1.9150E+01	-2.6184E+00	2.7720E+01	5.4352E+01
5	1.0833E+03	-2.6731E+03	-2.3459E+03	3.7564E+03	5.8309E+03
	7.4693E+00	-1.8430E+01	-1.6175E+01	2.5900E+01	4.0202E+01
6	9.2067E+01	-1.9054E+03	-4.0359E+03	1.9975E+03	2.9263E+03
	6.3478E-01	-1.3137E+01	-2.7827E+01	1.3772E+01	2.0176E+01
7	-3.5565E+02	-7.8825E+02	-5.1984E+03	4.3260E+02	3.1666E+02
	-2.4521E+00	-5.4348E+00	-3.5841E+01	2.9827E+00	2.1833E+00
8	-3.6670E+02	-7.8345E+02	-5.3036E+03	4.1675E+02	2.8573E+02
	-2.5283E+00	-5.4017E+00	-3.6567E+01	2.8734E+00	1.9701E+00
9	-3.5668E+02	-7.8538E+02	-5.2337E+03	4.2870E+02	3.1557E+02
	-2.4592E+00	-5.4150E+00	-3.6085E+01	2.9558E+00	2.1758E+00
10	-2.7337E+02	-1.1647E+03	-3.1680E+03	8.9130E+02	5.0426E+02
	-1.8848E+00	-8.0301E+00	-2.1842E+01	6.1453E+00	3.4768E+00
11	-1.5437E+02	-1.6408E+03	-1.8390E+03	1.4865E+03	4.7144E+02
	-1.0644E+00	-1.1313E+01	-1.2679E+01	1.0249E+01	3.2505E+00
12	4.4007E+00	-1.5123E+03	-1.5278E+03	1.5167E+03	4.8226E+02
	3.0342E-02	-1.0427E+01	-1.0534E+01	1.0457E+01	3.3251E+00
13	-1.3496E+02	-2.0341E+03	-8.0849E+02	1.8992E+03	7.2585E+02
	-9.3055E-01	-1.4025E+01	-5.5743E+00	1.3094E+01	5.0045E+00
14	-1.5661E+02	-1.8394E+03	-2.6736E+00	1.6828E+03	1.1946E+03
	-1.0798E+00	-1.2682E+01	-1.8434E-02	1.1602E+01	8.2363E+00
15	1.7869E+03	-1.5239E+03	2.4934E+02	3.3107E+03	5.5458E+03
	1.2320E+01	-1.0507E+01	1.7191E+00	2.2827E+01	3.8237E+01

16	4.4330E+02	-6.6719E+02	-6.5466E+02	1.1105E+03	1.7860E+03
	3.0565E+00	-4.6001E+00	-4.5138E+00	7.6566E+00	1.2314E+01
17	2.0475E+02	-5.1145E+02	-4.2469E+02	7.1620E+02	1.2351E+03
	1.4117E+00	-3.5263E+00	-2.9281E+00	4.9380E+00	8.5158E+00
18	1.2498E+02	-3.0352E+02	1.1854E+03	4.2850E+02	8.8734E+01
	8.6171E-01	-2.0927E+00	8.1727E+00	2.9544E+00	6.1180E-01
19	1.6221E+00	-5.9528E+02	1.0841E+03	5.9691E+02	8.4443E+02
	1.1184E-02	-4.1043E+00	7.4745E+00	4.1155E+00	5.8221E+00
20	-4.7829E+01	-8.8893E+02	-4.3415E+02	8.4110E+02	2.9246E+02
	-3.2977E-01	-6.1289E+00	-2.9934E+00	5.7992E+00	2.0164E+00
21	5.0982E+02	-7.8860E+00	5.1174E+02	5.1771E+02	4.6929E+02
	3.5151E+00	-5.4372E-02	3.5283E+00	3.5695E+00	3.2356E+00
22	1.3164E+03	-1.6682E+02	1.3248E+03	1.4832E+03	1.3214E+03
	9.0761E+00	-1.1502E+00	9.1342E+00	1.0226E+01	9.1106E+00

Allowable Stress for Load Case 112

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	397.69	393.79	20.00	22.40	61.80
2	421.38	420.44	18.70	20.70	59.70
3	398.11	394.09	20.00	22.40	61.80
4	387.57	385.92	20.00	22.40	61.80
5	396.04	393.93	20.00	22.40	61.80
6	399.30	397.51	20.00	22.40	61.80
7	420.21	419.36	18.70	20.70	59.70
8	422.94	422.25	18.70	20.70	59.70
9	419.78	418.92	18.70	20.70	59.70
10	405.39	403.33	18.70	20.70	59.70
11	400.58	395.11	20.00	22.40	61.80
12	395.36	393.33	20.00	22.40	61.80
13	392.49	388.83	20.00	22.40	61.80
14	386.73	384.32	20.00	22.40	61.80
15	352.88	351.82	20.00	22.40	61.80
16	357.51	356.57	20.00	22.40	61.80
17	358.32	357.89	20.00	22.40	61.80
18	366.93	365.39	20.00	22.40	61.80
19	369.52	368.28	20.00	22.40	61.80
20	378.80	376.82	20.00	22.40	61.80
21	358.39	355.01	20.00	22.40	61.80
22	345.65	344.67	20.00	22.40	61.80

Table 2-200. Load Case 113, Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5803E+02	-2.7760E+02	1.7835E+00	4.3563E+02	6.2595E+02
	1.0896E+00	-1.9140E+00	1.2297E-02	3.0036E+00	4.3158E+00
2	2.0084E+02	-4.0703E+02	-9.4501E+01	6.0788E+02	1.2410E+03
	1.3848E+00	-2.8064E+00	-6.5156E-01	4.1912E+00	8.5561E+00
3	1.6793E+02	-2.6952E+02	-1.6762E+01	4.3746E+02	6.2904E+02
	1.1579E+00	-1.8583E+00	-1.1557E-01	3.0162E+00	4.3371E+00
4	9.6509E+02	-1.3385E+03	-4.9136E+02	2.3036E+03	4.4713E+03
	6.6541E+00	-9.2284E+00	-3.3878E+00	1.5882E+01	3.0829E+01
5	7.8424E+02	-9.5460E+02	-1.3867E+03	1.7388E+03	2.4003E+03
	5.4071E+00	-6.5817E+00	-9.5608E+00	1.1989E+01	1.6549E+01
6	8.9809E+01	-1.1521E+03	-3.0844E+03	1.2419E+03	1.9565E+03
	6.1921E-01	-7.9435E+00	-2.1266E+01	8.5627E+00	1.3490E+01
7	-2.0207E+02	-6.3638E+02	-4.8104E+03	4.3431E+02	2.5519E+02
	-1.3932E+00	-4.3877E+00	-3.3167E+01	2.9945E+00	1.7595E+00
8	-2.1053E+02	-6.2730E+02	-4.8366E+03	4.1677E+02	2.0828E+02
	-1.4515E+00	-4.3250E+00	-3.3347E+01	2.8735E+00	1.4360E+00
9	-2.0530E+02	-6.3225E+02	-4.8697E+03	4.2695E+02	2.3828E+02
	-1.4155E+00	-4.3592E+00	-3.3576E+01	2.9437E+00	1.6429E+00
10	4.6523E+01	-1.4391E+03	-2.5204E+03	1.4856E+03	7.8617E+02
	3.2077E-01	-9.9220E+00	-1.7378E+01	1.0243E+01	5.4204E+00
11	-2.4746E+02	-1.4386E+03	-1.3279E+03	1.1911E+03	1.3893E+03
	-1.7062E+00	-9.9189E+00	-9.1555E+00	8.2127E+00	9.5788E+00
12	5.7912E+00	-1.4461E+03	-1.4457E+03	1.4519E+03	1.4559E+03
	3.9929E-02	-9.9704E+00	-9.9676E+00	1.0010E+01	1.0038E+01
13	5.8436E+01	-9.0888E+02	-2.4141E+02	9.6732E+02	4.7323E+02
	4.0290E-01	-6.2665E+00	-1.6645E+00	6.6694E+00	3.2628E+00
14	-4.2972E+01	-9.0105E+02	-4.2503E+01	8.5807E+02	1.3754E+03
	-2.9628E-01	-6.2125E+00	-2.9305E-01	5.9162E+00	9.4832E+00
15	1.6047E+03	-1.6009E+03	-1.1313E+01	3.2056E+03	5.3983E+03
	1.1064E+01	-1.1038E+01	-7.7998E-02	2.2102E+01	3.7220E+01

16	4.0305E+02	-7.2117E+02	-3.3881E+02	1.1242E+03	1.8211E+03
	2.7790E+00	-4.9723E+00	-2.3360E+00	7.7512E+00	1.2556E+01
17	1.7956E+02	-4.9085E+02	-8.9893E+01	6.7042E+02	1.1542E+03
	1.2381E+00	-3.3843E+00	-6.1979E-01	4.6224E+00	7.9582E+00
18	3.1291E+01	-1.7994E+02	5.6555E+02	2.1123E+02	1.2786E+02
	2.1574E-01	-1.2406E+00	3.8994E+00	1.4564E+00	8.8153E-01
19	2.2015E+01	-3.5607E+02	5.4593E+02	3.7809E+02	6.0451E+02
	1.5178E-01	-2.4550E+00	3.7640E+00	2.6068E+00	4.1679E+00
20	-5.3771E+01	-5.1229E+02	-5.4478E+01	4.5852E+02	5.5518E+02
	-3.7074E-01	-3.5321E+00	-3.7561E-01	3.1614E+00	3.8278E+00
21	1.3317E+02	-9.7416E+00	1.2572E+02	1.4291E+02	1.8800E+02
	9.1815E-01	-6.7166E-02	8.6680E-01	9.8532E-01	1.2962E+00
22	3.5922E+02	-1.6708E+02	3.6611E+02	5.2631E+02	1.7161E+02
	2.4768E+00	-1.1520E+00	2.5242E+00	3.6288E+00	1.1832E+00

Allowable Stress for Load Case 113

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	394.90	393.44	20.00	22.40	61.80
2	399.29	396.57	20.00	22.40	61.80
3	395.63	394.18	20.00	22.40	61.80
4	393.53	393.11	20.00	22.40	61.80
5	396.63	395.95	20.00	22.40	61.80
6	397.66	397.29	20.00	22.40	61.80
7	403.43	402.74	18.70	20.70	59.70
8	404.07	403.42	18.70	20.70	59.70
9	403.62	402.94	18.70	20.70	59.70
10	400.60	399.83	20.00	22.40	61.80
11	399.84	398.41	20.00	22.40	61.80
12	400.99	399.52	20.00	22.40	61.80
13	396.83	395.75	20.00	22.40	61.80
14	394.86	394.22	20.00	22.40	61.80
15	384.94	384.58	20.00	22.40	61.80
16	386.38	386.05	20.00	22.40	61.80
17	386.68	386.49	20.00	22.40	61.80
18	389.07	388.71	20.00	22.40	61.80
19	390.04	389.62	20.00	22.40	61.80
20	394.25	393.41	20.00	22.40	61.80
21	387.19	386.19	20.00	22.40	61.80
22	382.33	381.94	20.00	22.40	61.80

Table 2-201. Load Case 114, Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	8.1181E+01	-1.6562E+02	-5.7915E+01	2.4681E+02	4.0313E+02
	5.5973E-01	-1.1419E+00	-3.9931E-01	1.7017E+00	2.7795E+00
2	8.4423E+01	-2.2432E+02	-2.2671E+01	3.0874E+02	6.2856E+02
	5.8208E-01	-1.5466E+00	-1.5631E-01	2.1287E+00	4.3337E+00
3	9.1572E+01	-1.6860E+02	-6.5267E+01	2.6017E+02	4.2304E+02
	6.3137E-01	-1.1625E+00	-4.5000E-01	1.7938E+00	2.9168E+00
4	8.8592E+02	-1.0058E+03	-5.5238E+02	1.8917E+03	3.6145E+03
	6.1082E+00	-6.9345E+00	-3.8086E+00	1.3043E+01	2.4921E+01
5	7.2182E+02	-5.7428E+02	-1.1874E+03	1.2961E+03	1.5622E+03
	4.9767E+00	-3.9595E+00	-8.1865E+00	8.9363E+00	1.0771E+01
6	1.0618E+02	-9.8323E+02	-2.8680E+03	1.0894E+03	1.6975E+03
	7.3212E-01	-6.7791E+00	-1.9774E+01	7.5113E+00	1.1704E+01
7	-1.5615E+02	-6.0083E+02	-4.6663E+03	4.4467E+02	2.3802E+02
	-1.0767E+00	-4.1426E+00	-3.2173E+01	3.0659E+00	1.6411E+00
8	-1.6453E+02	-5.9011E+02	-4.6715E+03	4.2558E+02	1.8948E+02
	-1.1344E+00	-4.0687E+00	-3.2209E+01	2.9342E+00	1.3064E+00
9	-1.5962E+02	-5.9643E+02	-4.7275E+03	4.3681E+02	2.1865E+02
	-1.1006E+00	-4.1123E+00	-3.2595E+01	3.0117E+00	1.5076E+00
10	1.2735E+02	-1.4957E+03	-2.3382E+03	1.6231E+03	8.6146E+02
	8.7803E-01	-1.0313E+01	-1.6121E+01	1.1191E+01	5.9396E+00
11	-2.5758E+02	-1.4024E+03	-1.2084E+03	1.1448E+03	1.5751E+03
	-1.7760E+00	-9.6689E+00	-8.3319E+00	7.8929E+00	1.0860E+01
12	1.4533E+01	-1.4391E+03	-1.4265E+03	1.4536E+03	1.6540E+03
	1.0020E-01	-9.9222E+00	-9.8357E+00	1.0022E+01	1.1404E+01
13	1.3134E+02	-6.9638E+02	-1.3223E+02	8.2772E+02	7.4000E+02
	9.0556E-01	-4.8014E+00	-9.1172E-01	5.7070E+00	5.1021E+00
14	2.6138E+01	-7.4408E+02	-7.8429E+01	7.7022E+02	1.3924E+03
	1.8021E-01	-5.1303E+00	-5.4075E-01	5.3105E+00	9.6002E+00
15	1.5283E+03	-1.6054E+03	-9.1984E+01	3.1337E+03	5.2815E+03
	1.0538E+01	-1.1069E+01	-6.3421E-01	2.1606E+01	3.6414E+01

16	3.8578E+02	-7.2805E+02	-2.3863E+02	1.1138E+03	1.8068E+03
	2.6598E+00	-5.0197E+00	-1.6453E+00	7.6795E+00	1.2457E+01
17	1.6998E+02	-4.7847E+02	1.0658E+01	6.4846E+02	1.1141E+03
	1.1720E+00	-3.2989E+00	7.3487E-02	4.4709E+00	7.6817E+00
18	1.8617E+01	-1.5746E+02	4.0052E+02	1.7607E+02	1.8202E+02
	1.2836E-01	-1.0856E+00	2.7615E+00	1.2140E+00	1.2550E+00
19	2.8830E+01	-2.9177E+02	4.0525E+02	3.2060E+02	5.3274E+02
	1.9878E-01	-2.0117E+00	2.7941E+00	2.2105E+00	3.6731E+00
20	-3.2328E+01	-4.3405E+02	4.9820E+01	4.0172E+02	6.1415E+02
	-2.2290E-01	-2.9927E+00	3.4350E-01	2.7698E+00	4.2344E+00
21	4.0571E+01	-2.2968E+01	1.7931E+01	6.3539E+01	1.2438E+02
	2.7973E-01	-1.5836E-01	1.2363E-01	4.3808E-01	8.5755E-01
22	6.0611E+01	-1.7859E+02	5.3876E+01	2.3920E+02	1.8407E+02
	4.1790E-01	-1.2314E+00	3.7146E-01	1.6493E+00	1.2691E+00

Allowable Stress for Load Case 114

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	392.25	391.33	20.00	22.40	61.80
2	392.08	388.72	20.00	22.40	61.80
3	392.71	391.84	20.00	22.40	61.80
4	393.32	393.22	20.00	22.40	61.80
5	395.11	394.79	20.00	22.40	61.80
6	395.84	395.57	20.00	22.40	61.80
7	397.26	396.61	20.00	22.40	61.80
8	397.34	396.69	20.00	22.40	61.80
9	397.49	396.84	20.00	22.40	61.80
10	397.34	396.69	20.00	22.40	61.80
11	398.01	396.89	20.00	22.40	61.80
12	400.01	398.68	20.00	22.40	61.80
13	395.56	395.10	20.00	22.40	61.80
14	394.51	394.29	20.00	22.40	61.80
15	392.22	392.06	20.00	22.40	61.80
16	392.66	392.50	20.00	22.40	61.80
17	392.81	392.69	20.00	22.40	61.80
18	393.53	393.42	20.00	22.40	61.80
19	393.99	393.80	20.00	22.40	61.80
20	396.85	396.32	20.00	22.40	61.80
21	392.13	391.76	20.00	22.40	61.80
22	390.97	390.77	20.00	22.40	61.80

Table 2-202. Load Case 115, Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.2828E+01	-1.4042E+02	-7.2671E+01	2.0325E+02	3.5224E+02
	4.3319E-01	-9.6814E-01	-5.0105E-01	1.4013E+00	2.4286E+00
2	6.0532E+01	-1.8544E+02	-1.0003E+01	2.4597E+02	4.8948E+02
	4.1735E-01	-1.2785E+00	-6.8970E-02	1.6959E+00	3.3748E+00
3	7.2462E+01	-1.4440E+02	-7.1590E+01	2.1686E+02	3.7014E+02
	4.9961E-01	-9.9559E-01	-4.9360E-01	1.4952E+00	2.5520E+00
4	8.5824E+02	-9.2645E+02	-5.7299E+02	1.7847E+03	3.3962E+03
	5.9174E+00	-6.3877E+00	-3.9506E+00	1.2305E+01	2.3416E+01
5	7.0477E+02	-4.9255E+02	-1.1376E+03	1.1973E+03	1.3642E+03
	4.8592E+00	-3.3960E+00	-7.8438E+00	8.2552E+00	9.4059E+00
6	1.0977E+02	-9.3862E+02	-2.7986E+03	1.0484E+03	1.6237E+03
	7.5687E-01	-6.4716E+00	-1.9296E+01	7.2284E+00	1.1195E+01
7	-1.4452E+02	-5.8688E+02	-4.5820E+03	4.4236E+02	2.3338E+02
	-9.9640E-01	-4.0464E+00	-3.1592E+01	3.0500E+00	1.6091E+00
8	-1.5275E+02	-5.7579E+02	-4.5809E+03	4.2303E+02	1.8516E+02
	-1.0532E+00	-3.9699E+00	-3.1584E+01	2.9167E+00	1.2766E+00
9	-1.4800E+02	-5.8222E+02	-4.6409E+03	4.3422E+02	2.1354E+02
	-1.0204E+00	-4.0143E+00	-3.1998E+01	2.9938E+00	1.4723E+00
10	1.4488E+02	-1.4959E+03	-2.2670E+03	1.6407E+03	8.7805E+02
	9.9888E-01	-1.0314E+01	-1.5631E+01	1.1313E+01	6.0540E+00
11	-2.5718E+02	-1.3855E+03	-1.1701E+03	1.1283E+03	1.6003E+03
	-1.7732E+00	-9.5526E+00	-8.0675E+00	7.7794E+00	1.1034E+01
12	1.7814E+01	-1.4299E+03	-1.4133E+03	1.4477E+03	1.6817E+03
	1.2282E-01	-9.8587E+00	-9.7441E+00	9.9815E+00	1.1595E+01
13	1.5359E+02	-6.5494E+02	-1.0806E+02	8.0853E+02	7.9494E+02
	1.0590E+00	-4.5157E+00	-7.4505E-01	5.5746E+00	5.4809E+00
14	4.3124E+01	-7.0934E+02	-8.8439E+01	7.5247E+02	1.3873E+03
	2.9733E-01	-4.8908E+00	-6.0977E-01	5.1881E+00	9.5650E+00
15	1.5037E+03	-1.6057E+03	-1.1709E+02	3.1094E+03	5.2415E+03
	1.0368E+01	-1.1071E+01	-8.0730E-01	2.1439E+01	3.6139E+01

16	3.8051E+02	-7.3035E+02	-2.0803E+02	1.1109E+03	1.8026E+03
	2.6235E+00	-5.0356E+00	-1.4343E+00	7.6591E+00	1.2429E+01
17	1.6708E+02	-4.7485E+02	4.1226E+01	6.4193E+02	1.1019E+03
	1.1520E+00	-3.2740E+00	2.8424E-01	4.4260E+00	7.5974E+00
18	1.6828E+01	-1.5315E+02	3.5562E+02	1.6998E+02	1.9743E+02
	1.1603E-01	-1.0560E+00	2.4519E+00	1.1720E+00	1.3612E+00
19	3.1133E+01	-2.7485E+02	3.6741E+02	3.0599E+02	5.1379E+02
	2.1466E-01	-1.8951E+00	2.5332E+00	2.1097E+00	3.5425E+00
20	-2.3064E+01	-4.1675E+02	7.9153E+01	3.9369E+02	6.3140E+02
	-1.5902E-01	-2.8734E+00	5.4574E-01	2.7144E+00	4.3533E+00
21	2.1075E+01	-3.3497E+01	-1.2587E+01	5.4572E+01	1.0657E+02
	1.4531E-01	-2.3095E-01	-8.6785E-02	3.7626E-01	7.3475E-01
22	-2.3356E+01	-1.9350E+02	-4.5827E+01	1.7014E+02	2.9308E+02
	-1.6104E-01	-1.3341E+00	-3.1596E-01	1.1731E+00	2.0207E+00

Allowable Stress for Load Case 115

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	389.60	388.76	20.00	22.40	61.80
2	388.21	384.70	20.00	22.40	61.80
3	389.76	388.97	20.00	22.40	61.80
4	391.47	391.37	20.00	22.40	61.80
5	392.83	392.61	20.00	22.40	61.80
6	393.59	393.24	20.00	22.40	61.80
7	393.70	393.05	20.00	22.40	61.80
8	393.59	392.94	20.00	22.40	61.80
9	393.86	393.20	20.00	22.40	61.80
10	394.53	393.75	20.00	22.40	61.80
11	395.38	394.33	20.00	22.40	61.80
12	397.58	396.28	20.00	22.40	61.80
13	393.07	392.75	20.00	22.40	61.80
14	392.26	392.11	20.00	22.40	61.80
15	392.45	392.35	20.00	22.40	61.80
16	392.58	392.47	20.00	22.40	61.80
17	392.69	392.58	20.00	22.40	61.80
18	392.98	392.90	20.00	22.40	61.80
19	393.25	393.12	20.00	22.40	61.80
20	395.75	395.30	20.00	22.40	61.80
21	391.20	391.01	20.00	22.40	61.80
22	391.63	391.50	20.00	22.40	61.80

Table 2-203. Load Case 116, Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.9070E+01	-1.3671E+02	-7.6306E+01	1.9578E+02	3.4473E+02
	4.0728E-01	-9.4259E-01	-5.2611E-01	1.3499E+00	2.3768E+00
2	5.6802E+01	-1.7902E+02	-1.0429E+01	2.3582E+02	4.6640E+02
	3.9164E-01	-1.2343E+00	-7.1907E-02	1.6260E+00	3.2157E+00
3	6.7689E+01	-1.3896E+02	-6.9582E+01	2.0665E+02	3.5584E+02
	4.6670E-01	-9.5811E-01	-4.7975E-01	1.4248E+00	2.4534E+00
4	8.4325E+02	-9.1077E+02	-5.7907E+02	1.7540E+03	3.3393E+03
	5.8140E+00	-6.2796E+00	-3.9925E+00	1.2094E+01	2.3023E+01
5	6.9253E+02	-4.8042E+02	-1.1241E+03	1.1729E+03	1.3288E+03
	4.7748E+00	-3.3124E+00	-7.7506E+00	8.0872E+00	9.1619E+00
6	1.0801E+02	-9.2293E+02	-2.7634E+03	1.0309E+03	1.5959E+03
	7.4473E-01	-6.3634E+00	-1.9053E+01	7.1081E+00	1.1004E+01
7	-1.4150E+02	-5.7810E+02	-4.5104E+03	4.3661E+02	2.3189E+02
	-9.7558E-01	-3.9859E+00	-3.1098E+01	3.0103E+00	1.5988E+00
8	-1.4957E+02	-5.6704E+02	-4.5074E+03	4.1747E+02	1.8447E+02
	-1.0313E+00	-3.9096E+00	-3.1077E+01	2.8783E+00	1.2719E+00
9	-1.4494E+02	-5.7334E+02	-4.5673E+03	4.2840E+02	2.1211E+02
	-9.9935E-01	-3.9531E+00	-3.1490E+01	2.9537E+00	1.4625E+00
10	1.4643E+02	-1.4820E+03	-2.2229E+03	1.6284E+03	8.7928E+02
	1.0096E+00	-1.0218E+01	-1.5326E+01	1.1227E+01	6.0625E+00
11	-2.5547E+02	-1.3709E+03	-1.1503E+03	1.1154E+03	1.5882E+03
	-1.7614E+00	-9.4520E+00	-7.9308E+00	7.6906E+00	1.0950E+01
12	1.7885E+01	-1.4174E+03	-1.4005E+03	1.4353E+03	1.6696E+03
	1.2331E-01	-9.7726E+00	-9.6562E+00	9.8959E+00	1.1512E+01
13	1.5507E+02	-6.4493E+02	-1.0268E+02	8.0000E+02	7.9652E+02
	1.0692E+00	-4.4466E+00	-7.0793E-01	5.5158E+00	5.4918E+00
14	4.4733E+01	-6.9970E+02	-9.0350E+01	7.4444E+02	1.3764E+03
	3.0842E-01	-4.8243E+00	-6.2294E-01	5.1327E+00	9.4903E+00
15	1.4870E+03	-1.5967E+03	-1.2483E+02	3.0837E+03	5.1984E+03
	1.0252E+01	-1.1009E+01	-8.6071E-01	2.1262E+01	3.5841E+01

16	3.7659E+02	-7.2684E+02	-1.9683E+02	1.1034E+03	1.7909E+03
	2.5965E+00	-5.0114E+00	-1.3571E+00	7.6079E+00	1.2348E+01
17	1.6521E+02	-4.7101E+02	5.0628E+01	6.3622E+02	1.0918E+03
	1.1391E+00	-3.2475E+00	3.4907E-01	4.3866E+00	7.5279E+00
18	1.6382E+01	-1.5131E+02	3.4336E+02	1.6769E+02	2.0017E+02
	1.1295E-01	-1.0432E+00	2.3674E+00	1.1562E+00	1.3801E+00
19	3.1300E+01	-2.6905E+02	3.5801E+02	3.0035E+02	5.0584E+02
	2.1581E-01	-1.8550E+00	2.4684E+00	2.0708E+00	3.4877E+00
20	-2.0801E+01	-4.1146E+02	8.8235E+01	3.9066E+02	6.3207E+02
	-1.4342E-01	-2.8369E+00	6.0836E-01	2.6935E+00	4.3580E+00
21	1.4824E+01	-3.8128E+01	-2.3571E+01	5.2952E+01	9.8872E+01
	1.0221E-01	-2.6288E-01	-1.6252E-01	3.6509E-01	6.8170E-01
22	-4.9483E+01	-2.0350E+02	-8.3140E+01	1.5402E+02	3.2879E+02
	-3.4118E-01	-1.4031E+00	-5.7323E-01	1.0619E+00	2.2670E+00

Allowable Stress for Load Case 116

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	386.85	385.94	20.00	22.40	61.80
2	385.11	381.59	20.00	22.40	61.80
3	386.81	386.00	20.00	22.40	61.80
4	388.94	388.84	20.00	22.40	61.80
5	390.21	390.00	20.00	22.40	61.80
6	390.98	390.59	20.00	22.40	61.80
7	390.70	390.05	20.00	22.40	61.80
8	390.52	389.87	20.00	22.40	61.80
9	390.80	390.14	20.00	22.40	61.80
10	391.66	390.84	20.00	22.40	61.80
11	392.55	391.52	20.00	22.40	61.80
12	394.81	393.51	20.00	22.40	61.80
13	390.26	389.98	20.00	22.40	61.80
14	389.52	389.38	20.00	22.40	61.80
15	390.57	390.49	20.00	22.40	61.80
16	390.60	390.50	20.00	22.40	61.80
17	390.70	390.59	20.00	22.40	61.80
18	390.87	390.78	20.00	22.40	61.80
19	391.08	390.96	20.00	22.40	61.80
20	393.47	393.05	20.00	22.40	61.80
21	388.83	388.69	20.00	22.40	61.80
22	389.88	389.78	20.00	22.40	61.80

Table 2-204. Load Case 301, 30-ft. Head-On Drop, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-4.3851E+01	-3.2062E+03	-5.9694E+02	3.1624E+03	1.2779E+03
	-3.0234E-01	-2.2106E+01	-4.1157E+00	2.1804E+01	8.8110E+00
2	3.6608E+01	-1.7299E+03	-1.0905E+02	1.7665E+03	8.2715E+01
	2.5240E-01	-1.1927E+01	-7.5189E-01	1.2180E+01	5.7030E-01
3	1.4808E+01	-1.0201E+03	-3.7223E+01	1.0349E+03	8.9395E+01
	1.0210E-01	-7.0335E+00	-2.5664E-01	7.1356E+00	6.1636E-01
4	8.7090E+02	-5.1268E+03	-1.6448E+03	5.9977E+03	4.3668E+03
	6.0047E+00	-3.5348E+01	-1.1341E+01	4.1353E+01	3.0108E+01
5	1.4694E+02	-1.9133E+03	-8.0020E+02	2.0603E+03	2.9578E+03
	1.0131E+00	-1.3192E+01	-5.5172E+00	1.4205E+01	2.0393E+01
6	-3.3587E+02	-1.3042E+03	-6.9110E+02	9.6830E+02	5.0009E+02
	-2.3157E+00	-8.9919E+00	-4.7650E+00	6.6762E+00	3.4480E+00
7	-6.4298E+00	-8.8189E+02	-5.5845E+01	8.7546E+02	1.6685E+01
	-4.4332E-02	-6.0804E+00	-3.8504E-01	6.0361E+00	1.1504E-01
8	-3.9646E+00	-8.4322E+02	-3.9722E+01	8.3925E+02	8.5101E-01
	-2.7335E-02	-5.8138E+00	-2.7387E-01	5.7864E+00	5.8675E-03
9	-3.2081E+00	-8.1085E+02	-2.7565E+01	8.0765E+02	5.7717E-01
	-2.2119E-02	-5.5906E+00	-1.9006E-01	5.5685E+00	3.9795E-03
10	-1.5792E+02	-1.3134E+03	-9.6320E+01	1.1555E+03	6.8283E+02
	-1.0888E+00	-9.0557E+00	-6.6410E-01	7.9668E+00	4.7080E+00
11	2.0361E+02	-6.7121E+02	-4.4778E+01	8.7482E+02	3.1955E+02
	1.4038E+00	-4.6278E+00	-3.0873E-01	6.0316E+00	2.2032E+00
12	1.9175E+02	-1.8880E+02	1.4942E+02	3.8055E+02	7.7647E+02
	1.3221E+00	-1.3018E+00	1.0302E+00	2.6238E+00	5.3536E+00
13	2.5373E+02	-7.1035E+02	-3.8245E+01	9.6407E+02	6.7407E+02
	1.7494E+00	-4.8977E+00	-2.6369E-01	6.6471E+00	4.6476E+00
14	2.4952E+02	-5.6415E+02	2.2970E+01	8.1367E+02	3.5190E+02
	1.7204E+00	-3.8897E+00	1.5837E-01	5.6101E+00	2.4263E+00
15	8.3614E+02	1.8534E+02	1.3136E+02	6.5081E+02	2.3281E+01
	5.7650E+00	1.2778E+00	9.0573E-01	4.4872E+00	1.6052E-01

16	2.8958E+02	-9.1798E+02	-4.4126E+02	1.2076E+03	5.6522E+02
	1.9966E+00	-6.3292E+00	-3.0424E+00	8.3258E+00	3.8970E+00
17	4.9047E+02	-8.8069E+02	-4.9980E+02	1.3712E+03	1.1635E+03
	3.3817E+00	-6.0722E+00	-3.4460E+00	9.4538E+00	8.0221E+00
18	4.6270E+02	-1.4211E+03	-2.9977E+02	1.8838E+03	2.1661E+03
	3.1902E+00	-9.7984E+00	-2.0668E+00	1.2989E+01	1.4935E+01
19	4.0197E+02	-1.4487E+03	-5.6530E+02	1.8507E+03	1.2611E+03
	2.7715E+00	-9.9885E+00	-3.8976E+00	1.2760E+01	8.6948E+00
20	-9.7709E+01	-9.6214E+02	-6.2784E+02	8.6443E+02	1.4123E+03
	-6.7368E-01	-6.6337E+00	-4.3288E+00	5.9600E+00	9.7373E+00
21	1.6604E+02	1.2645E+00	-3.2787E-01	1.6478E+02	9.0540E+00
	1.1448E+00	8.7186E-03	-2.2606E-03	1.1361E+00	6.2425E-02
22	5.3497E+02	1.2521E+02	3.5320E+02	4.0975E+02	3.3572E+02
	3.6885E+00	8.6331E-01	2.4353E+00	2.8252E+00	2.3147E+00

Table 2-205. Load Case 302, 30-ft. Side Drop, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2336E+02	-2.3155E+02	-1.1679E+03	2.8923E+03	8.9802E+02
	8.5055E-01	-1.5965E+00	-8.0522E+00	1.9942E+01	6.1916E+00
2	7.7973E+02	-4.3247E+02	-5.4364E+02	7.5772E+02	7.1297E+02
	5.3760E+00	-2.9818E+00	-3.7482E+00	5.2243E+00	4.9158E+00
3	1.1985E+02	-2.3080E+02	-1.1706E+03	2.8891E+03	8.9456E+02
	8.2631E-01	-1.5913E+00	-8.0709E+00	1.9920E+01	6.1678E+00
4	5.5776E+02	2.0099E+01	-1.0278E+03	2.0075E+03	3.0013E+02
	3.8456E+00	1.3858E-01	-7.0866E+00	1.3841E+01	2.0693E+00
5	9.0284E+02	-9.2816E+01	-1.2872E+03	2.0979E+03	7.1927E+01
	6.2249E+00	-6.3994E-01	-8.8751E+00	1.4464E+01	4.9592E-01
6	8.7986E+02	-2.2339E+02	-1.4084E+03	1.9989E+03	1.0140E+02
	6.0664E+00	-1.5402E+00	-9.7105E+00	1.3782E+01	6.9911E-01
7	3.5189E+02	2.1050E+02	2.3683E+00	1.2031E+03	8.8602E+01
	2.4262E+00	1.4513E+00	1.6329E-02	8.2954E+00	6.1089E-01
8	3.3275E+02	1.8205E+02	1.9696E+01	6.8956E+02	8.4128E+01
	2.2943E+00	1.2552E+00	1.3580E-01	4.7543E+00	5.8004E-01
9	3.5011E+02	2.0993E+02	2.3935E+00	1.1935E+03	8.9656E+01
	2.4139E+00	1.4474E+00	1.6503E-02	8.2290E+00	6.1815E-01
10	1.0304E+03	-5.1047E-01	-1.3396E+03	1.6257E+03	5.6488E+02
	7.1044E+00	-3.5196E-03	-9.2359E+00	1.1209E+01	3.8947E+00
11	5.1229E+02	-2.9694E+02	-1.5437E+03	1.5784E+03	6.1907E+02
	3.5321E+00	-2.0473E+00	-1.0643E+01	1.0883E+01	4.2683E+00
12	-2.1825E+01	-1.7954E+02	-1.1229E+03	1.1011E+03	9.3933E+01
	-1.5048E-01	-1.2379E+00	-7.7422E+00	7.5918E+00	6.4765E-01
13	9.1723E+02	-9.9795E+01	-1.2219E+03	2.0671E+03	7.0769E+01
	6.3241E+00	-6.8806E-01	-8.4244E+00	1.4252E+01	4.8793E-01
14	7.3429E+02	-4.5162E+01	-1.1530E+03	2.0119E+03	3.1427E+02
	5.0628E+00	-3.1138E-01	-7.9499E+00	1.3871E+01	2.1668E+00
15	-3.8179E+01	-1.6871E+02	-1.1388E+03	1.1366E+03	2.6769E+01
	-2.6323E-01	-1.1632E+00	-7.8521E+00	7.8368E+00	1.8457E-01

16	1.2567E+02	-4.3643E+01	-1.0954E+03	2.0591E+03	1.2665E+02
	8.6647E-01	-3.0091E-01	-7.5524E+00	1.4197E+01	8.7320E-01
17	1.9939E+02	-1.8239E+02	-1.0667E+03	2.1191E+03	1.3503E+02
	1.3748E+00	-1.2575E+00	-7.3547E+00	1.4610E+01	9.3102E-01
18	6.2202E+02	-1.0528E+02	-1.1477E+03	2.2225E+03	1.0892E+02
	4.2887E+00	-7.2588E-01	-7.9133E+00	1.5324E+01	7.5096E-01
19	7.2302E+02	-1.1144E+02	-1.2830E+03	2.2128E+03	1.7240E+02
	4.9850E+00	-7.6835E-01	-8.8461E+00	1.5257E+01	1.1886E+00
20	6.4346E+02	-1.7954E+02	-1.2263E+03	1.7388E+03	8.1722E+01
	4.4365E+00	-1.2379E+00	-8.4547E+00	1.1988E+01	5.6346E-01
21	-1.4700E+01	-1.9807E+02	-1.2202E+03	1.2506E+03	1.3144E+02
	-1.0135E-01	-1.3657E+00	-8.4130E+00	8.6223E+00	9.0623E-01
22	-1.1578E+01	-2.1293E+02	-1.2608E+03	1.2901E+03	1.0271E+02
	-7.9826E-02	-1.4681E+00	-8.6928E+00	8.8949E+00	7.0816E-01

Table 2-206. Load Case 303, 30-ft. Cg/Corner Drop, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.6716E+02	-5.8955E+02	-3.6837E+03	9.5531E+03	2.6104E+03
	5.2894E+00	-4.0648E+00	-2.5398E+01	6.5866E+01	1.7998E+01
2	4.0515E+02	-6.5706E+01	-1.0152E+03	2.7335E+03	3.1417E+02
	2.7934E+00	-4.5302E-01	-6.9994E+00	1.8847E+01	2.1661E+00
3	2.4003E+03	1.0597E+02	-1.2773E+02	2.5280E+03	6.1308E+02
	1.6549E+01	7.3062E-01	-8.8065E-01	1.7430E+01	4.2270E+00
4	3.7566E+02	-2.6707E+02	-2.6770E+03	7.4818E+03	4.9213E+02
	2.5901E+00	-1.8414E+00	-1.8457E+01	5.1585E+01	3.3931E+00
5	8.4819E+02	-7.1544E+02	-3.4538E+03	4.2711E+03	2.4488E+02
	5.8481E+00	-4.9328E+00	-2.3813E+01	2.9448E+01	1.6884E+00
6	1.1854E+03	-1.1821E+03	-3.9831E+03	3.9761E+03	7.2372E+02
	8.1733E+00	-8.1502E+00	-2.7462E+01	2.7414E+01	4.9899E+00
7	1.0588E+03	1.1990E+02	-6.5288E+01	3.6220E+03	1.4902E+02
	7.3001E+00	8.2670E-01	-4.5014E-01	2.4973E+01	1.0275E+00
8	8.1711E+02	6.4819E+01	-9.7472E+01	2.6613E+03	8.5194E+01
	5.6338E+00	4.4691E-01	-6.7205E-01	1.8349E+01	5.8739E-01
9	5.2106E+02	5.2922E+01	-2.5782E+02	1.7470E+03	3.4302E+01
	3.5926E+00	3.6489E-01	-1.7776E+00	1.2045E+01	2.3650E-01
10	2.6930E+02	-7.0126E+01	-4.3539E+02	1.6288E+03	7.3718E+02
	1.8568E+00	-4.8350E-01	-3.0019E+00	1.1230E+01	5.0827E+00
11	5.4592E+02	1.6102E+02	-1.6800E+02	1.1700E+03	2.7161E+02
	3.7640E+00	1.1102E+00	-1.1583E+00	8.0669E+00	1.8727E+00
12	4.1415E+02	2.6127E+02	1.1458E+01	4.0411E+02	1.5487E+02
	2.8554E+00	1.8014E+00	7.8998E-02	2.7862E+00	1.0678E+00
13	5.0434E+02	-8.3421E+01	-4.2215E+02	1.1486E+03	3.9469E+01
	3.4773E+00	-5.7517E-01	-2.9106E+00	7.9194E+00	2.7213E-01
14	5.4580E+02	-8.7709E+01	-4.1560E+02	9.8589E+02	1.0118E+02
	3.7632E+00	-6.0473E-01	-2.8654E+00	6.7975E+00	6.9765E-01
15	2.2282E+02	-2.0608E+03	-2.1863E+03	2.5173E+03	7.3651E+01
	1.5363E+00	-1.4209E+01	-1.5074E+01	1.7356E+01	5.0781E-01

16	2.0749E+02	-5.8484E+02	-1.9053E+03	6.4312E+03	2.0725E+02
	1.4306E+00	-4.0323E+00	-1.3136E+01	4.4342E+01	1.4289E+00
17	1.6099E+02	-4.7693E+02	-2.0193E+03	6.2336E+03	3.3961E+02
	1.1100E+00	-3.2883E+00	-1.3922E+01	4.2979E+01	2.3415E+00
18	4.6612E+02	-3.9737E+02	-2.9088E+03	4.9563E+03	4.0106E+02
	3.2138E+00	-2.7398E+00	-2.0055E+01	3.4173E+01	2.7652E+00
19	6.3593E+02	-4.9538E+02	-3.3365E+03	4.3281E+03	7.8647E+02
	4.3846E+00	-3.4155E+00	-2.3005E+01	2.9841E+01	5.4225E+00
20	9.1076E+02	-7.2535E+02	-3.4967E+03	4.0267E+03	1.6067E+02
	6.2795E+00	-5.0011E+00	-2.4109E+01	2.7763E+01	1.1078E+00
21	1.0198E+02	-3.9654E+01	-1.5957E+02	2.5832E+02	3.5412E+01
	7.0313E-01	-2.7341E-01	-1.1002E+00	1.7811E+00	2.4416E-01
22	8.3959E+01	-2.0189E+03	-2.4774E+03	2.7581E+03	2.6874E+02
	5.7888E-01	-1.3920E+01	-1.7081E+01	1.9017E+01	1.8529E+00

Table 2-207. Load Case 304, 30-ft. Head-On Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-6.1344E+01	-4.4853E+03	-8.3529E+02	4.4239E+03	1.7879E+03
	-4.2295E-01	-3.0925E+01	-5.7592E+00	3.0502E+01	1.2327E+01
2	5.1212E+01	-2.4187E+03	-1.5249E+02	2.4699E+03	1.1552E+02
	3.5310E-01	-1.6676E+01	-1.0514E+00	1.7029E+01	7.9649E-01
3	2.0609E+01	-1.4240E+03	-5.2185E+01	1.4446E+03	1.2414E+02
	1.4210E-01	-9.8183E+00	-3.5980E-01	9.9604E+00	8.5592E-01
4	1.2182E+03	-7.1728E+03	-2.3016E+03	8.3910E+03	6.1093E+03
	8.3989E+00	-4.9455E+01	-1.5869E+01	5.7854E+01	4.2122E+01
5	2.0538E+02	-2.6768E+03	-1.1198E+03	2.8821E+03	4.1378E+03
	1.4161E+00	-1.8456E+01	-7.7205E+00	1.9872E+01	2.8529E+01
6	-4.6968E+02	-1.8236E+03	-9.6680E+02	1.3540E+03	7.0012E+02
	-3.2383E+00	-1.2574E+01	-6.6659E+00	9.3353E+00	4.8272E+00
7	-8.9918E+00	-1.2330E+03	-7.8126E+01	1.2240E+03	2.3341E+01
	-6.1996E-02	-8.5013E+00	-5.3866E-01	8.4393E+00	1.6093E-01
8	-5.5430E+00	-1.1787E+03	-5.5556E+01	1.1731E+03	1.1936E+00
	-3.8217E-02	-8.1267E+00	-3.8305E-01	8.0885E+00	8.2298E-03
9	-4.4839E+00	-1.1328E+03	-3.8552E+01	1.1283E+03	7.9224E-01
	-3.0916E-02	-7.8102E+00	-2.6581E-01	7.7793E+00	5.4623E-03
10	-2.2049E+02	-1.8332E+03	-1.3443E+02	1.6127E+03	9.5326E+02
	-1.5202E+00	-1.2640E+01	-9.2684E-01	1.1119E+01	6.5725E+00
11	2.8430E+02	-9.3687E+02	-6.2471E+01	1.2212E+03	4.4594E+02
	1.9602E+00	-6.4595E+00	-4.3072E-01	8.4197E+00	3.0747E+00
12	2.6789E+02	-2.6305E+02	2.0866E+02	5.3093E+02	1.0835E+03
	1.8470E+00	-1.8136E+00	1.4387E+00	3.6607E+00	7.4703E+00
13	3.5415E+02	-9.9070E+02	-5.3193E+01	1.3449E+03	9.3957E+02
	2.4418E+00	-6.8307E+00	-3.6675E-01	9.2725E+00	6.4781E+00
14	3.4823E+02	-7.8643E+02	3.2338E+01	1.1347E+03	4.9065E+02
	2.4009E+00	-5.4222E+00	2.2296E-01	7.8232E+00	3.3829E+00
15	1.1705E+03	2.5960E+02	1.8405E+02	9.1090E+02	3.2605E+01
	8.0703E+00	1.7899E+00	1.2690E+00	6.2804E+00	2.2480E-01

16	4.0554E+02	-1.2846E+03	-6.1730E+02	1.6901E+03	7.9122E+02
	2.7961E+00	-8.8569E+00	-4.2561E+00	1.1653E+01	5.4553E+00
17	6.8676E+02	-1.2322E+03	-6.9917E+02	1.9190E+03	1.6283E+03
	4.7351E+00	-8.4958E+00	-4.8206E+00	1.3231E+01	1.1227E+01
18	6.4798E+02	-1.9883E+03	-4.1939E+02	2.6363E+03	3.0310E+03
	4.4677E+00	-1.3709E+01	-2.8916E+00	1.8177E+01	2.0898E+01
19	5.6229E+02	-2.0269E+03	-7.9117E+02	2.5892E+03	1.7641E+03
	3.8769E+00	-1.3975E+01	-5.4549E+00	1.7852E+01	1.2163E+01
20	-1.3705E+02	-1.3459E+03	-8.7847E+02	1.2088E+03	1.9756E+03
	-9.4491E-01	-9.2794E+00	-6.0568E+00	8.3345E+00	1.3621E+01
21	2.3914E+02	2.5406E+00	2.4560E-01	2.3660E+02	1.4666E+01
	1.6488E+00	1.7517E-02	1.6933E-03	1.6313E+00	1.0112E-01
22	7.4884E+02	1.7533E+02	4.9447E+02	5.7351E+02	4.6979E+02
	5.1631E+00	1.2089E+00	3.4092E+00	3.9542E+00	3.2391E+00

Table 2-208. Load Case 305, 30-ft. Side Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.7426E+02	-3.3534E+02	-1.6817E+03	4.0814E+03	1.2675E+03
	1.2015E+00	-2.3121E+00	-1.1595E+01	2.8141E+01	8.7393E+00
2	1.0995E+03	-6.2733E+02	-7.9378E+02	1.0688E+03	1.0053E+03
	7.5807E+00	-4.3253E+00	-5.4730E+00	7.3694E+00	6.9316E+00
3	1.6929E+02	-3.3426E+02	-1.6856E+03	4.0770E+03	1.2626E+03
	1.1672E+00	-2.3046E+00	-1.1622E+01	2.8110E+01	8.7055E+00
4	7.8751E+02	3.0165E+01	-1.4620E+03	2.8354E+03	4.2420E+02
	5.4297E+00	2.0798E-01	-1.0080E+01	1.9549E+01	2.9248E+00
5	1.2746E+03	-1.2900E+02	-1.8284E+03	2.9649E+03	1.0169E+02
	8.7880E+00	-8.8943E-01	-1.2606E+01	2.0443E+01	7.0112E-01
6	1.2418E+03	-3.1448E+02	-1.9998E+03	2.8256E+03	1.4377E+02
	8.5618E+00	-2.1683E+00	-1.3788E+01	1.9482E+01	9.9126E-01
7	5.0746E+02	3.0222E+02	3.6789E+00	1.7076E+03	1.2651E+02
	3.4988E+00	2.0837E+00	2.5365E-02	1.1774E+01	8.7227E-01
8	4.8120E+02	2.6213E+02	2.7966E+01	9.8650E+02	1.2020E+02
	3.3178E+00	1.8073E+00	1.9282E-01	6.8017E+00	8.2874E-01
9	5.0492E+02	3.0143E+02	3.7109E+00	1.6917E+03	1.2801E+02
	3.4813E+00	2.0783E+00	2.5586E-02	1.1664E+01	8.8258E-01
10	1.4543E+03	3.5274E+00	-1.8993E+03	2.3005E+03	7.9662E+02
	1.0027E+01	2.4320E-02	-1.3095E+01	1.5861E+01	5.4925E+00
11	7.2211E+02	-3.9916E+02	-2.1962E+03	2.2318E+03	8.7841E+02
	4.9788E+00	-2.7521E+00	-1.5142E+01	1.5388E+01	6.0564E+00
12	-3.0837E+01	-2.5082E+02	-1.5917E+03	1.5609E+03	1.3327E+02
	-2.1261E-01	-1.7293E+00	-1.0975E+01	1.0762E+01	9.1884E-01
13	1.2948E+03	-1.3898E+02	-1.7355E+03	2.9212E+03	1.0044E+02
	8.9276E+00	-9.5824E-01	-1.1966E+01	2.0141E+01	6.9248E-01
14	1.0367E+03	-6.1758E+01	-1.6389E+03	2.8426E+03	4.4390E+02
	7.1479E+00	-4.2580E-01	-1.1300E+01	1.9599E+01	3.0606E+00
15	-5.4154E+01	-2.3607E+02	-1.6115E+03	1.6079E+03	3.7784E+01
	-3.7338E-01	-1.6277E+00	-1.1111E+01	1.1086E+01	2.6051E-01

16	1.7767E+02	-6.1210E+01	-1.5565E+03	2.9089E+03	1.7892E+02
	1.2250E+00	-4.2203E-01	-1.0732E+01	2.0056E+01	1.2336E+00
17	2.8150E+02	-2.5872E+02	-1.5166E+03	2.9935E+03	1.9063E+02
	1.9409E+00	-1.7838E+00	-1.0457E+01	2.0640E+01	1.3143E+00
18	8.7814E+02	-1.4789E+02	-1.6328E+03	3.1398E+03	1.5376E+02
	6.0546E+00	-1.0196E+00	-1.1258E+01	2.1648E+01	1.0602E+00
19	1.0206E+03	-1.5608E+02	-1.8239E+03	3.1265E+03	2.4334E+02
	7.0371E+00	-1.0762E+00	-1.2575E+01	2.1557E+01	1.6778E+00
20	9.0782E+02	-2.5307E+02	-1.7404E+03	2.4576E+03	1.1566E+02
	6.2592E+00	-1.7449E+00	-1.2000E+01	1.6945E+01	7.9747E-01
21	-2.0831E+01	-2.7740E+02	-1.7266E+03	1.7691E+03	1.8565E+02
	-1.4363E-01	-1.9126E+00	-1.1904E+01	1.2198E+01	1.2800E+00
22	-1.6396E+01	-2.9834E+02	-1.7839E+03	1.8250E+03	1.4507E+02
	-1.1305E-01	-2.0570E+00	-1.2300E+01	1.2583E+01	1.0002E+00

Table 2-209. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.9722E+02	-7.1919E+02	-4.9768E+03	1.2379E+04	1.9561E+03
	3.4282E+00	-4.9586E+00	-3.4314E+01	8.5350E+01	1.3487E+01
2	4.4467E+02	-1.5266E+02	-1.4031E+03	3.5792E+03	3.0487E+02
	3.0659E+00	-1.0525E+00	-9.6738E+00	2.4677E+01	2.1020E+00
3	3.1449E+03	1.2521E+02	-1.5168E+02	3.2965E+03	8.2358E+02
	2.1683E+01	8.6329E-01	-1.0458E+00	2.2729E+01	5.6784E+00
4	4.8383E+02	-2.0304E+02	-3.3069E+03	8.9938E+03	6.2219E+02
	3.3359E+00	-1.3999E+00	-2.2800E+01	6.2010E+01	4.2898E+00
5	9.5746E+02	-6.9919E+02	-4.2506E+03	5.1333E+03	2.6828E+02
	6.6015E+00	-4.8207E+00	-2.9307E+01	3.5393E+01	1.8497E+00
6	1.3806E+03	-1.3035E+03	-4.8960E+03	4.8737E+03	8.5981E+02
	9.5188E+00	-8.9872E+00	-3.3757E+01	3.3603E+01	5.9282E+00
7	1.4207E+03	1.9024E+02	-3.3322E+01	4.7292E+03	1.8224E+02
	9.7955E+00	1.3117E+00	-2.2975E-01	3.2607E+01	1.2565E+00
8	9.4579E+02	7.1215E+01	-1.2834E+02	3.4839E+03	1.0015E+02
	6.5210E+00	4.9101E-01	-8.8485E-01	2.4020E+01	6.9052E-01
9	5.6825E+02	5.7602E+01	-3.6776E+02	2.3120E+03	3.9190E+01
	3.9179E+00	3.9715E-01	-2.5356E+00	1.5941E+01	2.7020E-01
10	3.7209E+02	-1.5126E+02	-5.9917E+02	2.2137E+03	1.0160E+03
	2.5655E+00	-1.0429E+00	-4.1312E+00	1.5263E+01	7.0050E+00
11	7.7191E+02	1.8996E+02	-2.2472E+02	1.5952E+03	3.6272E+02
	5.3221E+00	1.3097E+00	-1.5494E+00	1.0998E+01	2.5009E+00
12	5.8293E+02	3.2305E+02	1.5332E+01	5.6917E+02	2.1283E+02
	4.0192E+00	2.2273E+00	1.0571E-01	3.9243E+00	1.4674E+00
13	7.0350E+02	-1.5275E+02	-5.7988E+02	1.5219E+03	5.5725E+01
	4.8504E+00	-1.0532E+00	-3.9982E+00	1.0493E+01	3.8421E-01
14	7.5225E+02	-1.5891E+02	-5.7275E+02	1.3250E+03	1.3856E+02
	5.1866E+00	-1.0956E+00	-3.9490E+00	9.1356E+00	9.5535E-01
15	2.3810E+02	-1.4254E+03	-2.4674E+03	2.8187E+03	5.5834E+01
	1.6416E+00	-9.8281E+00	-1.7012E+01	1.9434E+01	3.8496E-01

16	2.2430E+02	-2.9832E+02	-2.3098E+03	6.2097E+03	2.9290E+02
	1.5465E+00	-2.0569E+00	-1.5925E+01	4.2814E+01	2.0195E+00
17	1.6232E+02	-2.2660E+02	-2.4889E+03	6.6434E+03	3.8969E+02
	1.1192E+00	-1.5624E+00	-1.7160E+01	4.5805E+01	2.6868E+00
18	4.3990E+02	-3.3170E+02	-3.6261E+03	5.9484E+03	4.8913E+02
	3.0330E+00	-2.2870E+00	-2.5001E+01	4.1013E+01	3.3724E+00
19	7.1106E+02	-4.5006E+02	-4.1152E+03	5.2099E+03	9.6196E+02
	4.9026E+00	-3.1031E+00	-2.8373E+01	3.5921E+01	6.6324E+00
20	1.1428E+03	-8.2566E+02	-4.2300E+03	4.8575E+03	2.2568E+02
	7.8792E+00	-5.6928E+00	-2.9165E+01	3.3491E+01	1.5560E+00
21	1.7306E+02	-5.3988E+01	-2.5213E+02	4.2088E+02	5.1057E+01
	1.1932E+00	-3.7223E-01	-1.7383E+00	2.9019E+00	3.5203E-01
22	9.2758E+01	-1.7102E+03	-2.2530E+03	2.4632E+03	1.7968E+02
	6.3954E-01	-1.1791E+01	-1.5534E+01	1.6983E+01	1.2388E+00

Table 2-210. Load Case 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-050

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5059E+02	-5.7619E+02	4.5961E+02	7.2677E+02	2.7207E+02
	1.0383E+00	-3.9727E+00	3.1689E+00	5.0109E+00	1.8758E+00
2	1.0161E+01	-3.8441E+02	4.9608E+01	3.9457E+02	9.3678E+01
	7.0055E-02	-2.6504E+00	3.4203E-01	2.7205E+00	6.4589E-01
3	-8.4136E-01	-1.4568E+02	-4.1551E-01	1.4484E+02	5.3673E+00
	-5.8010E-03	-1.0044E+00	-2.8648E-03	9.9863E-01	3.7006E-02
4	1.0214E+03	-4.5549E+02	8.5825E+02	1.4769E+03	1.4714E+03
	7.0426E+00	-3.1405E+00	5.9175E+00	1.0183E+01	1.0145E+01
5	1.0667E+03	-1.0043E+03	7.0190E+02	2.0710E+03	1.9750E+03
	7.3545E+00	-6.9246E+00	4.8394E+00	1.4279E+01	1.3617E+01
6	-2.4375E+02	-1.8358E+03	2.2745E+01	1.5920E+03	6.2613E+01
	-1.6806E+00	-1.2657E+01	1.5682E-01	1.0977E+01	4.3170E-01
7	-1.9378E+00	-1.0352E+03	-2.0719E+01	1.0333E+03	1.5530E+01
	-1.3361E-02	-7.1375E+00	-1.4286E-01	7.1241E+00	1.0707E-01
8	-1.1807E+00	-5.8331E+02	-1.3324E+01	5.8213E+02	6.2556E-02
	-8.1408E-03	-4.0218E+00	-9.1863E-02	4.0136E+00	4.3131E-04
9	-3.0853E-01	-3.0830E+02	-1.1509E+01	3.0799E+02	3.6978E+00
	-2.1272E-03	-2.1256E+00	-7.9355E-02	2.1235E+00	2.5495E-02
10	-3.5905E+00	-1.7857E+02	1.2412E+02	1.7498E+02	2.8005E+02
	-2.4756E-02	-1.2312E+00	8.5575E-01	1.2065E+00	1.9309E+00
11	1.4029E+02	-1.5601E+02	8.4072E+01	2.9631E+02	3.1162E+01
	9.6728E-01	-1.0757E+00	5.7966E-01	2.0430E+00	2.1486E-01
12	1.0665E+02	-2.7197E+02	8.9264E+01	3.7862E+02	5.7001E+02
	7.3530E-01	-1.8752E+00	6.1545E-01	2.6105E+00	3.9301E+00
13	3.9885E+02	-2.1905E+01	1.5807E+02	4.2076E+02	4.4686E+02
	2.7500E+00	-1.5103E-01	1.0898E+00	2.9010E+00	3.0810E+00
14	4.3090E+02	-3.7056E+01	1.8449E+02	4.6795E+02	3.4451E+02
	2.9709E+00	-2.5549E-01	1.2720E+00	3.2264E+00	2.3753E+00
15	-7.4413E+03	-3.6305E+04	-3.4619E+03	2.8863E+04	9.1774E+02
	-5.1306E+01	-2.5031E+02	-2.3869E+01	1.9901E+02	6.3276E+00

16	1.7983E+03	-3.6317E+03	6.1164E+00	5.4300E+03	6.8714E+03
	1.2399E+01	-2.5040E+01	4.2171E-02	3.7439E+01	4.7376E+01
17	-7.5775E+02	-3.8943E+03	1.9867E+01	3.1365E+03	4.6503E+03
	-5.2245E+00	-2.6850E+01	1.3698E-01	2.1626E+01	3.2063E+01
18	-2.3591E+02	-1.8719E+03	-3.4718E+02	1.6359E+03	1.9733E+02
	-1.6265E+00	-1.2906E+01	-2.3938E+00	1.1279E+01	1.3606E+00
19	8.2950E+02	-9.9622E+02	1.5234E+01	1.8257E+03	2.0568E+03
	5.7192E+00	-6.8687E+00	1.0503E-01	1.2588E+01	1.4181E+01
20	1.2243E+03	-1.0885E+03	-2.0862E+02	2.3129E+03	3.0121E+03
	8.4414E+00	-7.5052E+00	-1.4384E+00	1.5947E+01	2.0768E+01
21	4.0249E+01	-1.6387E+02	-5.2979E+01	2.0412E+02	2.8952E+02
	2.7751E-01	-1.1299E+00	-3.6527E-01	1.4074E+00	1.9961E+00
22	-2.5486E+03	-1.1313E+04	-3.5071E+03	8.7639E+03	6.2192E+01
	-1.7572E+01	-7.7997E+01	-2.4181E+01	6.0425E+01	4.2880E-01

Table 2-211. Load Combination 301, Head-On Orientation, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 301, 102, 201, 211
30-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	4.36	2.98	7.34	20.00	66.30	8.04
	30.04	20.54	50.58	137.90	457.12	
2	1.84	0.14	1.98	20.00	66.30	>10
	12.71	0.94	13.65	137.90	457.12	
3	1.07	0.10	1.17	20.00	66.30	>10
	7.38	0.71	8.09	137.90	457.12	
4	7.71	7.06	14.76	20.00	66.30	3.49
	53.13	48.67	101.80	137.90	457.12	
5	3.71	5.49	9.20	20.00	66.30	6.21
	25.56	37.86	63.42	137.90	457.12	
6	1.58	1.52	3.10	20.00	66.30	>10
	10.89	10.48	21.36	137.90	457.12	
7	1.22	0.02	1.23	20.00	66.30	>10
	8.38	0.12	8.51	137.90	457.12	
8	1.18	0.00	1.18	20.00	66.30	>10
	8.13	0.01	8.14	137.90	457.12	
9	1.15	0.00	1.15	20.00	66.30	>10
	7.91	0.02	7.93	137.90	457.12	
10	1.65	0.90	2.55	20.00	66.30	>10
	11.37	6.19	17.55	137.90	457.12	
11	1.14	0.48	1.62	20.00	66.30	>10
	7.88	3.33	11.20	137.90	457.12	
12	0.61	0.89	1.50	20.00	66.30	>10
	4.23	6.11	10.34	137.90	457.12	
13	1.78	1.57	3.35	20.00	66.30	>10
	12.30	10.80	23.10	137.90	457.12	

14	1.62	1.00	2.62	20.00	66.30	>10
	11.19	6.87	18.06	137.90	457.12	
15	2.01	0.67	2.68	20.00	66.30	>10
	13.83	4.63	18.45	137.90	457.12	
16	1.57	1.03	2.61	20.00	66.30	>10
	10.83	7.13	17.96	137.90	457.12	
17	1.65	1.51	3.17	20.00	66.30	>10
	11.41	10.43	21.83	137.90	457.12	
18	2.40	2.98	5.38	20.00	66.30	>10
	16.52	20.55	37.07	137.90	457.12	
19	2.59	2.23	4.82	20.00	66.30	>10
	17.89	15.35	33.24	137.90	457.12	
20	1.60	2.42	4.02	20.00	66.30	>10
	11.00	16.71	27.71	137.90	457.12	
21	0.34	0.30	0.63	20.00	66.30	>10
	2.33	2.05	4.37	137.90	457.12	
22	1.13	0.70	1.83	20.00	66.30	>10
	7.80	4.80	12.60	137.90	457.12	

Min MS: 3.491, Location: 4, Combination: Pm+Pb

Table 2-212. Load Combination 302, Side Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 302, 102, 201, 211
30-ft. Side Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	4.09	2.60	6.69	20.00	66.30	8.92
	28.17	17.93	46.10	137.90	457.12	
2	0.84	0.77	1.60	20.00	66.30	>10
	5.76	5.28	11.04	137.90	457.12	
3	2.92	0.91	3.83	20.00	66.30	>10
	20.16	6.26	26.42	137.90	457.12	
4	3.72	2.99	6.71	20.00	66.30	8.88
	25.62	20.63	46.25	137.90	457.12	
5	3.75	2.61	6.35	20.00	66.30	9.44
	25.82	17.96	43.79	137.90	457.12	
6	2.61	1.12	3.73	20.00	66.30	>10
	17.99	7.73	25.72	137.90	457.12	
7	1.54	0.09	1.63	20.00	66.30	>10
	10.64	0.62	11.26	137.90	457.12	
8	1.03	0.08	1.11	20.00	66.30	>10
	7.10	0.58	7.68	137.90	457.12	
9	1.53	0.09	1.63	20.00	66.30	>10
	10.57	0.63	11.21	137.90	457.12	
10	2.12	0.78	2.90	20.00	66.30	>10
	14.61	5.37	19.98	137.90	457.12	
11	1.85	0.78	2.63	20.00	66.30	>10
	12.73	5.39	18.12	137.90	457.12	
12	1.33	0.20	1.54	20.00	66.30	>10
	9.20	1.41	10.60	137.90	457.12	
13	2.89	0.96	3.85	20.00	66.30	>10
	19.90	6.64	26.55	137.90	457.12	

14	2.82	0.96	3.78	20.00	66.30	>10
	19.46	6.61	26.07	137.90	457.12	
15	2.49	0.67	3.17	20.00	66.30	>10
	17.18	4.65	21.82	137.90	457.12	
16	2.42	0.60	3.02	20.00	66.30	>10
	16.70	4.11	20.81	137.90	457.12	
17	2.40	0.48	2.89	20.00	66.30	>10
	16.56	3.33	19.90	137.90	457.12	
18	2.73	0.92	3.66	20.00	66.30	>10
	18.86	6.37	25.22	137.90	457.12	
19	2.96	1.14	4.09	20.00	66.30	>10
	20.39	7.84	28.23	137.90	457.12	
20	2.47	1.09	3.56	20.00	66.30	>10
	17.03	7.53	24.56	137.90	457.12	
21	1.42	0.42	1.84	20.00	66.30	>10
	9.81	2.89	12.70	137.90	457.12	
22	2.01	0.46	2.47	20.00	66.30	>10
	13.87	3.19	17.06	137.90	457.12	

Min MS: 8.885, Location: 4, Combination: Pm+Pb

Table 2-213. Load Combination 303, Cg/Corner Orientation, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 303, 102, 201, 211
30-ft. Cg/Corner Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	10.75	4.31	15.06	20.00	66.30	3.32
	74.10	29.73	103.83	137.90	457.12	
2	2.81	0.37	3.18	20.00	66.30	>10
	19.38	2.53	21.91	137.90	457.12	
3	2.56	0.63	3.19	20.00	66.30	>10
	17.67	4.32	21.99	137.90	457.12	
4	9.19	3.18	12.37	20.00	66.30	4.05
	63.36	21.95	85.31	137.90	457.12	
5	5.92	2.78	8.70	20.00	66.30	6.62
	40.81	19.16	59.96	137.90	457.12	
6	4.59	1.74	6.33	20.00	66.30	9.12
	31.62	12.02	43.64	137.90	457.12	
7	3.96	0.15	4.11	20.00	66.30	>10
	27.32	1.04	28.36	137.90	457.12	
8	3.00	0.09	3.09	20.00	66.30	>10
	20.70	0.59	21.29	137.90	457.12	
9	2.09	0.04	2.12	20.00	66.30	>10
	14.39	0.25	14.64	137.90	457.12	
10	2.12	0.95	3.07	20.00	66.30	>10
	14.63	6.56	21.19	137.90	457.12	
11	1.44	0.43	1.87	20.00	66.30	>10
	9.91	2.99	12.91	137.90	457.12	
12	0.64	0.26	0.90	20.00	66.30	>10
	4.39	1.83	6.22	137.90	457.12	
13	1.97	0.93	2.90	20.00	66.30	>10
	13.57	6.43	20.00	137.90	457.12	

14	1.80	0.75	2.54	20.00	66.30	>10
	12.38	5.14	17.52	137.90	457.12	
15	3.87	0.72	4.59	20.00	66.30	>10
	26.69	4.97	31.67	137.90	457.12	
16	6.79	0.68	7.47	20.00	66.30	5.83
	46.85	4.66	51.51	137.90	457.12	
17	6.52	0.69	7.20	20.00	66.30	6.12
	44.93	4.74	49.68	137.90	457.12	
18	5.47	1.22	6.68	20.00	66.30	7.49
	37.70	8.38	46.09	137.90	457.12	
19	5.07	1.75	6.82	20.00	66.30	8.15
	34.97	12.08	47.05	137.90	457.12	
20	4.76	1.17	5.93	20.00	66.30	8.75
	32.81	8.08	40.88	137.90	457.12	
21	0.43	0.32	0.75	20.00	66.30	>10
	2.97	2.23	5.20	137.90	457.12	
22	3.48	0.63	4.11	20.00	66.30	>10
	23.99	4.34	28.33	137.90	457.12	

Min MS: 3.318, Location: 1, Combination: Pm

Table 2-214. Load Combination 304, Head-On Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 304, 105, 202, 211
30-ft. Head-On Drop at -40°F
-40°F Ambient, Maximum Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	5.61	3.49	9.10	20.00	70.00	6.69
	38.71	24.05	62.76	137.90	482.63	
2	2.54	0.17	2.71	20.00	70.00	>10
	17.54	1.16	18.70	137.90	482.63	
3	1.48	0.14	1.61	20.00	70.00	>10
	10.18	0.94	11.12	137.90	482.63	
4	9.88	8.46	18.34	20.00	70.00	2.82
	68.10	58.32	126.42	137.90	482.63	
5	4.39	6.44	10.83	20.00	70.00	5.46
	30.27	44.44	74.70	137.90	482.63	
6	1.93	1.70	3.63	20.00	70.00	>10
	13.30	11.73	25.03	137.90	482.63	
7	1.55	0.02	1.58	20.00	70.00	>10
	10.71	0.17	10.88	137.90	482.63	
8	1.50	0.00	1.50	20.00	70.00	>10
	10.36	0.01	10.37	137.90	482.63	
9	1.46	0.00	1.46	20.00	70.00	>10
	10.05	0.01	10.06	137.90	482.63	
10	1.99	1.04	3.03	20.00	70.00	>10
	13.69	7.19	20.88	137.90	482.63	
11	1.42	0.58	2.00	20.00	70.00	>10
	9.81	4.00	13.81	137.90	482.63	
12	0.65	1.18	1.83	20.00	70.00	>10
	4.50	8.13	12.63	137.90	482.63	
13	2.05	1.74	3.79	20.00	70.00	>10
	14.14	11.97	26.12	137.90	482.63	

14	1.85	1.03	2.88	20.00	70.00	>10
	12.73	7.13	19.85	137.90	482.63	
15	1.88	0.24	2.13	20.00	70.00	>10
	12.99	1.68	14.68	137.90	482.63	
16	1.80	0.91	2.71	20.00	70.00	>10
	12.42	6.26	18.69	137.90	482.63	
17	2.02	1.74	3.76	20.00	70.00	>10
	13.94	11.97	25.91	137.90	482.63	
18	2.92	3.52	6.44	20.00	70.00	9.87
	20.15	24.27	44.42	137.90	482.63	
19	2.98	2.18	5.15	20.00	70.00	>10
	20.51	15.01	35.53	137.90	482.63	
20	1.68	2.52	4.20	20.00	70.00	>10
	11.60	17.36	28.97	137.90	482.63	
21	0.34	0.23	0.56	20.00	70.00	>10
	2.32	1.55	3.88	137.90	482.63	
22	1.16	0.74	1.90	20.00	70.00	>10
	8.00	5.08	13.08	137.90	482.63	

Min MS: 2.818, Location: 4, Combination: Pm+Pb

Table 2-215. Load Combination 305, Side Drop Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 305, 105, 202, 211
30-ft. Side Drop at -40°F
-40°F Ambient, Maximum Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	5.27	2.97	8.24	20.00	70.00	7.50
	36.35	20.46	56.81	137.90	482.63	
2	1.14	1.06	2.20	20.00	70.00	>10
	7.88	7.30	15.17	137.90	482.63	
3	4.11	1.27	5.38	20.00	70.00	>10
	28.33	8.79	37.12	137.90	482.63	
4	4.32	2.77	7.09	20.00	70.00	8.87
	29.79	19.13	48.92	137.90	482.63	
5	4.47	2.41	6.88	20.00	70.00	9.17
	30.84	16.61	47.45	137.90	482.63	
6	3.40	1.15	4.55	20.00	70.00	>10
	23.45	7.90	31.34	137.90	482.63	
7	2.04	0.13	2.16	20.00	70.00	>10
	14.05	0.88	14.92	137.90	482.63	
8	1.32	0.12	1.44	20.00	70.00	>10
	9.07	0.83	9.91	137.90	482.63	
9	2.02	0.13	2.15	20.00	70.00	>10
	13.94	0.89	14.83	137.90	482.63	
10	2.67	0.89	3.56	20.00	70.00	>10
	18.43	6.11	24.54	137.90	482.63	
11	2.43	1.01	3.45	20.00	70.00	>10
	16.77	6.99	23.76	137.90	482.63	
12	1.68	0.23	1.91	20.00	70.00	>10
	11.60	1.58	13.18	137.90	482.63	
13	3.63	0.90	4.52	20.00	70.00	>10
	25.01	6.18	31.20	137.90	482.63	

14	3.55	0.99	4.54	20.00	70.00	>10
	24.50	6.80	31.31	137.90	482.63	
15	2.58	0.25	2.83	20.00	70.00	>10
	17.80	1.72	19.52	137.90	482.63	
16	3.02	0.30	3.32	20.00	70.00	>10
	20.83	2.04	22.87	137.90	482.63	
17	3.10	0.30	3.40	20.00	70.00	>10
	21.35	2.06	23.41	137.90	482.63	
18	3.43	0.64	4.07	20.00	70.00	>10
	23.63	4.43	28.05	137.90	482.63	
19	3.51	0.66	4.17	20.00	70.00	>10
	24.22	4.53	28.74	137.90	482.63	
20	2.93	0.66	3.59	20.00	70.00	>10
	20.21	4.54	24.75	137.90	482.63	
21	1.87	0.40	2.27	20.00	70.00	>10
	12.89	2.73	15.62	137.90	482.63	
22	2.41	0.41	2.82	20.00	70.00	>10
	16.62	2.84	19.47	137.90	482.63	

Min MS: 7.495, Location: 1, Combination: Pm+Pb

Table 2-216. Load Combination 306, Cg/Corner Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 306, 105, 202, 211
30-ft. Cg/Corner Drop at -40°F
-40°F Ambient, Maximum Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	13.57	3.66	17.23	20.00	70.00	2.54
	93.56	25.21	118.77	137.90	482.63	
2	3.65	0.36	4.01	20.00	70.00	>10
	25.18	2.47	27.65	137.90	482.63	
3	3.33	0.84	4.16	20.00	70.00	>10
	22.95	5.76	28.71	137.90	482.63	
4	10.48	2.97	13.45	20.00	70.00	3.58
	72.25	20.49	92.74	137.90	482.63	
5	6.64	2.58	9.22	20.00	70.00	6.23
	45.79	17.76	63.54	137.90	482.63	
6	5.45	1.86	7.31	20.00	70.00	7.81
	37.57	12.83	50.40	137.90	482.63	
7	5.06	0.18	5.24	20.00	70.00	8.49
	34.88	1.26	36.14	137.90	482.63	
8	3.81	0.10	3.91	20.00	70.00	>10
	26.29	0.69	26.99	137.90	482.63	
9	2.64	0.04	2.68	20.00	70.00	>10
	18.21	0.28	18.49	137.90	482.63	
10	2.59	1.11	3.69	20.00	70.00	>10
	17.83	7.63	25.46	137.90	482.63	
11	1.80	0.50	2.29	20.00	70.00	>10
	12.38	3.43	15.81	137.90	482.63	
12	0.69	0.31	1.00	20.00	70.00	>10
	4.76	2.12	6.89	137.90	482.63	
13	2.23	0.85	3.08	20.00	70.00	>10
	15.36	5.88	21.24	137.90	482.63	

14	2.04	0.68	2.72	20.00	70.00	>10
	14.04	4.70	18.74	137.90	482.63	
15	3.79	0.27	4.06	20.00	70.00	>10
	26.15	1.84	27.99	137.90	482.63	
16	6.32	0.41	6.73	20.00	70.00	6.59
	43.59	2.83	46.41	137.90	482.63	
17	6.75	0.50	7.24	20.00	70.00	6.12
	46.51	3.43	49.95	137.90	482.63	
18	6.24	0.98	7.21	20.00	70.00	6.70
	42.99	6.74	49.73	137.90	482.63	
19	5.60	1.38	6.97	20.00	70.00	7.58
	38.58	9.48	48.06	137.90	482.63	
20	5.33	0.77	6.10	20.00	70.00	8.00
	36.76	5.30	42.06	137.90	482.63	
21	0.52	0.26	0.78	20.00	70.00	>10
	3.59	1.80	5.40	137.90	482.63	
22	3.05	0.45	3.50	20.00	70.00	>10
	21.02	3.08	24.10	137.90	482.63	

Min MS: 2.537, Location: 1, Combination: Pm

Table 2-217. Load Combination 310, Additional Increase Evaluation Pressure, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 204, 101, 211
Additional Increased External Pressure, 2 MPa (290 psia)
100°F Ambient, Maximum Decay Heat
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.30	1.70	3.00	20.00	70.00	>10
	8.98	11.74	20.71	137.90	482.63	
2	0.19	0.06	0.25	20.00	70.00	>10
	1.33	0.40	1.73	137.90	482.63	
3	0.15	0.06	0.22	20.00	70.00	>10
	1.07	0.43	1.50	137.90	482.63	
4	6.40	10.98	17.38	20.00	70.00	3.03
	44.11	75.70	119.81	137.90	482.63	
5	6.16	9.39	15.55	20.00	70.00	3.50
	42.46	64.77	107.23	137.90	482.63	
6	2.26	3.81	6.07	20.00	70.00	>10
	15.59	26.25	41.84	137.90	482.63	
7	1.51	0.01	1.52	20.00	70.00	>10
	10.39	0.08	10.47	137.90	482.63	
8	1.51	0.00	1.51	20.00	70.00	>10
	10.39	0.01	10.40	137.90	482.63	
9	1.51	0.02	1.52	20.00	70.00	>10
	10.38	0.13	10.51	137.90	482.63	
10	1.42	0.78	2.20	20.00	70.00	>10
	9.82	5.37	15.19	137.90	482.63	
11	0.86	0.49	1.35	20.00	70.00	>10
	5.96	3.37	9.33	137.90	482.63	
12	1.47	2.40	3.87	20.00	70.00	>10
	10.16	16.53	26.69	137.90	482.63	
13	1.74	2.04	3.78	20.00	70.00	>10
	11.99	14.06	26.05	137.90	482.63	

14	1.50	0.89	2.38	20.00	70.00	>10
	10.31	6.11	16.42	137.90	482.63	
15	5.55	0.29	5.85	20.00	70.00	7.64
	38.30	2.02	40.31	137.90	482.63	
16	0.68	0.85	1.54	20.00	70.00	>10
	4.71	5.88	10.59	137.90	482.63	
17	0.53	0.88	1.41	20.00	70.00	>10
	3.68	6.07	9.74	137.90	482.63	
18	0.90	1.60	2.50	20.00	70.00	>10
	6.24	11.00	17.24	137.90	482.63	
19	1.22	1.26	2.48	20.00	70.00	>10
	8.42	8.65	17.07	137.90	482.63	
20	1.50	1.35	2.84	20.00	70.00	>10
	10.32	9.30	19.62	137.90	482.63	
21	1.78	1.47	3.25	20.00	70.00	>10
	12.26	10.13	22.39	137.90	482.63	
22	2.08	0.54	2.62	20.00	70.00	>10
	14.31	3.76	18.06	137.90	482.63	

Min MS: 3.028, Location: 4, Combination: Pm+Pb

Table 2-218. Load Combination 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 311, 101, 201, 211
4-ft. Drop onto Rod
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.92	1.97	3.89	20.00	70.00	>10
	13.24	13.61	26.85	137.90	482.63	
2	0.47	0.15	0.62	20.00	70.00	>10
	3.25	1.01	4.27	137.90	482.63	
3	0.18	0.02	0.20	20.00	70.00	>10
	1.24	0.13	1.37	137.90	482.63	
4	3.18	4.16	7.35	20.00	70.00	8.53
	21.96	28.70	50.66	137.90	482.63	
5	3.72	4.51	8.23	20.00	70.00	7.51
	25.64	31.08	56.72	137.90	482.63	
6	2.20	1.08	3.28	20.00	70.00	>10
	15.19	7.46	22.65	137.90	482.63	
7	1.37	0.02	1.39	20.00	70.00	>10
	9.47	0.12	9.59	137.90	482.63	
8	0.92	0.00	0.92	20.00	70.00	>10
	6.36	0.00	6.36	137.90	482.63	
9	0.65	0.01	0.65	20.00	70.00	>10
	4.47	0.04	4.51	137.90	482.63	
10	0.67	0.49	1.16	20.00	70.00	>10
	4.60	3.41	8.01	137.90	482.63	
11	0.56	0.19	0.76	20.00	70.00	>10
	3.89	1.34	5.23	137.90	482.63	
12	0.61	0.68	1.29	20.00	70.00	>10
	4.22	4.69	8.91	137.90	482.63	

13	1.24	1.34	2.58	20.00	70.00	>10
	8.55	9.24	17.79	137.90	482.63	
14	1.28	0.99	2.27	20.00	70.00	>10
	8.81	6.82	15.63	137.90	482.63	
15	30.22	1.57	31.78	20.00	70.00	0.59
	208.34	10.79	219.13	137.90	482.63	
16	5.79	7.34	13.13	20.00	70.00	4.33
	39.94	50.61	90.56	137.90	482.63	
17	3.42	5.00	8.42	20.00	70.00	7.31
	23.58	34.47	58.04	137.90	482.63	
18	2.15	1.01	3.16	20.00	70.00	>10
	14.81	6.98	21.79	137.90	482.63	
19	2.57	3.02	5.59	20.00	70.00	>10
	17.72	20.84	38.55	137.90	482.63	
20	3.04	4.02	7.07	20.00	70.00	8.90
	20.99	27.74	48.73	137.90	482.63	
21	0.38	0.58	0.95	20.00	70.00	>10
	2.60	3.98	6.58	137.90	482.63	
22	9.48	0.42	9.91	20.00	70.00	4.06
	65.40	2.91	68.31	137.90	482.63	

Min MS: 0.588, Location: 15, Combination: Pm

Table 2-219. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 311, 104, 201, 211
4-ft. Drop onto Rod
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.92	1.97	3.89	20.00	70.00	>10
	13.24	13.61	26.85	137.90	482.63	
2	0.47	0.15	0.62	20.00	70.00	>10
	3.25	1.01	4.27	137.90	482.63	
3	0.18	0.02	0.20	20.00	70.00	>10
	1.24	0.13	1.37	137.90	482.63	
4	3.18	4.16	7.35	20.00	70.00	8.53
	21.96	28.70	50.66	137.90	482.63	
5	3.72	4.51	8.23	20.00	70.00	7.51
	25.64	31.08	56.72	137.90	482.63	
6	2.20	1.08	3.28	20.00	70.00	>10
	15.19	7.46	22.65	137.90	482.63	
7	1.37	0.02	1.39	20.00	70.00	>10
	9.47	0.12	9.59	137.90	482.63	
8	0.92	0.00	0.92	20.00	70.00	>10
	6.36	0.00	6.36	137.90	482.63	
9	0.65	0.01	0.65	20.00	70.00	>10
	4.47	0.04	4.51	137.90	482.63	
10	0.67	0.49	1.16	20.00	70.00	>10
	4.60	3.41	8.01	137.90	482.63	
11	0.56	0.19	0.76	20.00	70.00	>10
	3.89	1.34	5.23	137.90	482.63	
12	0.61	0.68	1.29	20.00	70.00	>10
	4.22	4.69	8.91	137.90	482.63	

13	1.24	1.34	2.58	20.00	70.00	>10
	8.55	9.24	17.79	137.90	482.63	
14	1.28	0.99	2.27	20.00	70.00	>10
	8.81	6.82	15.63	137.90	482.63	
15	30.22	1.57	31.78	20.00	70.00	0.59
	208.34	10.79	219.13	137.90	482.63	
16	5.79	7.34	13.13	20.00	70.00	4.33
	39.94	50.61	90.56	137.90	482.63	
17	3.42	5.00	8.42	20.00	70.00	7.31
	23.58	34.47	58.04	137.90	482.63	
18	2.15	1.01	3.16	20.00	70.00	>10
	14.81	6.98	21.79	137.90	482.63	
19	2.57	3.02	5.59	20.00	70.00	>10
	17.72	20.84	38.55	137.90	482.63	
20	3.04	4.02	7.07	20.00	70.00	8.90
	20.99	27.74	48.73	137.90	482.63	
21	0.38	0.58	0.95	20.00	70.00	>10
	2.60	3.98	6.58	137.90	482.63	
22	9.48	0.42	9.91	20.00	70.00	4.06
	65.40	2.91	68.31	137.90	482.63	

Min MS: 0.588, Location: 15, Combination: Pm

Table 2-220. Load Combination 350, Fire at 30 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 111, 201, 211
Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.19	1.70	2.90	20.00	61.80	>10
	8.23	11.73	19.97	137.90	426.10	
2	0.08	0.05	0.13	17.40	59.20	>10
	0.53	0.37	0.90	119.97	408.17	
3	0.04	0.01	0.05	20.00	61.80	>10
	0.24	0.09	0.33	137.90	426.10	
4	1.71	2.69	4.40	20.00	61.80	>10
	11.78	18.56	30.33	137.90	426.10	
5	1.65	2.53	4.18	20.00	61.80	>10
	11.36	17.47	28.83	137.90	426.10	
6	0.61	1.02	1.63	20.00	61.80	>10
	4.21	7.03	11.24	137.90	426.10	
7	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.01	2.36	128.93	411.62	
8	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.00	2.35	128.93	411.62	
9	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.01	2.36	128.93	411.62	
10	0.49	0.21	0.71	20.00	61.80	>10
	3.40	1.48	4.88	137.90	426.10	
11	0.27	0.16	0.43	20.00	61.80	>10
	1.85	1.12	2.97	137.90	426.10	
12	0.23	0.11	0.34	20.00	61.80	>10
	1.61	0.76	2.37	137.90	426.10	
13	0.82	0.89	1.71	20.00	61.80	>10
	5.65	6.15	11.81	137.90	426.10	

14	0.81	0.64	1.45	20.00	61.80	>10
	5.58	4.45	10.03	137.90	426.10	
15	1.35	0.65	2.00	20.00	66.30	>10
	9.34	4.46	13.80	137.90	457.12	
16	0.36	0.47	0.83	20.00	66.30	>10
	2.51	3.23	5.74	137.90	457.12	
17	0.28	0.35	0.63	20.00	66.30	>10
	1.95	2.40	4.36	137.90	457.12	
18	0.51	0.81	1.33	20.00	66.30	>10
	3.53	5.62	9.15	137.90	457.12	
19	0.74	0.97	1.71	20.00	66.30	>10
	5.13	6.65	11.78	137.90	457.12	
20	0.73	1.01	1.74	20.00	61.80	>10
	5.04	6.97	12.01	137.90	426.10	
21	0.17	0.29	0.46	20.00	66.30	>10
	1.19	1.98	3.17	137.90	457.12	
22	0.72	0.36	1.08	20.00	66.30	>10
	4.97	2.48	7.46	137.90	457.12	

Min MS: 13.046, Location: 4, Combination: Pm+Pb

Table 2-221. Load Combination 351, Fire at 60 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 112, 201, 211
Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.19	1.70	2.90	20.00	61.80	>10
	8.23	11.73	19.97	137.90	426.10	
2	0.08	0.05	0.13	18.70	59.70	>10
	0.53	0.37	0.90	128.93	411.62	
3	0.04	0.01	0.05	20.00	61.80	>10
	0.24	0.09	0.33	137.90	426.10	
4	1.71	2.69	4.40	20.00	61.80	>10
	11.78	18.56	30.33	137.90	426.10	
5	1.65	2.53	4.18	20.00	61.80	>10
	11.36	17.47	28.83	137.90	426.10	
6	0.61	1.02	1.63	20.00	61.80	>10
	4.21	7.03	11.24	137.90	426.10	
7	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.01	2.36	128.93	411.62	
8	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.00	2.35	128.93	411.62	
9	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.01	2.36	128.93	411.62	
10	0.49	0.21	0.71	18.70	59.70	>10
	3.40	1.48	4.88	128.93	411.62	
11	0.27	0.16	0.43	20.00	61.80	>10
	1.85	1.12	2.97	137.90	426.10	
12	0.23	0.11	0.34	20.00	61.80	>10
	1.61	0.76	2.37	137.90	426.10	
13	0.82	0.89	1.71	20.00	61.80	>10
	5.65	6.15	11.81	137.90	426.10	

14	0.81	0.64	1.45	20.00	61.80	>10
	5.58	4.45	10.03	137.90	426.10	
15	1.35	0.65	2.00	20.00	61.80	>10
	9.34	4.46	13.80	137.90	426.10	
16	0.36	0.47	0.83	20.00	61.80	>10
	2.51	3.23	5.74	137.90	426.10	
17	0.28	0.35	0.63	20.00	61.80	>10
	1.95	2.40	4.36	137.90	426.10	
18	0.51	0.81	1.33	20.00	61.80	>10
	3.53	5.62	9.15	137.90	426.10	
19	0.74	0.97	1.71	20.00	61.80	>10
	5.13	6.65	11.78	137.90	426.10	
20	0.73	1.01	1.74	20.00	61.80	>10
	5.04	6.97	12.01	137.90	426.10	
21	0.17	0.29	0.46	20.00	61.80	>10
	1.19	1.98	3.17	137.90	426.10	
22	0.72	0.36	1.08	20.00	61.80	>10
	4.97	2.48	7.46	137.90	426.10	

Min MS: 13.046, Location: 4, Combination: Pm+Pb

Table 2-222. Load Combination 352, Fire at 90 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 113, 201, 211
Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.19	1.70	2.90	20.00	61.80	>10
	8.23	11.73	19.97	137.90	426.10	
2	0.08	0.05	0.13	20.00	61.80	>10
	0.53	0.37	0.90	137.90	426.10	
3	0.04	0.01	0.05	20.00	61.80	>10
	0.24	0.09	0.33	137.90	426.10	
4	1.71	2.69	4.40	20.00	61.80	>10
	11.78	18.56	30.33	137.90	426.10	
5	1.65	2.53	4.18	20.00	61.80	>10
	11.36	17.47	28.83	137.90	426.10	
6	0.61	1.02	1.63	20.00	61.80	>10
	4.21	7.03	11.24	137.90	426.10	
7	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.01	2.36	128.93	411.62	
8	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.00	2.35	128.93	411.62	
9	0.34	0.00	0.34	18.70	59.70	>10
	2.35	0.01	2.36	128.93	411.62	
10	0.49	0.21	0.71	20.00	61.80	>10
	3.40	1.48	4.88	137.90	426.10	
11	0.27	0.16	0.43	20.00	61.80	>10
	1.85	1.12	2.97	137.90	426.10	
12	0.23	0.11	0.34	20.00	61.80	>10
	1.61	0.76	2.37	137.90	426.10	
13	0.82	0.89	1.71	20.00	61.80	>10
	5.65	6.15	11.81	137.90	426.10	

14	0.81	0.64	1.45	20.00	61.80	>10
	5.58	4.45	10.03	137.90	426.10	
15	1.35	0.65	2.00	20.00	61.80	>10
	9.34	4.46	13.80	137.90	426.10	
16	0.36	0.47	0.83	20.00	61.80	>10
	2.51	3.23	5.74	137.90	426.10	
17	0.28	0.35	0.63	20.00	61.80	>10
	1.95	2.40	4.36	137.90	426.10	
18	0.51	0.81	1.33	20.00	61.80	>10
	3.53	5.62	9.15	137.90	426.10	
19	0.74	0.97	1.71	20.00	61.80	>10
	5.13	6.65	11.78	137.90	426.10	
20	0.73	1.01	1.74	20.00	61.80	>10
	5.04	6.97	12.01	137.90	426.10	
21	0.17	0.29	0.46	20.00	61.80	>10
	1.19	1.98	3.17	137.90	426.10	
22	0.72	0.36	1.08	20.00	61.80	>10
	4.97	2.48	7.46	137.90	426.10	

Min MS: 13.046, Location: 4, Combination: Pm+Pb

Table 2-223. Load Combination 353, Fire at 120 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 114, 201, 211
Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.19	1.70	2.90	20.00	61.80	>10
	8.23	11.73	19.97	137.90	426.10	
2	0.08	0.05	0.13	20.00	61.80	>10
	0.53	0.37	0.90	137.90	426.10	
3	0.04	0.01	0.05	20.00	61.80	>10
	0.24	0.09	0.33	137.90	426.10	
4	1.71	2.69	4.40	20.00	61.80	>10
	11.78	18.56	30.33	137.90	426.10	
5	1.65	2.53	4.18	20.00	61.80	>10
	11.36	17.47	28.83	137.90	426.10	
6	0.61	1.02	1.63	20.00	61.80	>10
	4.21	7.03	11.24	137.90	426.10	
7	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.01	2.36	137.90	426.10	
8	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.00	2.35	137.90	426.10	
9	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.01	2.36	137.90	426.10	
10	0.49	0.21	0.71	20.00	61.80	>10
	3.40	1.48	4.88	137.90	426.10	
11	0.27	0.16	0.43	20.00	61.80	>10
	1.85	1.12	2.97	137.90	426.10	
12	0.23	0.11	0.34	20.00	61.80	>10
	1.61	0.76	2.37	137.90	426.10	
13	0.82	0.89	1.71	20.00	61.80	>10
	5.65	6.15	11.81	137.90	426.10	

14	0.81	0.64	1.45	20.00	61.80	>10
	5.58	4.45	10.03	137.90	426.10	
15	1.35	0.65	2.00	20.00	61.80	>10
	9.34	4.46	13.80	137.90	426.10	
16	0.36	0.47	0.83	20.00	61.80	>10
	2.51	3.23	5.74	137.90	426.10	
17	0.28	0.35	0.63	20.00	61.80	>10
	1.95	2.40	4.36	137.90	426.10	
18	0.51	0.81	1.33	20.00	61.80	>10
	3.53	5.62	9.15	137.90	426.10	
19	0.74	0.97	1.71	20.00	61.80	>10
	5.13	6.65	11.78	137.90	426.10	
20	0.73	1.01	1.74	20.00	61.80	>10
	5.04	6.97	12.01	137.90	426.10	
21	0.17	0.29	0.46	20.00	61.80	>10
	1.19	1.98	3.17	137.90	426.10	
22	0.72	0.36	1.08	20.00	61.80	>10
	4.97	2.48	7.46	137.90	426.10	

Min MS: 13.046, Location: 4, Combination: Pm+Pb

Table 2-224. Load Combination 354, Fire at 150 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 115, 201, 211
Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.19	1.70	2.90	20.00	61.80	>10
	8.23	11.73	19.97	137.90	426.10	
2	0.08	0.05	0.13	20.00	61.80	>10
	0.53	0.37	0.90	137.90	426.10	
3	0.04	0.01	0.05	20.00	61.80	>10
	0.24	0.09	0.33	137.90	426.10	
4	1.71	2.69	4.40	20.00	61.80	>10
	11.78	18.56	30.33	137.90	426.10	
5	1.65	2.53	4.18	20.00	61.80	>10
	11.36	17.47	28.83	137.90	426.10	
6	0.61	1.02	1.63	20.00	61.80	>10
	4.21	7.03	11.24	137.90	426.10	
7	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.01	2.36	137.90	426.10	
8	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.00	2.35	137.90	426.10	
9	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.01	2.36	137.90	426.10	
10	0.49	0.21	0.71	20.00	61.80	>10
	3.40	1.48	4.88	137.90	426.10	
11	0.27	0.16	0.43	20.00	61.80	>10
	1.85	1.12	2.97	137.90	426.10	
12	0.23	0.11	0.34	20.00	61.80	>10
	1.61	0.76	2.37	137.90	426.10	
13	0.82	0.89	1.71	20.00	61.80	>10
	5.65	6.15	11.81	137.90	426.10	

14	0.81	0.64	1.45	20.00	61.80	>10
	5.58	4.45	10.03	137.90	426.10	
15	1.35	0.65	2.00	20.00	61.80	>10
	9.34	4.46	13.80	137.90	426.10	
16	0.36	0.47	0.83	20.00	61.80	>10
	2.51	3.23	5.74	137.90	426.10	
17	0.28	0.35	0.63	20.00	61.80	>10
	1.95	2.40	4.36	137.90	426.10	
18	0.51	0.81	1.33	20.00	61.80	>10
	3.53	5.62	9.15	137.90	426.10	
19	0.74	0.97	1.71	20.00	61.80	>10
	5.13	6.65	11.78	137.90	426.10	
20	0.73	1.01	1.74	20.00	61.80	>10
	5.04	6.97	12.01	137.90	426.10	
21	0.17	0.29	0.46	20.00	61.80	>10
	1.19	1.98	3.17	137.90	426.10	
22	0.72	0.36	1.08	20.00	61.80	>10
	4.97	2.48	7.46	137.90	426.10	

Min MS: 13.046, Location: 4, Combination: Pm+Pb

Table 2-225. Load Combination 355, Fire at 180 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-050

Load Cases: 116, 201, 211
Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.19	1.70	2.90	20.00	61.80	>10
	8.23	11.73	19.97	137.90	426.10	
2	0.08	0.05	0.13	20.00	61.80	>10
	0.53	0.37	0.90	137.90	426.10	
3	0.04	0.01	0.05	20.00	61.80	>10
	0.24	0.09	0.33	137.90	426.10	
4	1.71	2.69	4.40	20.00	61.80	>10
	11.78	18.56	30.33	137.90	426.10	
5	1.65	2.53	4.18	20.00	61.80	>10
	11.36	17.47	28.83	137.90	426.10	
6	0.61	1.02	1.63	20.00	61.80	>10
	4.21	7.03	11.24	137.90	426.10	
7	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.01	2.36	137.90	426.10	
8	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.00	2.35	137.90	426.10	
9	0.34	0.00	0.34	20.00	61.80	>10
	2.35	0.01	2.36	137.90	426.10	
10	0.49	0.21	0.71	20.00	61.80	>10
	3.40	1.48	4.88	137.90	426.10	
11	0.27	0.16	0.43	20.00	61.80	>10
	1.85	1.12	2.97	137.90	426.10	
12	0.23	0.11	0.34	20.00	61.80	>10
	1.61	0.76	2.37	137.90	426.10	
13	0.82	0.89	1.71	20.00	61.80	>10
	5.65	6.15	11.81	137.90	426.10	

14	0.81	0.64	1.45	20.00	61.80	>10
	5.58	4.45	10.03	137.90	426.10	
15	1.35	0.65	2.00	20.00	61.80	>10
	9.34	4.46	13.80	137.90	426.10	
16	0.36	0.47	0.83	20.00	61.80	>10
	2.51	3.23	5.74	137.90	426.10	
17	0.28	0.35	0.63	20.00	61.80	>10
	1.95	2.40	4.36	137.90	426.10	
18	0.51	0.81	1.33	20.00	61.80	>10
	3.53	5.62	9.15	137.90	426.10	
19	0.74	0.97	1.71	20.00	61.80	>10
	5.13	6.65	11.78	137.90	426.10	
20	0.73	1.01	1.74	20.00	61.80	>10
	5.04	6.97	12.01	137.90	426.10	
21	0.17	0.29	0.46	20.00	61.80	>10
	1.19	1.98	3.17	137.90	426.10	
22	0.72	0.36	1.08	20.00	61.80	>10
	4.97	2.48	7.46	137.90	426.10	

Min MS: 13.046, Location: 4, Combination: Pm+Pb

2.10.2.3 Minimum Margins of Safety – Model AOS-050

Table 2-226 and Table 2-227 list the Model AOS-050 transport package Minimum Margins of Safety (Min MS), for Normal and Hypothetical Accident conditions of transport, respectively.

Table 2-226. Min MS for Normal Conditions of Transport – Model AOS-050

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
101	101 201 211 0 0	5.819E+00	4	Pm+Pb
102	104 201 211 0 0	2.164E+00	5	Pm+Pb+Q
103	103 201 211 0 0	2.686E+00	5	Pm+Pb+Q
104	101 201 202 211 0	5.535E+00	4	Pm+Pb
105	105 201 202 211 0	5.535E+00	4	Pm+Pb
106	101 201 203 211 0	4.918E+00	4	Pm+Pb
107	105 201 203 211 0	4.918E+00	4	Pm+Pb
215	215 101 201 211 0	5.145E+00	4	Pm+Pb
216	216 101 201 211 0	1.285E+00	15	Pm
217	216 104 201 211 0	1.285E+00	15	Pm
221	221 101 201 211 0	5.812E+00	4	Pm+Pb
222	222 101 201 211 0	5.775E+00	4	Pm+Pb
223	223 101 201 211 0	5.408E+00	4	Pm+Pb
231	231 102 201 211 0	3.034E+00	4	Pm+Pb
232	232 102 201 211 0	1.032E+00	4	Pm+Pb

Table 2-227. Min MS for Hypothetical Accident Conditions of Transport – Model AOS-050

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
301	301 102 201 211 0	3.491E+00	4	Pm+Pb
302	302 102 201 211 0	8.885E+00	4	Pm+Pb
303	303 102 201 211 0	3.318E+00	1	Pm
304	304 105 202 211 0	2.818E+00	4	Pm+Pb
305	305 105 202 211 0	7.495E+00	1	Pm+Pb
306	306 105 202 211 0	2.537E+00	1	Pm
310	204 101 211 0 0	3.028E+00	4	Pm+Pb
311	311 101 201 211 0	5.885E-01	15	Pm
312	311 104 201 211 0	5.885E-01	15	Pm
350	111 201 211 0 0	1.305E+01	4	Pm+Pb
351	112 201 211 0 0	1.305E+01	4	Pm+Pb
352	113 201 211 0 0	1.305E+01	4	Pm+Pb
353	114 201 211 0 0	1.305E+01	4	Pm+Pb
354	115 201 211 0 0	1.305E+01	4	Pm+Pb
355	116 201 211 0 0	1.305E+01	4	Pm+Pb

2.10.2.4 Free Drop – Model AOS-050

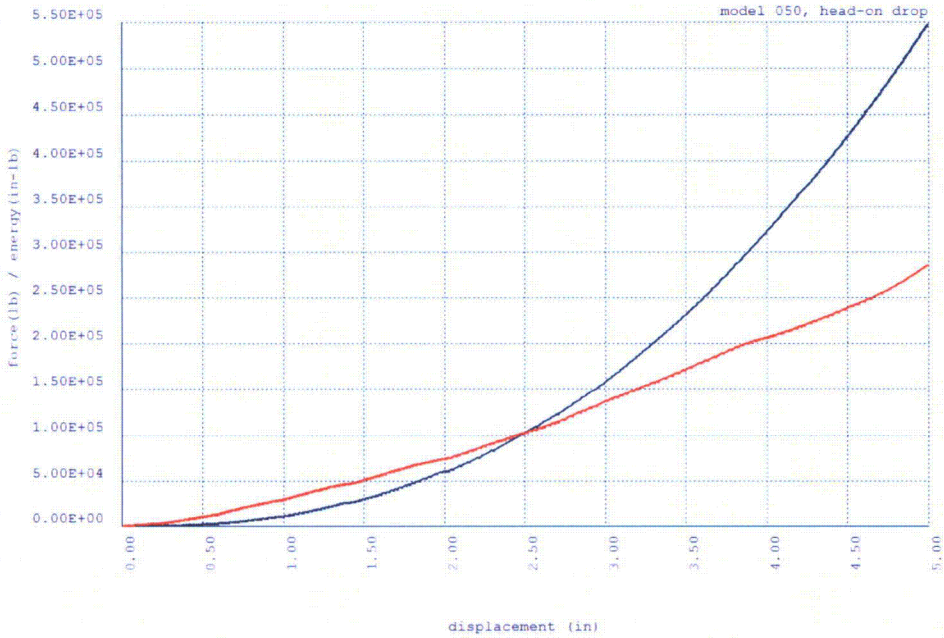

Figure 2-43. Head-On Drop Force and Energy, 10-lb. Foam – Model AOS-050

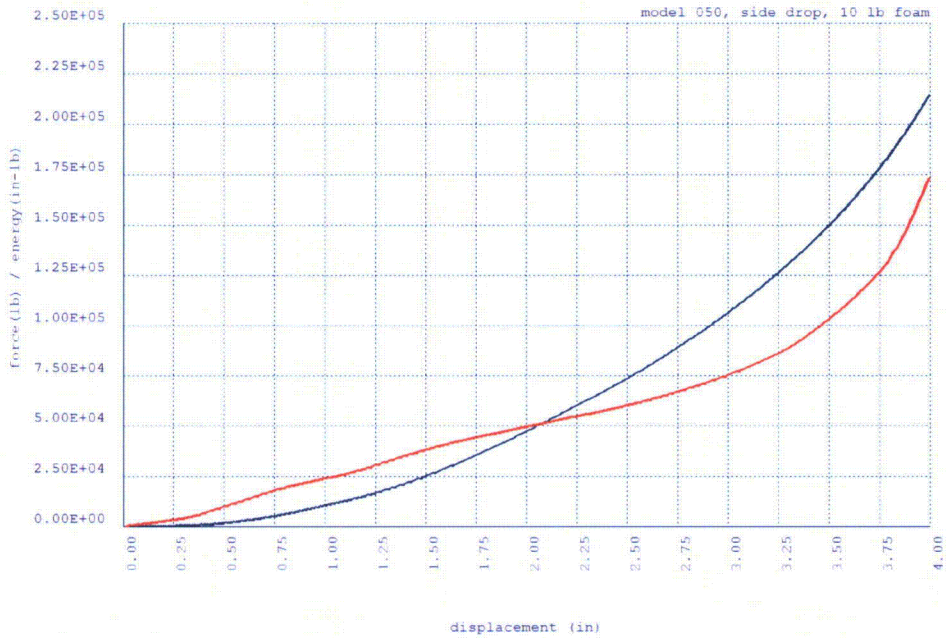

Figure 2-44. Side Drop Force and Energy, 10-lb. Foam – Model AOS-050

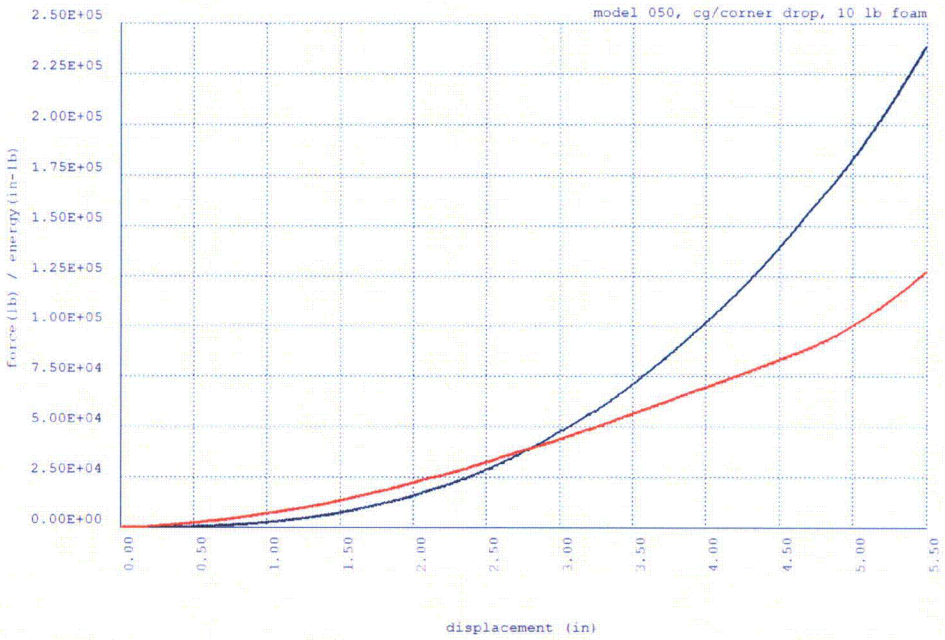

Figure 2-45. Cg/Corner Drop Force and Energy, 10-lb. Foam – Model AOS-050

2.10.3 Model AOS-165A Transport Package

This appendix presents the following information, specific to the Model AOS-165A transport package:

- Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-165A
- Hypothetical Accident Conditions of Transport Summary of Damages (Stresses) – Model AOS-165A
- Minimum Margins of Safety – Model AOS-165A
- Free Drop – Model AOS-165A and AOS-165B

2.10.3.1 Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-165A

Table 2-228 and Table 2-229 present Model AOS-165A transport package Load Cases and Load Combinations, respectively, under Normal conditions of transport:

- Table 2-230 through Table 2-247 present Load Case test case output data. Comparisons with allowable stress limits are included for Load Cases 101, 102, 103, 104, 105, and 106.
- Table 2-248 through Table 2-261 present Load Combination test case output data.

Table 2-228. Load Cases Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-165A

Load Case	Description	Data
101	100°F Ambient, Maximum Decay Heat	Table 2-230
102	100°F Ambient, Maximum Decay Heat, Maximum Insolation	Table 2-231
103	-20°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-232
104	-40°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-233
105	-40°F Ambient, Maximum Decay Heat	Table 2-234
106	-20°F Ambient, Maximum Decay Heat	Table 2-235
201	Maximum Internal Pressure, 1,517 kPa (220 psia)	Table 2-236
202	Minimum External Pressure, 24 kPa (3.5 psia)	Table 2-237
203	Maximum Increase External Pressure, 140 kPa (20 psia)	Table 2-238
204	Additional Increased External Pressure, 2 MPa (290 psia)	Table 2-239
211	Fabrication Stress	Table 2-240
215	Compression Load (5x weight)	Table 2-241
216	Rod Drop onto Cask	Table 2-242
221	Forward 5g Vibration Inertia Load	Table 2-243
222	Lateral 5g Vibration Inertia Load	Table 2-244
223	Vertical 10g Vibration Inertia Load	Table 2-245
231	4-ft. Head-On Drop	Table 2-246
232	Impact Test, Normal Condition	Table 2-247

Table 2-229. Load Combinations Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-165A

Load Combination	Load Cases	Description	Data
101	101, 201, 211	Hot Environment	Table 2-248
102	104, 201, 211	Cold Environment	Table 2-249
103	103, 201, 211	Increased External Pressure	Table 2-250
104	101, 201, 202, 211	Minimum External Pressure	Table 2-251
105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat	Table 2-252
106	101, 201, 203, 211	Maximum Pressure, Hot Environment	Table 2-253
107	105, 201, 203, 211	Maximum Pressure, Cold Environment	Table 2-254
215	215, 101, 201, 211	Compression Load	Table 2-255
216	216, 101, 201, 211	Rod Drop	Table 2-256
217	216, 104, 201, 211	Rod Drop, Cold Environment	Table 2-257
221	221, 101, 201, 211	Forward Vibration	Table 2-258
222	222, 101, 201, 211	Lateral Vibration	Table 2-259
223	223, 101, 201, 211	Vertical Vibration	Table 2-260
231	231, 102, 201, 211	4-ft. Head-On Drop	Table 2-261
232[1]	232, 102, 201, 211	Impact Test, Normal Condition	–

1. Load Combination 232 is documented only for the Model AOS-025 and AOS-050 transport packages, and demonstrates compliance with the requirements of Reference **[2.2]**, *Paragraph 737.*

Table 2-230. Load Case 101, 100°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.1299E+02	-6.3961E+02	-5.9108E+02	1.1526E+03	2.1901E+03
	3.5369E+00	-4.4100E+00	-4.0753E+00	7.9469E+00	1.5100E+01
2	6.7566E+02	-1.0384E+03	-2.4406E+02	1.7140E+03	3.0361E+03
	4.6585E+00	-7.1592E+00	-1.6827E+00	1.1818E+01	2.0933E+01
3	4.9866E+02	-7.5854E+02	1.9419E+02	1.2572E+03	2.5065E+03
	3.4382E+00	-5.2300E+00	1.3389E+00	8.6681E+00	1.7281E+01
4	1.0313E+03	-1.4423E+03	-3.7275E+02	2.4737E+03	4.8950E+03
	7.1107E+00	-9.9446E+00	-2.5700E+00	1.7055E+01	3.3750E+01
5	5.1031E+02	-6.3376E+02	-6.0557E+02	1.1441E+03	2.1641E+03
	3.5185E+00	-4.3697E+00	-4.1752E+00	7.8881E+00	1.4921E+01
6	6.6751E+02	-1.0005E+03	-1.6764E+02	1.6680E+03	3.0081E+03
	4.6023E+00	-6.8984E+00	-1.1559E+00	1.1501E+01	2.0740E+01
7	3.9690E+03	-1.4215E+04	-3.2556E+03	1.8184E+04	3.5913E+04
	2.7366E+01	-9.8011E+01	-2.2447E+01	1.2538E+02	2.4761E+02
8	3.7871E+03	-1.5512E+04	-7.5717E+03	1.9299E+04	3.0544E+04
	2.6111E+01	-1.0695E+02	-5.2205E+01	1.3306E+02	2.1060E+02
9	5.8664E+02	-7.9848E+03	-1.0752E+04	8.5714E+03	1.0255E+04
	4.0448E+00	-5.5053E+01	-7.4131E+01	5.9098E+01	7.0709E+01
10	-3.2312E+02	-2.8759E+03	-3.4282E+03	2.5528E+03	3.6404E+03
	-2.2278E+00	-1.9829E+01	-2.3637E+01	1.7601E+01	2.5100E+01
11	-3.3731E+02	-2.8591E+03	-3.5793E+03	2.5218E+03	3.5739E+03
	-2.3256E+00	-1.9713E+01	-2.4678E+01	1.7387E+01	2.4641E+01
12	-3.4050E+02	-2.8546E+03	-3.6505E+03	2.5141E+03	3.5551E+03
	-2.3476E+00	-1.9682E+01	-2.5169E+01	1.7334E+01	2.4512E+01
13	-2.8075E+02	-4.8138E+03	-8.2300E+02	4.5331E+03	8.6731E+03
	-1.9357E+00	-3.3190E+01	-5.6744E+00	3.1254E+01	5.9799E+01
14	-1.2202E+03	-5.8850E+03	-3.0486E+03	4.6648E+03	2.2495E+03
	-8.4127E+00	-4.0575E+01	-2.1019E+01	3.2163E+01	1.5510E+01
15	1.3743E+01	-7.0154E+03	-6.9646E+03	7.0291E+03	2.6068E+03
	9.4752E-02	-4.8369E+01	-4.8019E+01	4.8464E+01	1.7974E+01

16	-5.5915E+02	-8.4956E+03	-5.6261E+02	7.9364E+03	4.4001E+03
	-3.8552E+00	-5.8575E+01	-3.8790E+00	5.4720E+01	3.0338E+01
17	-5.9881E+02	-7.3938E+03	6.7546E+02	6.7950E+03	4.8243E+03
	-4.1286E+00	-5.0979E+01	4.6571E+00	4.6850E+01	3.3262E+01
18	-3.7023E+00	-2.3540E+02	-2.3143E+02	2.3170E+02	4.4466E+01
	-2.5526E-02	-1.6230E+00	-1.5957E+00	1.5975E+00	3.0658E-01
19	8.2377E+00	-7.8489E+01	2.0242E+02	8.6726E+01	1.5088E+02
	5.6797E-02	-5.4116E-01	1.3956E+00	5.9796E-01	1.0403E+00
20	5.5707E+01	-9.3396E+01	1.9280E+01	1.4910E+02	1.3634E+02
	3.8408E-01	-6.4395E-01	1.3293E-01	1.0280E+00	9.4003E-01
21	5.2927E+02	-6.5110E+02	4.0999E+03	1.1804E+03	1.2473E+03
	3.6492E+00	-4.4891E+00	2.8268E+01	8.1383E+00	8.5996E+00
22	1.2036E+01	-1.4703E+03	5.3138E+03	1.4824E+03	3.0233E+02
	8.2988E-02	-1.0138E+01	3.6637E+01	1.0221E+01	2.0845E+00
23	-7.8275E+01	-3.9418E+03	1.3678E+03	3.8636E+03	6.3755E+01
	-5.3969E-01	-2.7178E+01	9.4305E+00	2.6638E+01	4.3957E-01
24	6.5232E-01	-8.3286E+02	-8.2940E+02	8.3351E+02	6.8662E+02
	4.4976E-03	-5.7423E+00	-5.7185E+00	5.7468E+00	4.7341E+00
25	-5.8653E+00	-1.2301E+03	-1.2253E+03	1.2242E+03	7.1074E+02
	-4.0440E-02	-8.4810E+00	-8.4481E+00	8.4406E+00	4.9004E+00

Allowable Stress for Load Case 101

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	521.15	515.87	17.40	19.40	59.20
2	537.51	528.61	17.40	19.40	59.20
3	500.47	484.92	18.70	20.70	59.70
4	538.52	520.15	17.40	19.40	59.20
5	522.11	516.83	17.40	19.40	59.20
6	538.40	529.59	17.40	19.40	59.20
7	561.94	560.34	17.40	19.40	59.20
8	585.88	581.49	17.40	19.40	59.20
9	599.23	594.31	17.40	19.40	59.20
10	624.94	612.87	16.40	18.40	59.20
11	625.28	613.23	16.40	18.40	59.20
12	624.91	612.84	16.40	18.40	59.20
13	615.29	602.95	16.40	18.40	59.20
14	622.76	601.03	16.40	18.40	59.20
15	652.64	626.74	16.40	18.40	59.20
16	580.09	573.14	17.40	19.40	59.20
17	565.75	563.29	17.40	19.40	59.20
18	570.27	569.44	17.40	19.40	59.20
19	568.11	566.72	17.40	19.40	59.20
20	569.58	567.77	17.40	19.40	59.20
21	574.37	573.14	17.40	19.40	59.20
22	577.03	575.48	17.40	19.40	59.20
23	610.87	603.24	16.40	18.40	59.20
24	552.52	551.03	17.40	19.40	59.20
25	556.24	554.94	17.40	19.40	59.20

Table 2-231. Load Case 102, 100°F Ambient, Maximum Decay Heat, Maximum Insolation, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.9781E+02	-6.2151E+02	-5.7320E+02	1.1193E+03	2.1299E+03
	3.4323E+00	-4.2852E+00	-3.9520E+00	7.7174E+00	1.4685E+01
2	6.5851E+02	-1.0367E+03	-2.3773E+02	1.6952E+03	3.0215E+03
	4.5403E+00	-7.1480E+00	-1.6391E+00	1.1688E+01	2.0833E+01
3	4.9592E+02	-7.5182E+02	1.7687E+02	1.2477E+03	2.4900E+03
	3.4192E+00	-5.1836E+00	1.2195E+00	8.6029E+00	1.7168E+01
4	1.0214E+03	-1.4154E+03	-3.6921E+02	2.4368E+03	4.8197E+03
	7.0423E+00	-9.7590E+00	-2.5456E+00	1.6801E+01	3.3231E+01
5	4.9527E+02	-6.1575E+02	-5.8726E+02	1.1110E+03	2.1036E+03
	3.4147E+00	-4.2455E+00	-4.0490E+00	7.6602E+00	1.4504E+01
6	6.6081E+02	-9.7866E+02	-1.6418E+02	1.6395E+03	2.9461E+03
	4.5561E+00	-6.7476E+00	-1.1320E+00	1.1304E+01	2.0313E+01
7	4.1387E+03	-1.4446E+04	-3.3468E+03	1.8585E+04	3.6697E+04
	2.8535E+01	-9.9601E+01	-2.3076E+01	1.2814E+02	2.5302E+02
8	3.9402E+03	-1.5718E+04	-7.6257E+03	1.9658E+04	3.1101E+04
	2.7167E+01	-1.0837E+02	-5.2577E+01	1.3554E+02	2.1443E+02
9	5.9496E+02	-8.1357E+03	-1.0927E+04	8.7307E+03	1.0585E+04
	4.1021E+00	-5.6094E+01	-7.5340E+01	6.0196E+01	7.2981E+01
10	-3.6348E+02	-2.9160E+03	-3.7340E+03	2.5525E+03	3.5906E+03
	-2.5061E+00	-2.0105E+01	-2.5745E+01	1.7599E+01	2.4756E+01
11	-3.7828E+02	-2.8984E+03	-3.8853E+03	2.5201E+03	3.5207E+03
	-2.6081E+00	-1.9984E+01	-2.6788E+01	1.7376E+01	2.4274E+01
12	-3.8130E+02	-2.8941E+03	-3.9598E+03	2.5128E+03	3.5030E+03
	-2.6290E+00	-1.9954E+01	-2.7302E+01	1.7325E+01	2.4152E+01
13	-3.3567E+02	-4.8487E+03	-1.0147E+03	4.5131E+03	8.5598E+03
	-2.3143E+00	-3.3431E+01	-6.9960E+00	3.1116E+01	5.9017E+01
14	-1.2211E+03	-5.9080E+03	-3.1048E+03	4.6869E+03	2.3565E+03
	-8.4190E+00	-4.0734E+01	-2.1407E+01	3.2315E+01	1.6248E+01
15	1.3263E+01	-7.0308E+03	-6.9808E+03	7.0441E+03	2.7131E+03
	9.1446E-02	-4.8476E+01	-4.8131E+01	4.8567E+01	1.8706E+01

16	-5.4506E+02	-8.5083E+03	-6.0142E+02	7.9632E+03	4.3946E+03
	-3.7581E+00	-5.8663E+01	-4.1467E+00	5.4905E+01	3.0300E+01
17	-5.9831E+02	-7.4133E+03	6.1990E+02	6.8150E+03	5.0039E+03
	-4.1252E+00	-5.1113E+01	4.2741E+00	4.6988E+01	3.4500E+01
18	-3.9673E+00	-2.3634E+02	-2.3211E+02	2.3237E+02	3.5773E+01
	-2.7353E-02	-1.6295E+00	-1.6004E+00	1.6022E+00	2.4665E-01
19	7.6825E+00	-7.8894E+01	2.0143E+02	8.6576E+01	1.5192E+02
	5.2969E-02	-5.4395E-01	1.3888E+00	5.9692E-01	1.0475E+00
20	5.4854E+01	-9.2749E+01	2.1366E+01	1.4760E+02	1.3384E+02
	3.7821E-01	-6.3948E-01	1.4732E-01	1.0177E+00	9.2279E-01
21	5.2463E+02	-6.4734E+02	4.0675E+03	1.1720E+03	1.2332E+03
	3.6172E+00	-4.4633E+00	2.8045E+01	8.0805E+00	8.5025E+00
22	9.5391E+00	-1.4593E+03	5.2579E+03	1.4688E+03	3.1843E+02
	6.5770E-02	-1.0061E+01	3.6252E+01	1.0127E+01	2.1955E+00
23	-7.5627E+01	-3.9042E+03	1.3448E+03	3.8286E+03	4.1345E+01
	-5.2143E-01	-2.6919E+01	9.2723E+00	2.6397E+01	2.8506E-01
24	6.9320E-01	-8.1852E+02	-8.1506E+02	8.1921E+02	7.0185E+02
	4.7795E-03	-5.6435E+00	-5.6197E+00	5.6483E+00	4.8391E+00
25	-6.0811E+00	-1.2052E+03	-1.2005E+03	1.1991E+03	6.8740E+02
	-4.1928E-02	-8.3094E+00	-8.2770E+00	8.2674E+00	4.7394E+00

Allowable Stress for Load Case 102

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	560.23	554.98	17.40	19.40	59.20
2	576.40	567.63	17.40	19.40	59.20
3	540.16	524.96	17.40	19.40	59.20
4	577.49	559.47	17.40	19.40	59.20
5	561.12	555.88	17.40	19.40	59.20
6	577.24	568.53	17.40	19.40	59.20
7	600.51	598.97	17.40	19.40	59.20
8	624.19	619.85	16.40	18.40	59.20
9	637.33	632.47	16.40	18.40	59.20
10	662.54	650.65	16.10	18.00	59.20
11	662.89	651.03	16.10	18.00	59.20
12	662.51	650.62	16.10	18.00	59.20
13	653.14	640.99	16.40	18.40	59.20
14	660.62	639.24	16.40	18.40	59.20
15	690.20	664.71	16.10	18.00	59.20
16	618.61	611.75	16.40	18.40	59.20
17	604.44	602.00	16.40	18.40	59.20
18	608.23	607.42	16.40	18.40	59.20
19	606.06	604.70	16.40	18.40	59.20
20	607.52	605.73	16.40	18.40	59.20
21	612.47	611.22	16.40	18.40	59.20
22	615.20	613.63	16.40	18.40	59.20
23	648.65	641.13	16.40	18.40	59.20
24	591.19	589.73	17.40	19.40	59.20
25	594.85	593.58	17.40	19.40	59.20

Table 2-232. Load Case 103, -20°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2955E+00	-5.8856E-01	1.0962E-01	1.8841E+00	3.1694E+00
	8.9325E-03	-4.0580E-03	7.5579E-04	1.2990E-02	2.1852E-02
2	6.7981E+01	-3.8560E+00	-2.0932E+01	7.1837E+01	2.9096E+01
	4.6871E-01	-2.6586E-02	-1.4432E-01	4.9530E-01	2.0061E-01
3	5.2497E-01	-6.5153E-03	-2.8152E-01	5.3148E-01	2.9770E-01
	3.6195E-03	-4.4921E-05	-1.9410E-03	3.6644E-03	2.0525E-03
4	7.1685E+01	-8.7670E-02	7.2898E-01	7.1772E+01	6.0913E+00
	4.9425E-01	-6.0447E-04	5.0262E-03	4.9485E-01	4.1998E-02
5	1.3834E+00	-6.6108E-01	1.2608E-01	2.0445E+00	3.4525E+00
	9.5385E-03	-4.5580E-03	8.6932E-04	1.4096E-02	2.3804E-02
6	7.4593E+01	-1.2611E+00	-2.2988E+01	7.5854E+01	4.0064E+01
	5.1430E-01	-8.6946E-03	-1.5850E-01	5.2299E-01	2.7623E-01
7	2.7423E+03	-1.6986E+03	-1.0384E+02	4.4409E+03	9.2018E+03
	1.8908E+01	-1.1711E+01	-7.1594E-01	3.0619E+01	6.3444E+01
8	4.0641E+03	-1.8102E+03	-1.2993E+02	5.8743E+03	8.1054E+03
	2.8021E+01	-1.2481E+01	-8.9584E-01	4.0502E+01	5.5884E+01
9	2.5201E+03	-1.8570E+02	7.3407E+02	2.7058E+03	4.5431E+03
	1.7376E+01	-1.2804E+00	5.0612E+00	1.8656E+01	3.1323E+01
10	1.1473E+03	1.3042E-01	-3.2466E+01	1.1472E+03	3.4729E+01
	7.9106E+00	8.9920E-04	-2.2384E-01	7.9097E+00	2.3945E-01
11	1.1458E+03	8.1314E-03	1.3526E+00	1.1458E+03	2.3045E-01
	7.9002E+00	5.6064E-05	9.3260E-03	7.9001E+00	1.5889E-03
12	1.1464E+03	5.6746E-03	-2.0644E+01	1.1464E+03	1.4436E+01
	7.9045E+00	3.9125E-05	-1.4234E-01	7.9044E+00	9.9531E-02
13	1.1749E+03	-1.7996E+02	6.4403E+02	1.3549E+03	8.9643E+02
	8.1010E+00	-1.2408E+00	4.4404E+00	9.3417E+00	6.1807E+00
14	3.4310E+02	-3.9835E+02	9.2246E+01	7.4145E+02	5.2607E+02
	2.3656E+00	-2.7465E+00	6.3602E-01	5.1121E+00	3.6271E+00
15	1.5736E+02	-4.5859E+02	8.5127E+01	6.1595E+02	1.2308E+03
	1.0850E+00	-3.1619E+00	5.8693E-01	4.2468E+00	8.4857E+00

16	1.7956E+03	-6.4051E+02	1.8068E+02	2.4361E+03	1.6395E+03
	1.2380E+01	-4.4161E+00	1.2458E+00	1.6797E+01	1.1304E+01
17	1.4522E+03	-5.6413E+02	1.8288E+02	2.0163E+03	2.4506E+03
	1.0012E+01	-3.8895E+00	1.2609E+00	1.3902E+01	1.6896E+01
18	4.6835E+02	-2.8705E+02	1.8240E+02	7.5540E+02	1.2022E+03
	3.2291E+00	-1.9791E+00	1.2576E+00	5.2083E+00	8.2886E+00
19	8.1084E+02	-3.4429E+02	2.6896E+02	1.1551E+03	1.7750E+03
	5.5905E+00	-2.3738E+00	1.8544E+00	7.9643E+00	1.2238E+01
20	7.1786E+02	-1.5334E+02	-6.7341E+01	8.7120E+02	1.5314E+03
	4.9495E+00	-1.0572E+00	-4.6430E-01	6.0067E+00	1.0559E+01
21	6.7798E+02	-1.2117E+02	-1.1337E+02	7.9915E+02	1.3987E+03
	4.6745E+00	-8.3547E-01	-7.8163E-01	5.5100E+00	9.6439E+00
22	8.5603E+02	-3.5893E+02	1.7205E+02	1.2150E+03	1.8942E+03
	5.9021E+00	-2.4747E+00	1.1862E+00	8.3768E+00	1.3060E+01
23	1.0225E+03	-5.0787E+02	6.4055E+01	1.5304E+03	2.8320E+03
	7.0498E+00	-3.5017E+00	4.4165E-01	1.0551E+01	1.9526E+01
24	7.2199E+01	-5.6347E+02	-5.3912E+01	6.3567E+02	1.5483E+03
	4.9779E-01	-3.8850E+00	-3.7171E-01	4.3828E+00	1.0675E+01
25	3.3728E+01	-1.4428E+01	1.9801E+01	4.8156E+01	8.6842E+01
	2.3255E-01	-9.9478E-02	1.3652E-01	3.3203E-01	5.9876E-01

Allowable Stress for Load Case 103

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	0.00	-20.00	20.00	30.00	70.00
2	0.00	-20.00	20.00	30.00	70.00
3	0.00	-20.00	20.00	30.00	70.00
4	0.00	-20.00	20.00	30.00	70.00
5	0.00	-20.00	20.00	30.00	70.00
6	0.00	-20.00	20.00	30.00	70.00
7	0.00	-20.00	20.00	30.00	70.00
8	0.00	-20.00	20.00	30.00	70.00
9	0.00	-20.00	20.00	30.00	70.00
10	0.00	-20.00	20.00	30.00	70.00
11	0.00	-20.00	20.00	30.00	70.00
12	0.00	-20.00	20.00	30.00	70.00
13	0.00	-20.00	20.00	30.00	70.00
14	0.00	-20.00	20.00	30.00	70.00
15	0.00	-20.00	20.00	30.00	70.00
16	0.00	-20.00	20.00	30.00	70.00
17	0.00	-20.00	20.00	30.00	70.00
18	0.00	-20.00	20.00	30.00	70.00
19	0.00	-20.00	20.00	30.00	70.00
20	0.00	-20.00	20.00	30.00	70.00
21	0.00	-20.00	20.00	30.00	70.00
22	0.00	-20.00	20.00	30.00	70.00
23	0.00	-20.00	20.00	30.00	70.00
24	0.00	-20.00	20.00	30.00	70.00
25	0.00	-20.00	20.00	30.00	70.00

Table 2-233. Load Case 104, -40°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5834E+00	-7.1935E-01	1.3398E-01	2.3028E+00	3.8738E+00
	1.0917E-02	-4.9598E-03	9.2375E-04	1.5877E-02	2.6709E-02
2	8.3088E+01	-4.7129E+00	-2.5583E+01	8.7801E+01	3.5562E+01
	5.7287E-01	-3.2495E-02	-1.7639E-01	6.0537E-01	2.4519E-01
3	6.4162E-01	-7.9631E-03	-3.4408E-01	6.4959E-01	3.6385E-01
	4.4238E-03	-5.4904E-05	-2.3724E-03	4.4787E-03	2.5087E-03
4	8.7614E+01	-1.0715E-01	8.9098E-01	8.7722E+01	7.4450E+00
	6.0408E-01	-7.3879E-04	6.1431E-03	6.0482E-01	5.1331E-02
5	1.6909E+00	-8.0798E-01	1.5410E-01	2.4989E+00	4.2197E+00
	1.1658E-02	-5.5708E-03	1.0625E-03	1.7229E-02	2.9094E-02
6	9.1169E+01	-1.5413E+00	-2.8096E+01	9.2710E+01	4.8967E+01
	6.2859E-01	-1.0627E-02	-1.9372E-01	6.3921E-01	3.3762E-01
7	3.3517E+03	-2.0760E+03	-1.2691E+02	5.4278E+03	1.1247E+04
	2.3109E+01	-1.4314E+01	-8.7504E-01	3.7423E+01	7.7543E+01
8	4.9672E+03	-2.2125E+03	-1.5880E+02	7.1797E+03	9.9065E+03
	3.4248E+01	-1.5255E+01	-1.0949E+00	4.9502E+01	6.8303E+01
9	3.0801E+03	-2.2697E+02	8.9719E+02	3.3071E+03	5.5526E+03
	2.1237E+01	-1.5649E+00	6.1859E+00	2.2802E+01	3.8284E+01
10	1.4023E+03	1.5940E-01	-3.9680E+01	1.4021E+03	4.2447E+01
	9.6686E+00	1.0990E-03	-2.7359E-01	9.6675E+00	2.9266E-01
11	1.4005E+03	9.9383E-03	1.6532E+00	1.4004E+03	2.8166E-01
	9.6558E+00	6.8522E-05	1.1398E-02	9.6557E+00	1.9420E-03
12	1.4012E+03	6.9357E-03	-2.5232E+01	1.4012E+03	1.7644E+01
	9.6610E+00	4.7820E-05	-1.7397E-01	9.6610E+00	1.2165E-01
13	1.4360E+03	-2.1995E+02	7.8714E+02	1.6560E+03	1.0956E+03
	9.9012E+00	-1.5165E+00	5.4272E+00	1.1418E+01	7.5542E+00
14	4.1934E+02	-4.8687E+02	1.1275E+02	9.0621E+02	6.4298E+02
	2.8913E+00	-3.3569E+00	7.7735E-01	6.2481E+00	4.4332E+00
15	1.9233E+02	-5.6050E+02	1.0404E+02	7.5283E+02	1.5043E+03
	1.3261E+00	-3.8645E+00	7.1736E-01	5.1906E+00	1.0371E+01

16	2.1946E+03	-7.8284E+02	2.2084E+02	2.9775E+03	2.0039E+03
	1.5132E+01	-5.3975E+00	1.5226E+00	2.0529E+01	1.3816E+01
17	1.7749E+03	-6.8949E+02	2.2352E+02	2.4643E+03	2.9952E+03
	1.2237E+01	-4.7539E+00	1.5411E+00	1.6991E+01	2.0651E+01
18	5.7243E+02	-3.5084E+02	2.2294E+02	9.2327E+02	1.4693E+03
	3.9467E+00	-2.4190E+00	1.5371E+00	6.3657E+00	1.0130E+01
19	9.9102E+02	-4.2079E+02	3.2872E+02	1.4118E+03	2.1694E+03
	6.8329E+00	-2.9013E+00	2.2665E+00	9.7341E+00	1.4957E+01
20	8.7739E+02	-1.8741E+02	-8.2306E+01	1.0648E+03	1.8718E+03
	6.0494E+00	-1.2922E+00	-5.6748E-01	7.3416E+00	1.2905E+01
21	8.2864E+02	-1.4810E+02	-1.3856E+02	9.7674E+02	1.7096E+03
	5.7133E+00	-1.0211E+00	-9.5533E-01	6.7344E+00	1.1787E+01
22	1.0463E+03	-4.3869E+02	2.1028E+02	1.4849E+03	2.3151E+03
	7.2137E+00	-3.0246E+00	1.4498E+00	1.0238E+01	1.5962E+01
23	1.2497E+03	-6.2073E+02	7.8290E+01	1.8704E+03	3.4614E+03
	8.6164E+00	-4.2798E+00	5.3979E-01	1.2896E+01	2.3865E+01
24	8.8243E+01	-6.8868E+02	-6.5893E+01	7.7693E+02	1.8924E+03
	6.0842E-01	-4.7483E+00	-4.5431E-01	5.3567E+00	1.3047E+01
25	4.1223E+01	-1.7634E+01	2.4201E+01	5.8858E+01	1.0614E+02
	2.8423E-01	-1.2158E-01	1.6686E-01	4.0581E-01	7.3181E-01

Allowable Stress for Load Case 104

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	0.00	-40.00	20.00	30.00	70.00
2	0.00	-40.00	20.00	30.00	70.00
3	0.00	-40.00	20.00	30.00	70.00
4	0.00	-40.00	20.00	30.00	70.00
5	0.00	-40.00	20.00	30.00	70.00
6	0.00	-40.00	20.00	30.00	70.00
7	0.00	-40.00	20.00	30.00	70.00
8	0.00	-40.00	20.00	30.00	70.00
9	0.00	-40.00	20.00	30.00	70.00
10	0.00	-40.00	20.00	30.00	70.00
11	0.00	-40.00	20.00	30.00	70.00
12	0.00	-40.00	20.00	30.00	70.00
13	0.00	-40.00	20.00	30.00	70.00
14	0.00	-40.00	20.00	30.00	70.00
15	0.00	-40.00	20.00	30.00	70.00
16	0.00	-40.00	20.00	30.00	70.00
17	0.00	-40.00	20.00	30.00	70.00
18	0.00	-40.00	20.00	30.00	70.00
19	0.00	-40.00	20.00	30.00	70.00
20	0.00	-40.00	20.00	30.00	70.00
21	0.00	-40.00	20.00	30.00	70.00
22	0.00	-40.00	20.00	30.00	70.00
23	0.00	-40.00	20.00	30.00	70.00
24	0.00	-40.00	20.00	30.00	70.00
25	0.00	-40.00	20.00	30.00	70.00

Table 2-234. Load Case 105, -40°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.5912E+02	-6.9543E+02	-6.3703E+02	1.2546E+03	2.3757E+03
	3.8550E+00	-4.7948E+00	-4.3922E+00	8.6499E+00	1.6380E+01
2	7.0817E+02	-1.1460E+03	-2.5575E+02	1.8542E+03	3.3231E+03
	4.8827E+00	-7.9016E+00	-1.7634E+00	1.2784E+01	2.2912E+01
3	5.2015E+02	-7.9610E+02	2.3342E+02	1.3162E+03	2.6193E+03
	3.5863E+00	-5.4889E+00	1.6094E+00	9.0752E+00	1.8059E+01
4	1.1033E+03	-1.5275E+03	-3.9652E+02	2.6307E+03	5.1992E+03
	7.6066E+00	-1.0531E+01	-2.7339E+00	1.8138E+01	3.5847E+01
5	5.5549E+02	-6.8823E+02	-6.5573E+02	1.2437E+03	2.3464E+03
	3.8300E+00	-4.7452E+00	-4.5211E+00	8.5752E+00	1.6178E+01
6	7.1954E+02	-1.0580E+03	-1.8710E+02	1.7776E+03	3.1965E+03
	4.9610E+00	-7.2949E+00	-1.2900E+00	1.2256E+01	2.2039E+01
7	4.4063E+03	-1.5804E+04	-3.5164E+03	2.0210E+04	3.9888E+04
	3.0380E+01	-1.0896E+02	-2.4244E+01	1.3935E+02	2.7502E+02
8	4.2702E+03	-1.7416E+04	-7.9399E+03	2.1686E+04	3.4338E+04
	2.9442E+01	-1.2008E+02	-5.4743E+01	1.4952E+02	2.3676E+02
9	6.9602E+02	-8.8230E+03	-1.1013E+04	9.5190E+03	1.1352E+04
	4.7989E+00	-6.0833E+01	-7.5931E+01	6.5631E+01	7.8267E+01
10	-3.0038E+02	-3.0926E+03	-2.4286E+03	2.7923E+03	3.8351E+03
	-2.0710E+00	-2.1323E+01	-1.6745E+01	1.9252E+01	2.6442E+01
11	-3.1420E+02	-3.0764E+03	-2.5979E+03	2.7623E+03	3.7715E+03
	-2.1663E+00	-2.1211E+01	-1.7912E+01	1.9045E+01	2.6003E+01
12	-3.1753E+02	-3.0716E+03	-2.6512E+03	2.7541E+03	3.7515E+03
	-2.1893E+00	-2.1178E+01	-1.8280E+01	1.8989E+01	2.5865E+01
13	-4.0393E+02	-4.8272E+03	-4.1735E+02	4.4233E+03	8.8874E+03
	-2.7850E+00	-3.3283E+01	-2.8776E+00	3.0498E+01	6.1276E+01
14	-1.2071E+03	-5.9117E+03	-2.9736E+03	4.7046E+03	2.0697E+03
	-8.3226E+00	-4.0760E+01	-2.0502E+01	3.2437E+01	1.4270E+01
15	1.4605E+01	-7.0925E+03	-7.0393E+03	7.1071E+03	2.4338E+03
	1.0070E-01	-4.8901E+01	-4.8534E+01	4.9002E+01	1.6780E+01

16	-6.2351E+02	-9.0849E+03	-6.2343E+02	8.4614E+03	5.2995E+03
	-4.2989E+00	-6.2638E+01	-4.2984E+00	5.8339E+01	3.6539E+01
17	-5.9627E+02	-7.9010E+03	6.7211E+02	7.3048E+03	5.0378E+03
	-4.1112E+00	-5.4476E+01	4.6340E+00	5.0364E+01	3.4734E+01
18	-2.7271E+00	-2.3277E+02	-2.2969E+02	2.3005E+02	7.6154E+01
	-1.8803E-02	-1.6049E+00	-1.5837E+00	1.5861E+00	5.2506E-01
19	1.0167E+01	-7.7538E+01	2.0672E+02	8.7705E+01	1.4785E+02
	7.0100E-02	-5.3460E-01	1.4253E+00	6.0470E-01	1.0194E+00
20	5.8628E+01	-9.5649E+01	1.3084E+01	1.5428E+02	1.4477E+02
	4.0423E-01	-6.5948E-01	9.0212E-02	1.0637E+00	9.9818E-01
21	5.4644E+02	-6.6521E+02	4.2205E+03	1.2117E+03	1.2987E+03
	3.7675E+00	-4.5865E+00	2.9099E+01	8.3540E+00	8.9545E+00
22	2.1422E+01	-1.5120E+03	5.5231E+03	1.5334E+03	2.4368E+02
	1.4770E-01	-1.0425E+01	3.8081E+01	1.0573E+01	1.6801E+00
23	-8.8124E+01	-4.0822E+03	1.4511E+03	3.9941E+03	1.4726E+02
	-6.0759E-01	-2.8146E+01	1.0005E+01	2.7538E+01	1.0153E+00
24	7.7761E-01	-8.8400E+02	-8.8030E+02	8.8478E+02	7.7260E+02
	5.3614E-03	-6.0950E+00	-6.0695E+00	6.1003E+00	5.3269E+00
25	-5.0987E+00	-1.3156E+03	-1.3106E+03	1.3105E+03	7.6450E+02
	-3.5154E-02	-9.0710E+00	-9.0362E+00	9.0358E+00	5.2711E+00

Allowable Stress for Load Case 105

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	393.33	387.82	20.00	22.40	61.80
2	410.52	401.11	18.70	20.70	59.70
3	370.92	354.17	20.00	22.40	61.80
4	411.50	391.84	20.00	22.40	61.80
5	394.57	389.06	20.00	22.40	61.80
6	411.61	402.37	18.70	20.70	59.70
7	436.26	434.45	18.70	20.70	59.70
8	461.22	456.63	18.70	20.70	59.70
9	475.39	470.23	18.70	20.70	59.70
10	503.16	490.43	18.70	20.70	59.70
11	503.44	490.73	18.70	20.70	59.70
12	503.10	490.36	18.70	20.70	59.70
13	492.44	479.38	18.70	20.70	59.70
14	499.80	476.74	18.70	20.70	59.70
15	530.77	503.31	17.40	19.40	59.20
16	454.66	447.35	18.70	20.70	59.70
17	439.64	437.14	18.70	20.70	59.70
18	446.96	446.08	18.70	20.70	59.70
19	444.82	443.34	18.70	20.70	59.70
20	446.33	444.45	18.70	20.70	59.70
21	450.52	449.32	18.70	20.70	59.70
22	452.93	451.42	18.70	20.70	59.70
23	488.20	480.15	18.70	20.70	59.70
24	426.52	424.95	18.70	20.70	59.70
25	430.49	429.09	18.70	20.70	59.70

Table 2-235. Load Case 106, -20°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.5172E+02	-6.8640E+02	-6.2783E+02	1.2381E+03	2.3467E+03
	3.8039E+00	-4.7326E+00	-4.3288E+00	8.5365E+00	1.6180E+01
2	6.5087E+02	-1.2389E+03	-2.5193E+02	1.8898E+03	3.5121E+03
	4.4876E+00	-8.5419E+00	-1.7370E+00	1.3029E+01	2.4215E+01
3	5.1743E+02	-7.9033E+02	2.2570E+02	1.3078E+03	2.6031E+03
	3.5675E+00	-5.4492E+00	1.5561E+00	9.0167E+00	1.7948E+01
4	1.1199E+03	-1.4974E+03	-3.9829E+02	2.6172E+03	5.1577E+03
	7.7212E+00	-1.0324E+01	-2.7461E+00	1.8045E+01	3.5561E+01
5	5.4787E+02	-6.7849E+02	-6.4727E+02	1.2264E+03	2.3138E+03
	3.7774E+00	-4.6780E+00	-4.4628E+00	8.4555E+00	1.5953E+01
6	7.3838E+02	-1.0319E+03	-1.9520E+02	1.7703E+03	3.1448E+03
	5.0910E+00	-7.1146E+00	-1.3459E+00	1.2206E+01	2.1682E+01
7	5.2926E+03	-1.7721E+04	-3.9652E+03	2.3014E+04	4.5377E+04
	3.6491E+01	-1.2218E+02	-2.7339E+01	1.5867E+02	3.1286E+02
8	5.1311E+03	-1.9488E+04	-8.3215E+03	2.4619E+04	3.8953E+04
	3.5378E+01	-1.3436E+02	-5.7375E+01	1.6974E+02	2.6857E+02
9	8.0639E+02	-9.9230E+03	-1.1683E+04	1.0729E+04	1.3226E+04
	5.5598E+00	-6.8417E+01	-8.0552E+01	7.3977E+01	9.1192E+01
10	-4.0809E+02	-3.3774E+03	-2.5784E+03	2.9693E+03	3.8127E+03
	-2.8137E+00	-2.3287E+01	-1.7778E+01	2.0473E+01	2.6287E+01
11	-4.2377E+02	-3.3590E+03	-2.7612E+03	2.9352E+03	3.7407E+03
	-2.9218E+00	-2.3159E+01	-1.9038E+01	2.0237E+01	2.5791E+01
12	-4.2677E+02	-3.3545E+03	-2.8114E+03	2.9278E+03	3.7224E+03
	-2.9425E+00	-2.3129E+01	-1.9384E+01	2.0186E+01	2.5665E+01
13	-6.6082E+02	-4.9413E+03	-6.8570E+02	4.2805E+03	8.6636E+03
	-4.5562E+00	-3.4069E+01	-4.7277E+00	2.9513E+01	5.9733E+01
14	-1.1941E+03	-5.9828E+03	-3.0739E+03	4.7887E+03	2.2598E+03
	-8.2328E+00	-4.1250E+01	-2.1194E+01	3.3017E+01	1.5581E+01
15	1.3572E+01	-7.1757E+03	-7.1233E+03	7.1893E+03	2.6259E+03
	9.3576E-02	-4.9475E+01	-4.9113E+01	4.9569E+01	1.8105E+01

16	-6.1070E+02	-9.5680E+03	-7.9126E+02	8.9573E+03	5.9617E+03
	-4.2106E+00	-6.5969E+01	-5.4556E+00	6.1758E+01	4.1104E+01
17	-5.7912E+02	-8.3420E+03	4.8971E+02	7.7629E+03	5.7659E+03
	-3.9929E+00	-5.7516E+01	3.3764E+00	5.3523E+01	3.9755E+01
18	-2.8480E+00	-2.3311E+02	-2.2992E+02	2.3026E+02	7.2265E+01
	-1.9637E-02	-1.6072E+00	-1.5853E+00	1.5876E+00	4.9825E-01
19	9.8573E+00	-7.7559E+01	2.0610E+02	8.7416E+01	1.4785E+02
	6.7964E-02	-5.3475E-01	1.4210E+00	6.0271E-01	1.0194E+00
20	5.8230E+01	-9.5272E+01	1.3963E+01	1.5350E+02	1.4326E+02
	4.0148E-01	-6.5688E-01	9.6272E-02	1.0584E+00	9.8771E-01
21	5.4381E+02	-6.6298E+02	4.2015E+03	1.2068E+03	1.2910E+03
	3.7495E+00	-4.5711E+00	2.8968E+01	8.3206E+00	8.9008E+00
22	1.9977E+01	-1.5054E+03	5.4900E+03	1.5254E+03	2.5252E+02
	1.3774E-01	-1.0379E+01	3.7852E+01	1.0517E+01	1.7411E+00
23	-8.6502E+01	-4.0600E+03	1.4381E+03	3.9735E+03	1.3353E+02
	-5.9641E-01	-2.7993E+01	9.9154E+00	2.7396E+01	9.2063E-01
24	1.2032E+00	-8.7447E+02	-8.7038E+02	8.7568E+02	8.8541E+02
	8.2958E-03	-6.0293E+00	-6.0011E+00	6.0376E+00	6.1047E+00
25	-5.1730E+00	-1.2981E+03	-1.2932E+03	1.2930E+03	7.3370E+02
	-3.5667E-02	-8.9504E+00	-8.9161E+00	8.9147E+00	5.0587E+00

Allowable Stress for Load Case 106

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	413.70	408.22	18.70	20.70	59.70
2	430.76	421.43	18.70	20.70	59.70
3	391.60	375.06	20.00	22.40	61.80
4	431.76	412.31	18.70	20.70	59.70
5	414.89	409.41	18.70	20.70	59.70
6	431.82	422.64	18.70	20.70	59.70
7	456.29	454.52	18.70	20.70	59.70
8	481.08	476.53	18.70	20.70	59.70
9	495.12	490.00	18.70	20.70	59.70
10	522.56	509.93	17.40	19.40	59.20
11	522.85	510.24	17.40	19.40	59.20
12	522.50	509.87	17.40	19.40	59.20
13	512.01	499.07	18.70	20.70	59.70
14	519.39	496.55	18.70	20.70	59.70
15	550.20	522.98	17.40	19.40	59.20
16	474.65	467.40	18.70	20.70	59.70
17	459.74	457.24	18.70	20.70	59.70
18	466.60	465.73	18.70	20.70	59.70
19	464.46	462.99	18.70	20.70	59.70
20	465.96	464.10	18.70	20.70	59.70
21	470.25	469.05	18.70	20.70	59.70
22	472.70	471.19	18.70	20.70	59.70
23	507.75	499.76	18.70	20.70	59.70
24	446.59	445.03	18.70	20.70	59.70
25	450.53	449.14	18.70	20.70	59.70

Table 2-236. Load Case 201, Maximum Internal Pressure, 1,517 kPa (220 psia), Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-8.4024E+00	-1.5149E+01	-6.5658E+01	6.7468E+00	2.7045E+00
	-5.7933E-02	-1.0445E-01	-4.5269E-01	4.6518E-02	1.8647E-02
2	6.6368E+00	-3.1767E+00	-1.0501E+01	9.8135E+00	2.0563E+00
	4.5759E-02	-2.1903E-02	-7.2405E-02	6.7662E-02	1.4178E-02
3	-8.5608E+00	-1.4816E+01	-6.5103E+01	6.2547E+00	1.0086E-01
	-5.9025E-02	-1.0215E-01	-4.4887E-01	4.3125E-02	6.9544E-04
4	8.4350E+00	-4.4046E-01	-2.4887E+00	8.8754E+00	1.7101E+00
	5.8157E-02	-3.0369E-03	-1.7159E-02	6.1194E-02	1.1791E-02
5	-8.4193E+00	-1.5062E+01	-6.5880E+01	6.6429E+00	2.2583E+00
	-5.8049E-02	-1.0385E-01	-4.5423E-01	4.5801E-02	1.5571E-02
6	7.3696E+00	-2.4577E+00	-8.2996E+00	9.8273E+00	7.0026E+00
	5.0811E-02	-1.6945E-02	-5.7224E-02	6.7757E-02	4.8282E-02
7	2.8009E+03	-1.2622E+03	1.2506E+03	4.0630E+03	7.2780E+03
	1.9311E+01	-8.7024E+00	8.6222E+00	2.8014E+01	5.0180E+01
8	2.2943E+03	-1.1342E+03	1.2535E+03	3.4285E+03	5.6820E+03
	1.5818E+01	-7.8201E+00	8.6424E+00	2.3638E+01	3.9176E+01
9	9.5714E+02	-3.7893E+02	1.5665E+03	1.3361E+03	1.6979E+03
	6.5992E+00	-2.6126E+00	1.0801E+01	9.2119E+00	1.1707E+01
10	2.1854E+01	-9.7078E+01	8.4913E+02	1.1893E+02	6.6938E+00
	1.5068E-01	-6.6933E-01	5.8545E+00	8.2001E-01	4.6152E-02
11	2.1454E+01	-9.6913E+01	8.6353E+02	1.1837E+02	1.9168E-01
	1.4792E-01	-6.6819E-01	5.9539E+00	8.1611E-01	1.3216E-03
12	2.1386E+01	-9.7158E+01	8.8747E+02	1.1854E+02	9.2109E+00
	1.4745E-01	-6.6988E-01	6.1189E+00	8.1734E-01	6.3507E-02
13	4.0890E+02	-2.4002E+02	1.0376E+02	6.4892E+02	7.6682E+02
	2.8193E+00	-1.6549E+00	7.1539E-01	4.4742E+00	5.2870E+00
14	2.7103E+02	-1.4417E+02	7.2516E+01	4.1519E+02	1.8189E+02
	1.8687E+00	-9.9399E-01	4.9998E-01	2.8626E+00	1.2541E+00
15	-9.7665E+00	-3.8010E+02	-1.7071E+01	3.7033E+02	3.4393E+02
	-6.7337E-02	-2.6207E+00	-1.1770E-01	2.5533E+00	2.3713E+00

16	6.5400E+01	-4.9040E+02	-7.1997E+01	5.5580E+02	4.3983E+02
	4.5092E-01	-3.3812E+00	-4.9641E-01	3.8321E+00	3.0325E+00
17	7.6739E+01	-4.3983E+02	-8.3752E+01	5.1657E+02	5.6334E+02
	5.2909E-01	-3.0325E+00	-5.7745E-01	3.5616E+00	3.8841E+00
18	7.4264E+00	-3.0969E+03	-1.0137E+03	3.1043E+03	4.7853E+03
	5.1204E-02	-2.1352E+01	-6.9894E+00	2.1403E+01	3.2993E+01
19	3.7868E+02	-2.0379E+03	-1.0248E+03	2.4166E+03	3.6431E+03
	2.6109E+00	-1.4051E+01	-7.0658E+00	1.6662E+01	2.5118E+01
20	5.2357E+01	-1.6440E+03	-8.2506E+02	1.6963E+03	2.6914E+03
	3.6099E-01	-1.1335E+01	-5.6886E+00	1.1696E+01	1.8557E+01
21	1.4095E+01	-1.6143E+03	-7.8817E+02	1.6284E+03	2.5487E+03
	9.7182E-02	-1.1130E+01	-5.4342E+00	1.1228E+01	1.7573E+01
22	4.5317E+02	-2.1960E+03	-9.5851E+02	2.6491E+03	4.1370E+03
	3.1245E+00	-1.5141E+01	-6.6087E+00	1.8265E+01	2.8523E+01
23	3.8730E+02	-1.8573E+03	-7.4123E+02	2.2446E+03	4.2318E+03
	2.6704E+00	-1.2805E+01	-5.1106E+00	1.5476E+01	2.9177E+01
24	-4.0808E+00	-1.8618E+02	-1.7994E+01	1.8210E+02	3.1540E+02
	-2.8136E-02	-1.2837E+00	-1.2406E-01	1.2555E+00	2.1746E+00
25	8.6369E+02	-6.3566E+02	3.6655E+02	1.4993E+03	2.9081E+03
	5.9549E+00	-4.3827E+00	2.5273E+00	1.0338E+01	2.0050E+01

Table 2-237. Load Case 202, Minimum External Pressure, 24 kPa (3.5 psia), Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.9936E+00	-3.6737E+00	-1.5532E+01	1.6801E+00	8.2821E-01
	-1.3745E-02	-2.5329E-02	-1.0709E-01	1.1584E-02	5.7103E-03
2	-2.8216E-01	-3.4700E+00	-8.5588E-01	3.1878E+00	9.2560E-01
	-1.9455E-03	-2.3925E-02	-5.9011E-03	2.1979E-02	6.3818E-03
3	-2.0443E+00	-3.5609E+00	-1.5425E+01	1.5166E+00	6.0362E-02
	-1.4095E-02	-2.4552E-02	-1.0635E-01	1.0457E-02	4.1618E-04
4	-1.0814E-01	-3.1255E+00	-7.1165E-01	3.0173E+00	1.1409E-02
	-7.4563E-04	-2.1549E-02	-4.9066E-03	2.0804E-02	7.8663E-05
5	-1.9890E+00	-3.6621E+00	-1.5612E+01	1.6731E+00	7.8548E-01
	-1.3714E-02	-2.5250E-02	-1.0764E-01	1.1536E-02	5.4157E-03
6	-3.0689E-01	-3.6385E+00	-6.2273E-01	3.3317E+00	9.4937E-01
	-2.1159E-03	-2.5087E-02	-4.2936E-03	2.2971E-02	6.5457E-03
7	1.1314E+02	-4.8945E+01	7.1222E+01	1.6208E+02	2.7028E+02
	7.8007E-01	-3.3746E-01	4.9106E-01	1.1175E+00	1.8635E+00
8	7.5212E+01	-4.3874E+01	7.3601E+01	1.1909E+02	1.9991E+02
	5.1857E-01	-3.0250E-01	5.0746E-01	8.2106E-01	1.3783E+00
9	2.3016E+01	-2.0981E+01	8.4134E+01	4.3997E+01	4.3285E+01
	1.5869E-01	-1.4466E-01	5.8009E-01	3.0335E-01	2.9844E-01
10	-6.4631E+00	-1.2285E+01	5.7294E+01	5.8221E+00	4.8840E-02
	-4.4561E-02	-8.4704E-02	3.9503E-01	4.0142E-02	3.3674E-04
11	-6.4755E+00	-1.2272E+01	5.7688E+01	5.7961E+00	7.7989E-03
	-4.4647E-02	-8.4610E-02	3.9774E-01	3.9963E-02	5.3771E-05
12	-6.4263E+00	-1.2335E+01	5.9309E+01	5.9083E+00	4.9178E-01
	-4.4308E-02	-8.5044E-02	4.0892E-01	4.0736E-02	3.3907E-03
13	2.1088E+01	-2.4914E+01	5.4155E+00	4.6001E+01	4.6971E+01
	1.4540E-01	-1.7177E-01	3.7338E-02	3.1717E-01	3.2385E-01
14	1.5953E+01	-1.0520E+01	3.9919E+00	2.6473E+01	6.5664E+00
	1.0999E-01	-7.2533E-02	2.7523E-02	1.8252E-01	4.5274E-02
15	-3.9084E+00	-3.9117E+01	-3.0845E+00	3.5209E+01	2.3726E+00
	-2.6948E-02	-2.6970E-01	-2.1267E-02	2.4275E-01	1.6358E-02

16	8.0653E+00	-4.3587E+01	-6.7230E+00	5.1652E+01	4.3330E+01
	5.5608E-02	-3.0052E-01	-4.6353E-02	3.5613E-01	2.9875E-01
17	7.8800E+00	-3.7153E+01	-6.9863E+00	4.5033E+01	4.7213E+01
	5.4330E-02	-2.5616E-01	-4.8169E-02	3.1049E-01	3.2552E-01
18	4.9832E-01	-2.0692E+02	-6.7735E+01	2.0742E+02	3.1975E+02
	3.4358E-03	-1.4267E+00	-4.6701E-01	1.4301E+00	2.2046E+00
19	2.5302E+01	-1.3617E+02	-6.8476E+01	1.6147E+02	2.4342E+02
	1.7445E-01	-9.3885E-01	-4.7212E-01	1.1133E+00	1.6783E+00
20	3.4983E+00	-1.0985E+02	-5.5129E+01	1.1335E+02	1.7984E+02
	2.4120E-02	-7.5738E-01	-3.8010E-01	7.8150E-01	1.2399E+00
21	9.4187E-01	-1.0787E+02	-5.2664E+01	1.0881E+02	1.7030E+02
	6.4940E-03	-7.4372E-01	-3.6310E-01	7.5021E-01	1.1742E+00
22	3.0280E+01	-1.4673E+02	-6.4046E+01	1.7701E+02	2.7643E+02
	2.0877E-01	-1.0117E+00	-4.4158E-01	1.2205E+00	1.9059E+00
23	2.5879E+01	-1.2410E+02	-4.9527E+01	1.4998E+02	2.8276E+02
	1.7843E-01	-8.5563E-01	-3.4148E-01	1.0341E+00	1.9496E+00
24	-2.2938E+00	-3.0948E+01	-3.0838E+00	2.8654E+01	2.7117E+01
	-1.5815E-02	-2.1338E-01	-2.1262E-02	1.9757E-01	1.8697E-01
25	4.5120E+01	-3.5498E+01	2.0310E+01	8.0618E+01	1.5504E+02
	3.1109E-01	-2.4475E-01	1.4003E-01	5.5584E-01	1.0690E+00

Table 2-238. Load Case 203, Maximum Increase External Pressure, 140 kPa (20 psia), Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.1381E+01	-2.1129E+01	-8.8609E+01	9.7478E+00	5.0466E+00
	-7.8471E-02	-1.4568E-01	-6.1094E-01	6.7209E-02	3.4795E-02
2	-1.3186E+00	-2.7055E+01	-2.3312E+00	2.5736E+01	7.2655E+00
	-9.0916E-03	-1.8654E-01	-1.6073E-02	1.7744E-01	5.0094E-02
3	-1.1690E+01	-2.0432E+01	-8.8022E+01	8.7414E+00	4.0129E-01
	-8.0603E-02	-1.4087E-01	-6.0689E-01	6.0270E-02	2.7668E-03
4	-6.2308E-01	-2.5641E+01	-4.2535E+00	2.5018E+01	5.3173E-01
	-4.2960E-03	-1.7679E-01	-2.9327E-02	1.7249E-01	3.6662E-03
5	-1.1336E+01	-2.1084E+01	-8.9113E+01	9.7475E+00	4.9141E+00
	-7.8161E-02	-1.4537E-01	-6.1441E-01	6.7206E-02	3.3881E-02
6	-1.7209E+00	-2.8610E+01	-1.5032E+00	2.6889E+01	9.4278E+00
	-1.1865E-02	-1.9726E-01	-1.0364E-02	1.8539E-01	6.5002E-02
7	1.3413E+02	-2.8329E+02	-2.0824E+00	4.1742E+02	8.1512E+02
	9.2481E-01	-1.9532E+00	-1.4357E-02	2.8780E+00	5.6201E+00
8	1.3071E+02	-3.3351E+02	1.5368E+01	4.6422E+02	6.9592E+02
	9.0123E-01	-2.2995E+00	1.0596E-01	3.2007E+00	4.7982E+00
9	6.3437E+00	-1.9088E+02	-2.5607E+01	1.9722E+02	3.1004E+02
	4.3738E-02	-1.3161E+00	-1.7656E-01	1.3598E+00	2.1376E+00
10	-6.4755E+00	-8.3533E+01	6.0145E+01	7.7057E+01	1.8477E+00
	-4.4647E-02	-5.7594E-01	4.1468E-01	5.3129E-01	1.2739E-02
11	-6.4766E+00	-8.3452E+01	5.7635E+01	7.6976E+01	2.5830E-02
	-4.4655E-02	-5.7538E-01	3.9738E-01	5.3073E-01	1.7809E-04
12	-6.4563E+00	-8.3433E+01	5.9126E+01	7.6977E+01	4.6134E-01
	-4.4514E-02	-5.7525E-01	4.0766E-01	5.3074E-01	3.1809E-03
13	-7.6786E-01	-8.4787E+01	3.4596E+00	8.4020E+01	9.3802E+00
	-5.2942E-03	-5.8459E-01	2.3853E-02	5.7929E-01	6.4674E-02
14	8.2026E+00	-2.3146E+01	-1.1782E+00	3.1349E+01	2.1620E+01
	5.6555E-02	-1.5959E-01	-8.1234E-03	2.1614E-01	1.4906E-01
15	-1.1032E+01	-1.4240E+02	-1.5204E+01	1.3136E+02	1.4111E+02
	-7.6062E-02	-9.8179E-01	-1.0483E-01	9.0573E-01	9.7290E-01

16	2.4636E+01	-9.4692E+01	-1.8551E+01	1.1933E+02	1.1668E+02
	1.6986E-01	-6.5288E-01	-1.2791E-01	8.2274E-01	8.0445E-01
17	1.8998E+01	-7.3610E+01	-1.5786E+01	9.2609E+01	7.8201E+01
	1.3099E-01	-5.0753E-01	-1.0884E-01	6.3852E-01	5.3918E-01
18	4.8183E-01	-2.0694E+02	-6.7738E+01	2.0743E+02	3.1974E+02
	3.3221E-03	-1.4268E+00	-4.6704E-01	1.4302E+00	2.2045E+00
19	2.5303E+01	-1.3617E+02	-6.8477E+01	1.6147E+02	2.4343E+02
	1.7446E-01	-9.3887E-01	-4.7213E-01	1.1133E+00	1.6784E+00
20	3.4984E+00	-1.0985E+02	-5.5129E+01	1.1335E+02	1.7984E+02
	2.4120E-02	-7.5739E-01	-3.8010E-01	7.8151E-01	1.2400E+00
21	9.4313E-01	-1.0787E+02	-5.2664E+01	1.0882E+02	1.7031E+02
	6.5027E-03	-7.4375E-01	-3.6310E-01	7.5026E-01	1.1743E+00
22	3.0283E+01	-1.4674E+02	-6.4048E+01	1.7702E+02	2.7644E+02
	2.0879E-01	-1.0117E+00	-4.4160E-01	1.2205E+00	1.9060E+00
23	2.5882E+01	-1.2410E+02	-4.9529E+01	1.4998E+02	2.8277E+02
	1.7845E-01	-8.5565E-01	-3.4149E-01	1.0341E+00	1.9496E+00
24	-1.3955E+01	-1.5472E+02	-1.5569E+01	1.4077E+02	7.4468E+01
	-9.6217E-02	-1.0668E+00	-1.0735E-01	9.7057E-01	5.1344E-01
25	1.2723E+01	-3.9169E+01	-6.3536E+00	5.1892E+01	1.0028E+02
	8.7724E-02	-2.7006E-01	-4.3806E-02	3.5778E-01	6.9139E-01

Table 2-239. Load Case 204, Additional Increased External Pressure, 2 MPa (290 psia), Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.6500E+02	-3.0674E+02	-1.2844E+03	1.4174E+02	7.4017E+01
	-1.1376E+00	-2.1149E+00	-8.8559E+00	9.7726E-01	5.1033E-01
2	-1.8219E+01	-4.1179E+02	-2.6921E+01	3.9357E+02	1.1062E+02
	-1.2562E-01	-2.8392E+00	-1.8562E-01	2.7136E+00	7.6269E-01
3	-1.6953E+02	-2.9649E+02	-1.2760E+03	1.2695E+02	5.9714E+00
	-1.1689E+00	-2.0442E+00	-8.7977E+00	8.7530E-01	4.1172E-02
4	-9.0482E+00	-3.9266E+02	-6.2188E+01	3.8361E+02	9.3328E+00
	-6.2385E-02	-2.7073E+00	-4.2877E-01	2.6449E+00	6.4347E-02
5	-1.6429E+02	-3.0614E+02	-1.2919E+03	1.4185E+02	7.2402E+01
	-1.1328E+00	-2.1108E+00	-8.9071E+00	9.7799E-01	4.9920E-01
6	-2.4788E+01	-4.3594E+02	-1.6056E+01	4.1115E+02	1.4767E+02
	-1.7091E-01	-3.0057E+00	-1.1070E-01	2.8348E+00	1.0182E+00
7	3.0551E+03	-6.6435E+03	-1.1749E+03	9.6987E+03	1.8343E+04
	2.1064E+01	-4.5805E+01	-8.1005E+00	6.6870E+01	1.2647E+02
8	2.8504E+03	-6.8346E+03	-9.1447E+02	9.6850E+03	1.5182E+04
	1.9653E+01	-4.7123E+01	-6.3051E+00	6.6776E+01	1.0468E+02
9	4.1840E+02	-3.6111E+03	-1.7880E+03	4.0295E+03	6.0151E+03
	2.8848E+00	-2.4898E+01	-1.2328E+01	2.7782E+01	4.1473E+01
10	-6.3934E+00	-1.2280E+03	1.0610E+02	1.2216E+03	3.2647E+01
	-4.4081E-02	-8.4665E+00	7.3152E-01	8.4224E+00	2.2509E-01
11	-6.4916E+00	-1.2265E+03	5.6794E+01	1.2200E+03	5.6946E-01
	-4.4758E-02	-8.4566E+00	3.9158E-01	8.4118E+00	3.9263E-03
12	-6.2502E+00	-1.2258E+03	5.5856E+01	1.2196E+03	1.6208E+01
	-4.3093E-02	-8.4519E+00	3.8511E-01	8.4088E+00	1.1175E-01
13	-1.3701E+02	-1.2656E+03	-1.9503E+01	1.1286E+03	6.1619E+02
	-9.4463E-01	-8.7262E+00	-1.3447E-01	7.7816E+00	4.2485E+00
14	1.6306E+02	-5.1157E+02	-8.5122E+01	6.7463E+02	4.7333E+02
	1.1243E+00	-3.5272E+00	-5.8689E-01	4.6514E+00	3.2635E+00
15	-1.0466E+02	-1.8535E+03	-2.1261E+02	1.7488E+03	2.4972E+03
	-7.2163E-01	-1.2779E+01	-1.4659E+00	1.2058E+01	1.7218E+01

16	2.9959E+02	-9.2093E+02	-2.1108E+02	1.2205E+03	1.2959E+03
	2.0656E+00	-6.3496E+00	-1.4553E+00	8.4152E+00	8.9346E+00
17	2.0379E+02	-6.6353E+02	-1.5894E+02	8.6732E+02	5.5082E+02
	1.4051E+00	-4.5749E+00	-1.0958E+00	5.9800E+00	3.7978E+00
18	2.7472E-01	-2.0721E+02	-6.7781E+01	2.0748E+02	3.1971E+02
	1.8941E-03	-1.4286E+00	-4.6734E-01	1.4305E+00	2.2043E+00
19	2.5306E+01	-1.3619E+02	-6.8481E+01	1.6149E+02	2.4346E+02
	1.7448E-01	-9.3898E-01	-4.7216E-01	1.1135E+00	1.6786E+00
20	3.4942E+00	-1.0986E+02	-5.5127E+01	1.1336E+02	1.7986E+02
	2.4091E-02	-7.5749E-01	-3.8009E-01	7.8158E-01	1.2401E+00
21	9.7049E-01	-1.0796E+02	-5.2650E+01	1.0893E+02	1.7052E+02
	6.6913E-03	-7.4437E-01	-3.6301E-01	7.5106E-01	1.1757E+00
22	3.0349E+01	-1.4687E+02	-6.4082E+01	1.7722E+02	2.7679E+02
	2.0925E-01	-1.0127E+00	-4.4183E-01	1.2219E+00	1.9084E+00
23	2.5997E+01	-1.2435E+02	-4.9574E+01	1.5035E+02	2.8347E+02
	1.7924E-01	-8.5738E-01	-3.4180E-01	1.0366E+00	1.9545E+00
24	-2.0330E+02	-2.1820E+03	-2.1988E+02	1.9787E+03	8.5477E+02
	-1.4017E+00	-1.5044E+01	-1.5160E+00	1.3643E+01	5.8935E+00
25	7.8055E+02	-1.3919E+03	-4.3732E+02	2.1724E+03	4.2437E+03
	5.3817E+00	-9.5965E+00	-3.0152E+00	1.4978E+01	2.9260E+01

Table 2-240. Load Case 211, Fabrication Stress, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.0156E+01	-5.5174E+02	4.2251E+03	6.2189E+02	4.0815E+02
	4.8371E-01	-3.8041E+00	2.9131E+01	4.2878E+00	2.8141E+00
2	7.0344E+02	-1.8052E+03	-3.2178E+03	2.5086E+03	1.5771E+02
	4.8500E+00	-1.2446E+01	-2.2186E+01	1.7296E+01	1.0874E+00
3	-4.2396E-01	-5.0653E+02	4.1407E+03	5.0610E+02	1.4773E+01
	-2.9231E-03	-3.4924E+00	2.8549E+01	3.4894E+00	1.0186E-01
4	-2.2905E+01	-6.6366E+02	-4.3361E+03	6.4076E+02	3.0941E+02
	-1.5792E-01	-4.5758E+00	-2.9896E+01	4.4179E+00	2.1333E+00
5	6.2751E+01	-5.5356E+02	4.2692E+03	6.1631E+02	3.8451E+02
	4.3265E-01	-3.8166E+00	2.9435E+01	4.2493E+00	2.6511E+00
6	3.9043E+02	-2.1740E+03	-3.1787E+03	2.5644E+03	8.5159E+02
	2.6919E+00	-1.4989E+01	-2.1916E+01	1.7681E+01	5.8715E+00
7	5.9816E+02	-2.5814E+03	-3.6018E+03	3.1796E+03	4.3410E+03
	4.1242E+00	-1.7798E+01	-2.4833E+01	2.1922E+01	2.9930E+01
8	5.5161E+02	-1.9550E+03	-4.0761E+03	2.5066E+03	1.8300E+03
	3.8032E+00	-1.3479E+01	-2.8104E+01	1.7282E+01	1.2618E+01
9	9.1635E+02	-5.1562E+02	-2.7666E+03	1.4320E+03	2.2394E+03
	6.3180E+00	-3.5550E+00	-1.9075E+01	9.8731E+00	1.5440E+01
10	3.6674E+02	5.5438E-01	-5.1039E+00	3.6619E+02	5.5226E+01
	2.5286E+00	3.8223E-03	-3.5190E-02	2.5248E+00	3.8077E-01
11	3.6423E+02	-1.6469E-02	8.7467E-01	3.6425E+02	1.6415E+00
	2.5113E+00	-1.1355E-04	6.0306E-03	2.5114E+00	1.1318E-02
12	3.6578E+02	2.5815E-01	-1.2042E+01	3.6552E+02	3.3387E+01
	2.5219E+00	1.7799E-03	-8.3028E-02	2.5202E+00	2.3019E-01
13	5.5837E+02	-4.0245E+02	1.8431E+02	9.6082E+02	1.4296E+03
	3.8498E+00	-2.7748E+00	1.2708E+00	6.6246E+00	9.8570E+00
14	-1.1358E+02	-1.3527E+03	-1.2966E+03	1.2391E+03	1.4778E+03
	-7.8313E-01	-9.3267E+00	-8.9396E+00	8.5436E+00	1.0189E+01
15	2.0064E+01	-1.2589E+03	-1.2397E+03	1.2789E+03	1.5090E+03
	1.3833E-01	-8.6795E+00	-8.5471E+00	8.8179E+00	1.0404E+01

16	2.0533E+02	-2.5290E+03	-2.2111E+03	2.7343E+03	3.2424E+02
	1.4157E+00	-1.7437E+01	-1.5245E+01	1.8852E+01	2.2356E+00
17	2.0538E+02	-2.4970E+03	-2.2394E+03	2.7024E+03	9.8227E+02
	1.4160E+00	-1.7216E+01	-1.5440E+01	1.8632E+01	6.7725E+00
18	1.7491E+02	-2.5801E+02	1.2046E+01	4.3292E+02	6.2216E+02
	1.2060E+00	-1.7789E+00	8.3052E-02	2.9849E+00	4.2896E+00
19	5.0427E+02	-2.5506E+02	8.5064E+01	7.5932E+02	1.1448E+03
	3.4768E+00	-1.7586E+00	5.8650E-01	5.2353E+00	7.8929E+00
20	4.4764E+02	-7.6933E+01	-1.5443E+02	5.2457E+02	9.5959E+02
	3.0864E+00	-5.3043E-01	-1.0648E+00	3.6168E+00	6.6161E+00
21	5.2293E+02	-1.0833E+02	-2.3767E+02	6.3126E+02	1.1394E+03
	3.6055E+00	-7.4692E-01	-1.6387E+00	4.3524E+00	7.8556E+00
22	6.5796E+02	-3.7306E+02	7.6791E+00	1.0310E+03	1.4883E+03
	4.5365E+00	-2.5722E+00	5.2946E-02	7.1087E+00	1.0261E+01
23	7.7331E+02	-5.0703E+02	-6.6388E+01	1.2803E+03	2.3652E+03
	5.3318E+00	-3.4959E+00	-4.5773E-01	8.8277E+00	1.6307E+01
24	8.3863E+00	-8.4569E+01	-7.6164E+01	9.2955E+01	1.4333E+02
	5.7821E-02	-5.8308E-01	-5.2513E-01	6.4090E-01	9.8823E-01
25	7.2312E+01	-6.8757E+02	-5.7236E+02	7.5988E+02	1.2687E+03
	4.9857E-01	-4.7406E+00	-3.9463E+00	5.2392E+00	8.7475E+00

Table 2-241. Load Case 215, Compression Load (5x weight), Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5028E+01	-8.9507E+01	2.0172E+01	1.0453E+02	1.4821E+02
	1.0361E-01	-6.1713E-01	1.3908E-01	7.2074E-01	1.0219E+00
2	1.0159E+01	-1.7879E+02	4.4443E+01	1.8895E+02	4.7156E+01
	7.0045E-02	-1.2327E+00	3.0643E-01	1.3028E+00	3.2513E-01
3	1.9927E-01	-1.0519E+02	1.0485E+01	1.0539E+02	1.0069E+01
	1.3739E-03	-7.2523E-01	7.2291E-02	7.2661E-01	6.9426E-02
4	1.9921E+00	-1.7524E+02	-8.9845E+00	1.7723E+02	1.3464E+01
	1.3735E-02	-1.2082E+00	-6.1946E-02	1.2220E+00	9.2829E-02
5	7.8531E-01	-1.2079E+02	2.0004E+01	1.2157E+02	3.6365E+01
	5.4145E-03	-8.3279E-01	1.3793E-01	8.3821E-01	2.5073E-01
6	9.4098E+00	-2.0156E+02	-1.3558E+01	2.1097E+02	7.2537E+00
	6.4879E-02	-1.3897E+00	-9.3482E-02	1.4546E+00	5.0013E-02
7	2.1681E+02	-2.5775E+02	5.8567E+01	4.7455E+02	5.5049E+02
	1.4948E+00	-1.7771E+00	4.0380E-01	3.2719E+00	3.7955E+00
8	1.6150E+02	-1.9197E+02	4.8709E+01	3.5346E+02	4.2546E+02
	1.1135E+00	-1.3236E+00	3.3584E-01	2.4370E+00	2.9334E+00
9	-4.7383E+01	-2.8677E+02	-4.4353E+01	2.3939E+02	1.5046E+01
	-3.2669E-01	-1.9772E+00	-3.0580E-01	1.6505E+00	1.0374E-01
10	-4.5625E-01	-1.4718E+02	-3.4285E+00	1.4673E+02	2.2917E+00
	-3.1458E-03	-1.0148E+00	-2.3639E-02	1.0117E+00	1.5800E-02
11	-5.3840E-01	-1.0827E+02	-3.2480E+00	1.0773E+02	6.5904E-02
	-3.7121E-03	-7.4647E-01	-2.2394E-02	7.4276E-01	4.5439E-04
12	-6.5602E-01	-1.1972E+02	-4.6329E+00	1.1906E+02	1.4366E+00
	-4.5231E-03	-8.2544E-01	-3.1943E-02	8.2092E-01	9.9048E-03
13	-1.8194E+01	-2.0035E+02	-2.7052E+01	1.8215E+02	6.9956E+01
	-1.2545E-01	-1.3814E+00	-1.8652E-01	1.2559E+00	4.8233E-01
14	2.2990E+01	-7.9310E+01	-1.5026E+01	1.0230E+02	7.8981E+01
	1.5851E-01	-5.4682E-01	-1.0360E-01	7.0534E-01	5.4455E-01
15	-3.4935E+00	-1.1756E+02	-1.1037E+01	1.1406E+02	1.9217E+02
	-2.4087E-02	-8.1052E-01	-7.6099E-02	7.8643E-01	1.3250E+00

16	6.1021E+01	-1.8608E+02	-2.9159E+01	2.4710E+02	2.4059E+02
	4.2072E-01	-1.2830E+00	-2.0104E-01	1.7037E+00	1.6588E+00
17	5.6824E+01	-1.6181E+02	-2.4193E+01	2.1863E+02	1.5100E+02
	3.9179E-01	-1.1156E+00	-1.6681E-01	1.5074E+00	1.0411E+00
18	-6.7809E+02	-2.3317E+03	-4.5740E+02	1.6536E+03	9.3635E+01
	-4.6752E+00	-1.6076E+01	-3.1536E+00	1.1401E+01	6.4559E-01
19	5.8068E+01	-2.6726E+02	-8.3882E+01	3.2532E+02	3.5776E+02
	4.0036E-01	-1.8427E+00	-5.7835E-01	2.2430E+00	2.4667E+00
20	-7.5039E+01	-3.4808E+02	-1.0509E+02	2.7304E+02	2.2321E+02
	-5.1737E-01	-2.3999E+00	-7.2455E-01	1.8826E+00	1.5390E+00
21	-2.7339E+01	-1.9886E+02	-2.8427E+01	1.7152E+02	5.6535E+01
	-1.8850E-01	-1.3711E+00	-1.9600E-01	1.1826E+00	3.8979E-01
22	1.1203E+02	-1.2854E+02	2.1502E+01	2.4058E+02	2.4800E+02
	7.7243E-01	-8.8628E-01	1.4825E-01	1.6587E+00	1.7099E+00
23	1.6809E+02	-1.5210E+02	-1.0952E+01	3.2020E+02	3.1129E+02
	1.1590E+00	-1.0487E+00	-7.5512E-02	2.2077E+00	2.1462E+00
24	-1.6984E+01	-2.3732E+02	-1.5846E+01	2.2033E+02	9.5342E+01
	-1.1710E-01	-1.6363E+00	-1.0926E-01	1.5192E+00	6.5736E-01
25	-4.1270E+02	-8.2705E+02	-5.1143E+02	4.1435E+02	2.7563E+02
	-2.8455E+00	-5.7023E+00	-3.5262E+00	2.8569E+00	1.9004E+00

Table 2-242. Load Case 216, Rod Drop onto Cask, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-4.0860E-02	-1.4431E+00	7.1755E-01	1.4022E+00	1.1703E+00
	-2.8172E-04	-9.9495E-03	4.9474E-03	9.6678E-03	8.0690E-03
2	1.5460E-01	-2.9751E+00	2.9991E+00	3.1297E+00	1.2856E+00
	1.0659E-03	-2.0513E-02	2.0678E-02	2.1578E-02	8.8639E-03
3	5.1134E-03	-2.9308E+00	2.9958E-01	2.9360E+00	1.8450E-01
	3.5255E-05	-2.0207E-02	2.0655E-03	2.0243E-02	1.2721E-03
4	6.0656E-02	-5.1823E+00	-2.1661E-01	5.2429E+00	4.9969E-01
	4.1821E-04	-3.5731E-02	-1.4935E-03	3.6149E-02	3.4452E-03
5	1.6186E-02	-3.6405E+00	7.0341E-01	3.6567E+00	1.1151E+00
	1.1160E-04	-2.5101E-02	4.8499E-03	2.5212E-02	7.6881E-03
6	3.1287E-01	-6.9029E+00	-4.4370E-01	7.2158E+00	4.8260E-01
	2.1572E-03	-4.7594E-02	-3.0592E-03	4.9751E-02	3.3274E-03
7	1.6746E+01	-5.3078E+00	1.0668E+01	2.2054E+01	4.8606E+00
	1.1546E-01	-3.6596E-02	7.3556E-02	1.5206E-01	3.3513E-02
8	1.3529E+01	-8.9764E+00	6.9427E+00	2.2505E+01	7.8688E+00
	9.3279E-02	-6.1890E-02	4.7868E-02	1.5517E-01	5.4253E-02
9	-1.1416E+00	-2.8804E+01	-9.9716E-01	2.7662E+01	1.6472E+01
	-7.8712E-03	-1.9859E-01	-6.8752E-03	1.9072E-01	1.1357E-01
10	-3.6107E-02	-1.2991E+01	-4.9447E-01	1.2955E+01	1.9747E-01
	-2.4895E-04	-8.9567E-02	-3.4092E-03	8.9319E-02	1.3615E-03
11	-3.3891E-02	-7.2117E+00	-2.3788E-01	7.1778E+00	6.2446E-03
	-2.3367E-04	-4.9723E-02	-1.6401E-03	4.9489E-02	4.3055E-05
12	-3.9950E-02	-6.0610E+00	-2.4148E-01	6.0210E+00	6.5364E-02
	-2.7545E-04	-4.1789E-02	-1.6649E-03	4.1513E-02	4.5067E-04
13	-7.5034E-01	-8.7035E+00	-1.2480E+00	7.9532E+00	2.8521E+00
	-5.1734E-03	-6.0009E-02	-8.6044E-03	5.4835E-02	1.9664E-02
14	8.9446E-01	-3.3387E+00	-7.3041E-01	4.2332E+00	3.2975E+00
	6.1671E-03	-2.3020E-02	-5.0360E-03	2.9187E-02	2.2736E-02
15	-2.3993E-01	-4.8953E+00	-5.6423E-01	4.6554E+00	7.9609E+00
	-1.6543E-03	-3.3752E-02	-3.8902E-03	3.2098E-02	5.4888E-02

16	2.5346E+00	-8.2425E+00	-1.4371E+00	1.0777E+01	1.0594E+01
	1.7475E-02	-5.6830E-02	-9.9085E-03	7.4305E-02	7.3044E-02
17	2.3184E+00	-7.1495E+00	-1.2448E+00	9.4679E+00	6.6116E+00
	1.5985E-02	-4.9294E-02	-8.5828E-03	6.5279E-02	4.5586E-02
18	-1.4675E+02	-9.9414E+02	-4.5586E+01	8.4739E+02	5.7805E+01
	-1.0118E+00	-6.8544E+00	-3.1430E-01	5.8425E+00	3.9855E-01
19	1.2742E+01	-3.6663E+01	3.2291E+00	4.9405E+01	6.1786E+01
	8.7854E-02	-2.5278E-01	2.2264E-02	3.4063E-01	4.2600E-01
20	3.0384E+00	-3.3551E+01	5.2330E+00	3.6590E+01	4.8375E+01
	2.0949E-02	-2.3133E-01	3.6080E-02	2.5228E-01	3.3353E-01
21	4.7144E+00	-2.1284E+01	-2.7607E+00	2.5999E+01	2.1364E+01
	3.2505E-02	-1.4675E-01	-1.9035E-02	1.7925E-01	1.4730E-01
22	1.3142E+01	-6.9806E+00	6.5368E+00	2.0122E+01	5.4591E+00
	9.0608E-02	-4.8129E-02	4.5070E-02	1.3874E-01	3.7639E-02
23	2.1931E+01	-1.3651E+01	1.5096E+00	3.5582E+01	9.4815E+00
	1.5121E-01	-9.4118E-02	1.0408E-02	2.4533E-01	6.5373E-02
24	-6.6667E-01	-9.4575E+00	-6.2107E-01	8.7908E+00	3.7971E+00
	-4.5965E-03	-6.5207E-02	-4.2821E-03	6.0611E-02	2.6180E-02
25	-4.8661E+01	-1.4977E+03	-2.4974E+02	1.4490E+03	7.5397E+02
	-3.3551E-01	-1.0326E+01	-1.7219E+00	9.9908E+00	5.1985E+00

Table 2-243. Load Case 221, Forward 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.0090E+02	3.5262E+00	-9.0867E+00	1.1473E+02	1.4330E+01
	6.9565E-01	2.4312E-02	-6.2650E-02	7.9104E-01	9.8800E-02
2	1.0319E+02	1.6746E+01	-1.3895E+00	1.3021E+02	1.6468E+01
	7.1145E-01	1.1546E-01	-9.5804E-03	8.9779E-01	1.1354E-01
3	1.0634E+03	5.9879E+01	-8.0455E+00	1.7955E+03	5.5779E+02
	7.3322E+00	4.1285E-01	-5.5472E-02	1.2379E+01	3.8459E+00
4	3.5869E+01	4.8667E+00	-1.2085E+01	6.6400E+01	1.7895E+01
	2.4731E-01	3.3555E-02	-8.3324E-02	4.5781E-01	1.2338E-01
5	3.3413E+01	-5.0604E+00	-2.1456E+01	1.2989E+02	1.4245E+01
	2.3037E-01	-3.4890E-02	-1.4793E-01	8.9555E-01	9.8214E-02
6	3.0557E+01	-1.1655E+01	-3.9363E+01	1.3729E+02	1.5580E+01
	2.1068E-01	-8.0358E-02	-2.7140E-01	9.4660E-01	1.0742E-01
7	1.9684E+02	1.1251E+01	-6.7098E+01	2.4933E+02	3.0442E+02
	1.3571E+00	7.7571E-02	-4.6262E-01	1.7191E+00	2.0989E+00
8	7.8279E+01	-1.8874E+02	-6.1814E+02	6.3359E+02	5.0712E+02
	5.3972E-01	-1.3014E+00	-4.2619E+00	4.3684E+00	3.4965E+00
9	-4.0876E+01	-1.8714E+02	-4.0798E+02	3.6710E+02	4.1189E+02
	-2.8183E-01	-1.2903E+00	-2.8129E+00	2.5311E+00	2.8399E+00
10	1.6277E+01	-2.0498E+01	-5.7272E+01	8.5149E+01	4.2173E+00
	1.1223E-01	-1.4133E-01	-3.9488E-01	5.8708E-01	2.9077E-02
11	3.2644E+01	4.2149E-01	-1.6866E+00	3.4414E+01	5.9762E-01
	2.2507E-01	2.9061E-03	-1.1629E-02	2.3728E-01	4.1205E-03
12	1.3045E+02	8.1323E-01	-5.3464E-01	1.3253E+02	6.0636E+00
	8.9944E-01	5.6070E-03	-3.6862E-03	9.1375E-01	4.1807E-02
13	2.2939E+02	1.4002E+02	-2.4843E+01	2.5562E+02	1.5844E+02
	1.5816E+00	9.6537E-01	-1.7129E-01	1.7624E+00	1.0924E+00
14	1.1805E+02	5.7433E+01	-6.7972E+01	1.8684E+02	1.2616E+02
	8.1391E-01	3.9599E-01	-4.6865E-01	1.2882E+00	8.6985E-01
15	9.7858E+01	4.6599E+01	-3.2622E+01	1.3050E+02	1.6607E+02
	6.7471E-01	3.2129E-01	-2.2492E-01	8.9979E-01	1.1450E+00

16	4.5830E+02	1.1730E+02	-7.4118E+01	5.3199E+02	4.5226E+02
	3.1599E+00	8.0877E-01	-5.1102E-01	3.6680E+00	3.1182E+00
17	4.4188E+02	1.1959E+02	-6.6742E+01	5.1087E+02	4.8175E+02
	3.0467E+00	8.2452E-01	-4.6017E-01	3.5223E+00	3.3215E+00
18	2.7609E+01	-1.3914E+01	-7.2232E+01	9.9618E+01	1.7590E+01
	1.9036E-01	-9.5932E-02	-4.9802E-01	6.8684E-01	1.2128E-01
19	1.7376E+02	2.5883E+01	-1.7110E+01	1.7670E+02	1.0976E+02
	1.1981E+00	1.7846E-01	-1.1797E-01	1.2183E+00	7.5678E-01
20	1.1407E+02	2.3382E+01	-1.2356E+00	1.5714E+02	7.5320E+01
	7.8651E-01	1.6122E-01	-8.5190E-03	1.0835E+00	5.1931E-01
21	-1.3261E+01	-6.2160E+01	-4.2426E+02	4.1100E+02	3.9548E+02
	-9.1433E-02	-4.2858E-01	-2.9252E+00	2.8337E+00	2.7267E+00
22	9.0767E+01	-1.0513E+02	-5.9600E+02	6.2558E+02	5.2114E+02
	6.2582E-01	-7.2488E-01	-4.1093E+00	4.3132E+00	3.5932E+00
23	2.2257E+02	1.0150E+02	-3.9463E+01	2.3960E+02	2.0726E+02
	1.5346E+00	6.9983E-01	-2.7209E-01	1.6520E+00	1.4290E+00
24	2.4549E+01	-5.3954E+00	-1.0901E+02	1.3356E+02	8.8020E+01
	1.6926E-01	-3.7200E-02	-7.5159E-01	9.2085E-01	6.0688E-01
25	1.1863E+02	1.1105E+01	-1.4988E+01	1.3354E+02	6.9101E+01
	8.1795E-01	7.6565E-02	-1.0334E-01	9.2071E-01	4.7643E-01

Table 2-244. Load Case 222, Lateral 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.0099E+01	1.1283E+01	-7.2002E+00	2.5224E+01	5.5432E+00
	1.3858E-01	7.7791E-02	-4.9644E-02	1.7391E-01	3.8219E-02
2	4.3692E+01	8.7657E+00	-5.7767E+00	5.3837E+01	5.0372E+00
	3.0125E-01	6.0437E-02	-3.9829E-02	3.7120E-01	3.4731E-02
3	3.8323E+01	1.4672E+01	-8.5831E+00	1.7410E+02	5.7199E+01
	2.6422E-01	1.0116E-01	-5.9179E-02	1.2004E+00	3.9437E-01
4	7.4513E+01	1.6930E+01	5.5913E+00	6.8714E+01	2.1692E+01
	5.1375E-01	1.1673E-01	3.8550E-02	4.7377E-01	1.4956E-01
5	1.9184E+01	1.0742E+01	-6.6199E+00	2.4655E+01	6.4651E+00
	1.3227E-01	7.4061E-02	-4.5643E-02	1.6999E-01	4.4575E-02
6	4.2556E+01	8.2436E+00	-5.9099E+00	5.2404E+01	5.4267E+00
	2.9342E-01	5.6838E-02	-4.0747E-02	3.6131E-01	3.7416E-02
7	1.0673E+02	4.4137E+00	-3.9036E+01	1.2751E+02	8.3916E+00
	7.3589E-01	3.0432E-02	-2.6914E-01	8.7916E-01	5.7858E-02
8	1.2556E+02	2.1437E+01	-2.2509E+01	1.6139E+02	3.4806E+01
	8.6571E-01	1.4780E-01	-1.5519E-01	1.1128E+00	2.3998E-01
9	9.0114E+01	3.7306E+01	-7.1316E-01	9.3229E+01	5.7913E+01
	6.2132E-01	2.5722E-01	-4.9171E-03	6.4279E-01	3.9929E-01
10	1.0648E+02	1.3404E+01	-2.2402E+01	1.2872E+02	6.0458E+01
	7.3414E-01	9.2415E-02	-1.5446E-01	8.8748E-01	4.1685E-01
11	1.2291E+02	1.6991E+01	-2.9001E+01	1.5192E+02	6.8676E+01
	8.4747E-01	1.1715E-01	-1.9995E-01	1.0474E+00	4.7350E-01
12	1.0475E+02	1.1530E+01	-2.1164E+01	1.2592E+02	5.9277E+01
	7.2224E-01	7.9494E-02	-1.4592E-01	8.6816E-01	4.0870E-01
13	6.8684E+01	3.8748E+01	-1.3463E+01	1.0665E+02	1.0477E+02
	4.7356E-01	2.6716E-01	-9.2822E-02	7.3534E-01	7.2239E-01
14	8.1504E+01	1.2726E+01	-2.7565E+01	1.0194E+02	1.1519E+01
	5.6195E-01	8.7740E-02	-1.9006E-01	7.0283E-01	7.9418E-02
15	9.2024E+01	3.2630E+00	-2.4102E+01	1.1615E+02	3.1983E+01
	6.3449E-01	2.2498E-02	-1.6618E-01	8.0080E-01	2.2052E-01

16	1.1735E+02	1.3045E+01	-3.6973E+01	1.5329E+02	3.7934E+01
	8.0913E-01	8.9943E-02	-2.5492E-01	1.0569E+00	2.6154E-01
17	1.0748E+02	6.2879E+00	-3.8255E+01	1.2860E+02	7.6201E+00
	7.4102E-01	4.3354E-02	-2.6376E-01	8.8668E-01	5.2539E-02
18	8.7783E+01	5.7321E+00	-8.7197E+00	9.6462E+01	7.5958E+00
	6.0524E-01	3.9521E-02	-6.0120E-02	6.6508E-01	5.2371E-02
19	5.4965E+01	4.9951E+00	-3.8330E+01	9.3697E+01	2.6635E+01
	3.7897E-01	3.4440E-02	-2.6428E-01	6.4602E-01	1.8364E-01
20	6.4185E+01	9.3191E+00	-2.2050E+01	8.8004E+01	1.7045E+01
	4.4254E-01	6.4253E-02	-1.5203E-01	6.0677E-01	1.1752E-01
21	9.7196E+01	2.0433E+01	-4.5157E+00	1.0167E+02	1.2132E+01
	6.7014E-01	1.4088E-01	-3.1135E-02	7.0096E-01	8.3645E-02
22	1.0105E+02	6.8700E+00	-4.2450E+01	1.3140E+02	1.6101E+01
	6.9675E-01	4.7367E-02	-2.9268E-01	9.0599E-01	1.1101E-01
23	1.1382E+02	8.3906E+00	-4.6085E+01	1.2649E+02	8.4281E+00
	7.8478E-01	5.7851E-02	-3.1774E-01	8.7211E-01	5.8110E-02
24	6.2115E+01	3.2178E+00	-2.1543E+01	8.3795E+01	2.8704E+01
	4.2827E-01	2.2186E-02	-1.4853E-01	5.7775E-01	1.9791E-01
25	5.6217E+01	2.8409E+00	-2.6634E+01	8.2873E+01	2.1215E+01
	3.8761E-01	1.9587E-02	-1.8363E-01	5.7139E-01	1.4627E-01

Table 2-245. Load Case 223, Vertical 10g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.8560E+02	3.3733E+01	-4.6136E+02	1.0470E+03	5.0768E+02
	4.0375E+00	2.3258E-01	-3.1810E+00	7.2185E+00	3.5004E+00
2	5.6006E+02	8.4931E+01	-1.5034E+02	2.4887E+03	1.0859E+03
	3.8615E+00	5.8558E-01	-1.0365E+00	1.7159E+01	7.4869E+00
3	3.3114E+03	4.5643E+02	-3.6079E+02	3.7628E+03	1.5822E+03
	2.2832E+01	3.1470E+00	-2.4875E+00	2.5943E+01	1.0909E+01
4	1.9041E+02	8.5183E+01	-1.0286E+02	2.7041E+02	1.5243E+02
	1.3128E+00	5.8731E-01	-7.0922E-01	1.8644E+00	1.0510E+00
5	4.7189E+02	3.2912E+01	-3.7265E+02	8.4454E+02	4.1586E+02
	3.2536E+00	2.2692E-01	-2.5694E+00	5.8229E+00	2.8672E+00
6	4.1898E+02	8.5611E+01	-3.7242E+01	1.7181E+03	7.8726E+02
	2.8888E+00	5.9027E-01	-2.5678E-01	1.1846E+01	5.4280E+00
7	1.1529E+03	8.2482E-01	-5.6258E+02	4.2715E+03	2.9654E+03
	7.9492E+00	5.6869E-03	-3.8789E+00	2.9451E+01	2.0446E+01
8	1.8185E+03	5.6081E+02	-4.2452E+02	5.5452E+03	3.4909E+03
	1.2538E+01	3.8666E+00	-2.9270E+00	3.8233E+01	2.4069E+01
9	8.8183E+02	1.9596E+02	-3.8265E+02	3.0434E+03	1.4741E+03
	6.0800E+00	1.3511E+00	-2.6383E+00	2.0983E+01	1.0163E+01
10	1.0539E+03	3.7026E+02	-9.8153E+02	1.0338E+03	2.2906E+02
	7.2667E+00	2.5528E+00	-6.7674E+00	7.1281E+00	1.5793E+00
11	1.2573E+03	2.7145E+02	-1.4223E+03	1.3860E+03	2.7663E+02
	8.6690E+00	1.8716E+00	-9.8063E+00	9.5559E+00	1.9073E+00
12	9.4082E+02	-2.9144E+02	-1.2291E+03	1.2070E+03	2.5213E+02
	6.4867E+00	-2.0094E+00	-8.4743E+00	8.3219E+00	1.7384E+00
13	5.0945E+02	-1.0998E+02	-5.6689E+02	1.3522E+03	5.8489E+02
	3.5126E+00	-7.5831E-01	-3.9086E+00	9.3232E+00	4.0327E+00
14	3.0677E+02	-1.1209E+02	-2.9362E+02	9.5936E+02	7.3250E+02
	2.1151E+00	-7.7283E-01	-2.0244E+00	6.6145E+00	5.0504E+00
15	1.5139E+02	1.0077E+01	-3.8297E+02	5.5010E+02	4.9211E+01
	1.0438E+00	6.9480E-02	-2.6405E+00	3.7928E+00	3.3930E-01

16	4.5630E+02	-3.8031E+01	-3.3391E+02	2.1217E+03	1.0910E+03
	3.1461E+00	-2.6221E-01	-2.3022E+00	1.4629E+01	7.5221E+00
17	3.2190E+02	-5.7276E+01	-2.8764E+02	2.3060E+03	7.6075E+02
	2.2194E+00	-3.9490E-01	-1.9832E+00	1.5899E+01	5.2452E+00
18	6.4086E+01	9.2798E+00	-5.0761E+01	1.1327E+02	9.1293E+01
	4.4186E-01	6.3982E-02	-3.4999E-01	7.8096E-01	6.2945E-01
19	2.5094E+02	5.4346E+01	-2.2520E+02	4.9758E+02	4.2757E+02
	1.7302E+00	3.7470E-01	-1.5527E+00	3.4307E+00	2.9480E+00
20	1.6388E+02	3.2949E+01	-1.5767E+02	2.9208E+02	4.9681E+02
	1.1299E+00	2.2717E-01	-1.0871E+00	2.0138E+00	3.4254E+00
21	2.9393E+02	1.3618E+02	-5.4979E+01	3.4891E+02	3.8294E+02
	2.0266E+00	9.3890E-01	-3.7907E-01	2.4056E+00	2.6402E+00
22	4.6078E+02	1.2681E+02	1.7757E+01	4.4302E+02	9.3025E+01
	3.1770E+00	8.7434E-01	1.2243E-01	3.0545E+00	6.4138E-01
23	3.1190E+02	1.6699E+02	-1.9310E+02	5.0500E+02	8.2897E+02
	2.1505E+00	1.1513E+00	-1.3314E+00	3.4819E+00	5.7156E+00
24	7.3142E+01	7.7595E+00	-4.3855E+01	1.1605E+02	4.3569E+01
	5.0430E-01	5.3500E-02	-3.0237E-01	8.0011E-01	3.0039E-01
25	1.1322E+02	-2.6758E+01	-2.4564E+02	3.6422E+02	1.5799E+02
	7.8063E-01	-1.8449E-01	-1.6936E+00	2.5112E+00	1.0893E+00

Table 2-246. Load Case 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.5328E+01	-1.0868E+03	-2.3483E+02	1.0715E+03	4.9814E+02
	-1.0568E-01	-7.4933E+00	-1.6191E+00	7.3876E+00	3.4345E+00
2	8.2807E+00	-1.3482E+03	-2.2751E+02	1.3565E+03	3.8644E+02
	5.7093E-02	-9.2956E+00	-1.5686E+00	9.3526E+00	2.6644E+00
3	3.0323E+00	-7.4505E+02	9.0550E+00	7.4809E+02	1.0471E+01
	2.0907E-02	-5.1370E+00	6.2432E-02	5.1579E+00	7.2193E-02
4	1.5077E+01	-7.1984E+02	-3.7860E+01	7.3492E+02	2.2457E+01
	1.0395E-01	-4.9631E+00	-2.6104E-01	5.0671E+00	1.5484E-01
5	5.0628E+00	-4.6099E+02	2.3131E+01	4.6605E+02	6.5042E+01
	3.4906E-02	-3.1784E+00	1.5948E-01	3.2133E+00	4.4845E-01
6	1.7575E+01	-3.4348E+02	-9.7695E+00	3.6105E+02	4.5218E+01
	1.2118E-01	-2.3682E+00	-6.7358E-02	2.4894E+00	3.1177E-01
7	7.5783E+02	-2.1408E+03	-5.6935E+02	2.8986E+03	3.5335E+03
	5.2251E+00	-1.4760E+01	-3.9255E+00	1.9985E+01	2.4362E+01
8	3.9041E+02	-1.1608E+03	-3.5609E+02	1.5512E+03	2.4143E+03
	2.6918E+00	-8.0034E+00	-2.4551E+00	1.0695E+01	1.6646E+01
9	-1.1260E+02	-5.9745E+02	-4.0825E+02	4.8486E+02	6.2779E+02
	-7.7633E-01	-4.1193E+00	-2.8148E+00	3.3430E+00	4.3285E+00
10	-9.0517E-01	-2.3252E+02	-2.7837E+00	2.3162E+02	7.7207E+00
	-6.2409E-03	-1.6032E+00	-1.9193E-02	1.5969E+00	5.3232E-02
11	-3.6912E-01	-1.7799E+02	-4.1632E+00	1.7762E+02	1.4685E-01
	-2.5450E-03	-1.2272E+00	-2.8704E-02	1.2247E+00	1.0125E-03
12	-7.7964E-02	-1.4440E+02	-4.0314E+00	1.4432E+02	4.3446E-01
	-5.3754E-04	-9.9561E-01	-2.7795E-02	9.9507E-01	2.9955E-03
13	-2.3377E+01	-1.5833E+02	3.0079E+01	1.3495E+02	1.3592E+02
	-1.6118E-01	-1.0916E+00	2.0739E-01	9.3045E-01	9.3714E-01
14	7.9203E+01	-9.7469E+01	3.9341E+01	1.7667E+02	6.2064E+01
	5.4609E-01	-6.7203E-01	2.7125E-01	1.2181E+00	4.2791E-01
15	6.5552E+01	-5.5839E+01	5.7533E+01	1.2139E+02	2.1207E+02
	4.5196E-01	-3.8500E-01	3.9668E-01	8.3696E-01	1.4622E+00

16	1.6287E+02	-1.9780E+01	8.2715E+01	1.8265E+02	1.1651E+02
	1.1229E+00	-1.3638E-01	5.7030E-01	1.2593E+00	8.0328E-01
17	1.7424E+02	-8.8776E+00	1.0097E+02	1.8311E+02	3.6120E+01
	1.2013E+00	-6.1209E-02	6.9616E-01	1.2625E+00	2.4904E-01
18	4.4649E+02	1.3743E+01	-3.2288E+01	4.3274E+02	3.1231E+01
	3.0784E+00	9.4753E-02	-2.2261E-01	2.9837E+00	2.1533E-01
19	2.1475E+02	-2.2437E+02	-5.6798E+01	4.3912E+02	3.9960E+02
	1.4807E+00	-1.5470E+00	-3.9161E-01	3.0276E+00	2.7551E+00
20	2.6921E+02	-2.0613E+02	-1.2898E+02	4.7534E+02	6.0046E+02
	1.8561E+00	-1.4212E+00	-8.8928E-01	3.2773E+00	4.1400E+00
21	3.1076E+02	-5.3394E+02	3.3272E+00	8.4470E+02	1.1958E+03
	2.1426E+00	-3.6814E+00	2.2940E-02	5.8240E+00	8.2448E+00
22	2.1061E+02	-6.0885E+02	-2.2314E+02	8.1945E+02	8.8549E+02
	1.4521E+00	-4.1978E+00	-1.5385E+00	5.6499E+00	6.1052E+00
23	1.6026E+02	-5.0555E+02	-2.0657E+02	6.6581E+02	1.2221E+03
	1.1049E+00	-3.4857E+00	-1.4243E+00	4.5906E+00	8.4263E+00
24	5.8769E+02	5.0974E+01	4.8152E+01	5.3672E+02	2.1873E+02
	4.0520E+00	3.5145E-01	3.3200E-01	3.7005E+00	1.5081E+00
25	3.6483E+02	5.9496E+00	2.3039E+02	3.5888E+02	4.5912E+02
	2.5154E+00	4.1021E-02	1.5885E+00	2.4744E+00	3.1655E+00

Table 2-247. Load Case 232, Impact Test, Normal Condition, Normal Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-5.3589E+01	-3.8128E+03	-8.1400E+02	3.7592E+03	1.7416E+03
	-3.6948E-01	-2.6289E+01	-5.6123E+00	2.5919E+01	1.2008E+01
2	2.9106E+01	-4.7125E+03	-7.8313E+02	4.7416E+03	1.3332E+03
	2.0068E-01	-3.2492E+01	-5.3995E+00	3.2692E+01	9.1924E+00
3	1.0558E+01	-2.6737E+03	3.1340E+01	2.6842E+03	4.0202E+01
	7.2798E-02	-1.8434E+01	2.1608E-01	1.8507E+01	2.7718E-01
4	5.1548E+01	-2.5964E+03	-1.3754E+02	2.6479E+03	8.1897E+01
	3.5541E-01	-1.7901E+01	-9.4833E-01	1.8257E+01	5.6466E-01
5	1.9029E+01	-1.7292E+03	1.0463E+02	1.7482E+03	2.4464E+02
	1.3120E-01	-1.1922E+01	7.2137E-01	1.2054E+01	1.6867E+00
6	6.8413E+01	-1.3872E+03	-4.7712E+01	1.4556E+03	1.3845E+02
	4.7169E-01	-9.5646E+00	-3.2896E-01	1.0036E+01	9.5458E-01
7	2.6399E+03	-7.3981E+03	-1.9457E+03	1.0038E+04	1.2241E+04
	1.8201E+01	-5.1008E+01	-1.3415E+01	6.9209E+01	8.4396E+01
8	1.3651E+03	-4.0179E+03	-1.2152E+03	5.3830E+03	8.3720E+03
	9.4123E+00	-2.7702E+01	-8.3782E+00	3.7115E+01	5.7723E+01
9	-4.1651E+02	-2.0894E+03	-1.4121E+03	1.6728E+03	2.1516E+03
	-2.8717E+00	-1.4406E+01	-9.7360E+00	1.1534E+01	1.4835E+01
10	-3.3456E+00	-8.4683E+02	-1.0799E+01	8.4348E+02	2.7021E+01
	-2.3067E-02	-5.8387E+00	-7.4453E-02	5.8156E+00	1.8630E-01
11	-1.5832E+00	-6.7329E+02	-1.6293E+01	6.7170E+02	5.0604E-01
	-1.0916E-02	-4.6421E+00	-1.1233E-01	4.6312E+00	3.4890E-03
12	-7.5816E-01	-5.9586E+02	-1.7721E+01	5.9510E+02	2.8948E+00
	-5.2273E-03	-4.1083E+00	-1.2218E-01	4.1031E+00	1.9959E-02
13	-1.0545E+02	-7.3324E+02	7.0264E+01	6.2779E+02	5.2596E+02
	-7.2708E-01	-5.0555E+00	4.8445E-01	4.3285E+00	3.6264E+00
14	2.8147E+02	-4.0222E+02	1.1507E+02	6.8369E+02	2.9360E+02
	1.9407E+00	-2.7732E+00	7.9339E-01	4.7139E+00	2.0243E+00
15	2.1218E+02	-3.1219E+02	1.7945E+02	5.2436E+02	9.1244E+02
	1.4629E+00	-2.1525E+00	1.2373E+00	3.6154E+00	6.2910E+00

16	4.9561E+02	-1.5442E+02	2.4478E+02	6.5004E+02	1.2749E+02
	3.4171E+00	-1.0647E+00	1.6877E+00	4.4818E+00	8.7901E-01
17	5.0220E+02	-6.6833E+01	3.1050E+02	5.6903E+02	5.4738E+01
	3.4625E+00	-4.6080E-01	2.1409E+00	3.9233E+00	3.7740E-01
18	1.5163E+03	3.6960E+01	-1.1951E+02	1.4793E+03	1.0619E+02
	1.0454E+01	2.5483E-01	-8.2398E-01	1.0199E+01	7.3214E-01
19	7.2047E+02	-7.6998E+02	-2.0752E+02	1.4905E+03	1.3510E+03
	4.9675E+00	-5.3088E+00	-1.4308E+00	1.0276E+01	9.3146E+00
20	9.0643E+02	-7.0345E+02	-4.5076E+02	1.6099E+03	2.0358E+03
	6.2496E+00	-4.8501E+00	-3.1079E+00	1.1100E+01	1.4036E+01
21	1.0504E+03	-1.8428E+03	8.0577E+00	2.8932E+03	4.1098E+03
	7.2422E+00	-1.2706E+01	5.5556E-02	1.9948E+01	2.8336E+01
22	7.3628E+02	-2.1034E+03	-7.6203E+02	2.8397E+03	3.0772E+03
	5.0765E+00	-1.4502E+01	-5.2540E+00	1.9579E+01	2.1217E+01
23	5.7001E+02	-1.7509E+03	-7.1265E+02	2.3209E+03	4.2462E+03
	3.9301E+00	-1.2072E+01	-4.9136E+00	1.6002E+01	2.9276E+01
24	1.6846E+03	1.4540E+02	1.3718E+02	1.5392E+03	6.1954E+02
	1.1615E+01	1.0025E+00	9.4585E-01	1.0612E+01	4.2716E+00
25	1.2277E+03	1.3746E+01	7.6424E+02	1.2140E+03	1.5514E+03
	8.4650E+00	9.4776E-02	5.2692E+00	8.3702E+00	1.0696E+01

Table 2-248. Load Combination 101, Hot Environment, Normal Conditions of Transport – Model AOS-165A

Load Cases: 101, 201, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	1.15	1.04	2.19	17.40	59.20	>10
	4.33	2.83	7.95	7.17	15.11	119.97	408.17	
2	2.52	0.16	1.71	2.68	4.39	17.40	59.20	5.91
	17.36	1.10	11.82	18.47	30.28	119.97	408.17	
3	0.51	0.01	1.26	0.53	1.78	18.70	59.70	>10
	3.53	0.10	8.67	3.64	12.30	128.93	411.62	
4	0.65	0.31	2.47	0.96	3.43	17.40	59.20	>10
	4.48	2.15	17.06	6.62	23.68	119.97	408.17	
5	0.62	0.39	1.14	1.01	2.15	17.40	59.20	>10
	4.30	2.67	7.89	6.96	14.85	119.97	408.17	
6	2.57	0.86	1.67	3.43	5.10	17.40	59.20	5.76
	17.75	5.92	11.50	23.67	35.17	119.97	408.17	
7	7.24	11.62	18.18	18.86	37.05	17.40	59.20	0.38
	49.94	80.11	125.37	130.05	255.42	119.97	408.17	
8	5.94	7.51	19.30	13.45	32.75	17.40	59.20	0.59
	40.92	51.79	133.06	92.71	225.78	119.97	408.17	
9	2.77	3.94	8.57	6.71	15.28	17.40	59.20	2.42
	19.09	27.15	59.10	46.23	105.33	119.97	408.17	
10	0.49	0.06	2.55	0.55	3.10	16.40	59.20	>10
	3.34	0.43	17.60	3.77	21.37	113.07	408.17	
11	0.48	0.00	2.52	0.48	3.01	16.40	59.20	>10
	3.33	0.01	17.39	3.34	20.73	113.07	408.17	
12	0.48	0.04	2.51	0.53	3.04	16.40	59.20	>10
	3.34	0.29	17.33	3.63	20.97	113.07	408.17	
13	1.61	2.20	4.53	3.81	8.34	16.40	59.20	4.90
	11.10	15.14	31.25	26.24	57.50	113.07	408.17	

14	1.65	1.66	4.66	3.31	7.98	16.40	59.20	5.17
	11.41	11.44	32.16	22.85	55.01	113.07	408.17	
15	1.65	1.85	7.03	3.50	10.53	16.40	59.20	3.67
	11.37	12.78	48.46	24.15	72.61	113.07	408.17	
16	3.29	0.76	7.94	4.05	11.99	17.40	59.20	3.35
	22.68	5.27	54.72	27.95	82.67	119.97	408.17	
17	3.22	1.55	6.80	4.76	11.56	17.40	59.20	3.52
	22.19	10.66	46.85	32.85	79.70	119.97	408.17	
18	3.54	5.41	0.23	8.94	9.18	17.40	59.20	1.92
	24.39	37.28	1.60	61.67	63.27	119.97	408.17	
19	3.18	4.79	0.09	7.96	8.05	17.40	59.20	2.28
	21.90	33.01	0.60	54.91	55.51	119.97	408.17	
20	2.22	3.65	0.15	5.87	6.02	17.40	59.20	3.44
	15.31	25.17	1.03	40.49	41.51	119.97	408.17	
21	2.26	3.69	1.18	5.95	7.13	17.40	59.20	3.39
	15.58	25.43	8.14	41.01	49.15	119.97	408.17	
22	3.68	5.63	1.48	9.31	10.79	17.40	59.20	1.80
	25.37	38.79	10.22	64.16	74.38	119.97	408.17	

Min MS: 0.384, Location: 7, Combination: Pm+Pb

Table 2-249. Load Combination 102, Cold Environment, Normal Conditions of Transport – Model AOS-165A

Load Cases: 104, 201, 211
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.00	1.04	1.04	20.00	70.00	>10
	4.33	2.83	0.02	7.17	7.18	137.90	482.63	
2	2.52	0.16	0.09	2.68	2.77	20.00	70.00	6.94
	17.36	1.10	0.61	18.47	19.07	137.90	482.63	
3	0.51	0.01	0.00	0.53	0.53	20.00	70.00	>10
	3.53	0.10	0.00	3.64	3.64	137.90	482.63	
4	0.65	0.31	0.09	0.96	1.05	20.00	70.00	>10
	4.48	2.15	0.60	6.62	7.23	137.90	482.63	
5	0.62	0.39	0.00	1.01	1.01	20.00	70.00	>10
	4.30	2.67	0.02	6.96	6.98	137.90	482.63	
6	2.57	0.86	0.09	3.43	3.53	20.00	70.00	6.77
	17.75	5.92	0.64	23.67	24.31	137.90	482.63	
7	7.24	11.62	5.43	18.86	24.29	20.00	70.00	0.59
	49.94	80.11	37.42	130.05	167.47	137.90	482.63	
8	5.94	7.51	7.18	13.45	20.63	20.00	70.00	1.23
	40.92	51.79	49.50	92.71	142.22	137.90	482.63	
9	2.77	3.94	3.31	6.71	10.01	20.00	70.00	3.47
	19.09	27.15	22.80	46.23	69.03	137.90	482.63	
10	0.49	0.06	1.40	0.55	1.95	20.00	70.00	>10
	3.34	0.43	9.67	3.77	13.44	137.90	482.63	
11	0.48	0.00	1.40	0.48	1.88	20.00	70.00	>10
	3.33	0.01	9.66	3.34	13.00	137.90	482.63	
12	0.48	0.04	1.40	0.53	1.93	20.00	70.00	>10
	3.34	0.29	9.66	3.63	13.29	137.90	482.63	
13	1.61	2.20	1.66	3.81	5.46	20.00	70.00	6.88
	11.10	15.14	11.42	26.24	37.66	137.90	482.63	

14	1.65	1.66	0.91	3.31	4.22	20.00	70.00	8.05
	11.41	11.44	6.25	22.85	29.10	137.90	482.63	
15	1.65	1.85	0.75	3.50	4.25	20.00	70.00	7.57
	11.37	12.78	5.19	24.15	29.34	137.90	482.63	
16	3.29	0.76	2.98	4.05	7.03	20.00	70.00	5.08
	22.68	5.27	20.53	27.95	48.48	137.90	482.63	
17	3.22	1.55	2.46	4.76	7.23	20.00	70.00	5.21
	22.19	10.66	16.99	32.85	49.84	137.90	482.63	
18	3.54	5.41	0.92	8.94	9.87	20.00	70.00	2.35
	24.39	37.28	6.37	61.67	68.04	137.90	482.63	
19	3.18	4.79	1.41	7.96	9.38	20.00	70.00	2.77
	21.90	33.01	9.73	54.91	64.64	137.90	482.63	
20	2.22	3.65	1.06	5.87	6.94	20.00	70.00	4.11
	15.31	25.17	7.34	40.49	47.83	137.90	482.63	
21	2.26	3.69	0.98	5.95	6.92	20.00	70.00	4.04
	15.58	25.43	6.73	41.01	47.74	137.90	482.63	
22	3.68	5.63	1.48	9.31	10.79	20.00	70.00	2.22
	25.37	38.79	10.24	64.16	74.40	137.90	482.63	

Min MS: 0.591, Location: 7, Combination: Pm+Pb

Table 2-250. Load Combination 103, Increased External Pressure, Normal Conditions of Transport – Model AOS-165A

Load Cases: 103, 201, 211
-20°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.00	1.04	1.04	20.00	70.00	>10
	4.33	2.83	0.01	7.17	7.18	137.90	482.63	
2	2.52	0.16	0.07	2.68	2.75	20.00	70.00	6.94
	17.36	1.10	0.50	18.47	18.96	137.90	482.63	
3	0.51	0.01	0.00	0.53	0.53	20.00	70.00	>10
	3.53	0.10	0.00	3.64	3.64	137.90	482.63	
4	0.65	0.31	0.07	0.96	1.03	20.00	70.00	>10
	4.48	2.15	0.49	6.62	7.12	137.90	482.63	
5	0.62	0.39	0.00	1.01	1.01	20.00	70.00	>10
	4.30	2.67	0.01	6.96	6.98	137.90	482.63	
6	2.57	0.86	0.08	3.43	3.51	20.00	70.00	6.77
	17.75	5.92	0.52	23.67	24.19	137.90	482.63	
7	7.24	11.62	4.44	18.86	23.30	20.00	70.00	0.59
	49.94	80.11	30.62	130.05	160.67	137.90	482.63	
8	5.94	7.51	5.87	13.45	19.32	20.00	70.00	1.23
	40.92	51.79	40.50	92.71	133.22	137.90	482.63	
9	2.77	3.94	2.71	6.71	9.41	20.00	70.00	3.47
	19.09	27.15	18.66	46.23	64.89	137.90	482.63	
10	0.49	0.06	1.15	0.55	1.69	20.00	70.00	>10
	3.34	0.43	7.91	3.77	11.68	137.90	482.63	
11	0.48	0.00	1.15	0.48	1.63	20.00	70.00	>10
	3.33	0.01	7.90	3.34	11.24	137.90	482.63	
12	0.48	0.04	1.15	0.53	1.67	20.00	70.00	>10
	3.34	0.29	7.90	3.63	11.54	137.90	482.63	
13	1.61	2.20	1.35	3.81	5.16	20.00	70.00	6.88
	11.10	15.14	9.34	26.24	35.58	137.90	482.63	

14	1.65	1.66	0.74	3.31	4.06	20.00	70.00	8.05
	11.41	11.44	5.11	22.85	27.96	137.90	482.63	
15	1.65	1.85	0.62	3.50	4.12	20.00	70.00	7.57
	11.37	12.78	4.25	24.15	28.39	137.90	482.63	
16	3.29	0.76	2.44	4.05	6.49	20.00	70.00	5.08
	22.68	5.27	16.80	27.95	44.75	137.90	482.63	
17	3.22	1.55	2.02	4.76	6.78	20.00	70.00	5.21
	22.19	10.66	13.90	32.85	46.75	137.90	482.63	
18	3.54	5.41	0.76	8.94	9.70	20.00	70.00	2.35
	24.39	37.28	5.21	61.67	66.88	137.90	482.63	
19	3.18	4.79	1.16	7.96	9.12	20.00	70.00	2.77
	21.90	33.01	7.96	54.91	62.87	137.90	482.63	
20	2.22	3.65	0.87	5.87	6.74	20.00	70.00	4.11
	15.31	25.17	6.01	40.49	46.49	137.90	482.63	
21	2.26	3.69	0.80	5.95	6.75	20.00	70.00	4.04
	15.58	25.43	5.51	41.01	46.52	137.90	482.63	
22	3.68	5.63	1.22	9.31	10.52	20.00	70.00	2.22
	25.37	38.79	8.38	64.16	72.54	137.90	482.63	

Min MS: 0.591, Location: 7, Combination: Pm+Pb

Table 2-251. Load Combination 104, Minimum External Pressure, Normal Conditions of Transport – Model AOS-165A

Load Cases: 101, 201, 202, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	1.15	1.04	2.19	17.40	59.20	>10
	4.35	2.84	7.95	7.18	15.13	119.97	408.17	
2	2.52	0.16	1.71	2.68	4.40	17.40	59.20	5.90
	17.39	1.11	11.82	18.49	30.31	119.97	408.17	
3	0.51	0.01	1.26	0.53	1.79	18.70	59.70	>10
	3.54	0.10	8.67	3.65	12.31	128.93	411.62	
4	0.65	0.31	2.47	0.96	3.44	17.40	59.20	>10
	4.50	2.15	17.06	6.65	23.70	119.97	408.17	
5	0.62	0.39	1.14	1.01	2.16	17.40	59.20	>10
	4.31	2.67	7.89	6.98	14.87	119.97	408.17	
6	2.58	0.86	1.67	3.44	5.11	17.40	59.20	5.75
	17.77	5.93	11.50	23.70	35.20	119.97	408.17	
7	7.40	11.89	18.18	19.29	37.48	17.40	59.20	0.35
	51.05	81.97	125.37	133.03	258.40	119.97	408.17	
8	6.05	7.71	19.30	13.77	33.07	17.40	59.20	0.58
	41.74	53.17	133.06	94.91	227.98	119.97	408.17	
9	2.81	3.98	8.57	6.79	15.36	17.40	59.20	2.40
	19.39	27.45	59.10	46.83	105.93	119.97	408.17	
10	0.49	0.06	2.55	0.55	3.11	16.40	59.20	>10
	3.38	0.43	17.60	3.81	21.41	113.07	408.17	
11	0.49	0.00	2.52	0.49	3.01	16.40	59.20	>10
	3.37	0.01	17.39	3.38	20.77	113.07	408.17	
12	0.49	0.04	2.51	0.53	3.05	16.40	59.20	>10
	3.38	0.30	17.33	3.68	21.01	113.07	408.17	
13	1.66	2.24	4.53	3.90	8.43	16.40	59.20	4.83
	11.42	15.47	31.25	26.88	58.14	113.07	408.17	

14	1.68	1.67	4.66	3.35	8.01	16.40	59.20	5.14
	11.59	11.49	32.16	23.08	55.24	113.07	408.17	
15	1.68	1.86	7.03	3.54	10.57	16.40	59.20	3.66
	11.61	12.79	48.46	24.41	72.87	113.07	408.17	
16	3.34	0.81	7.94	4.15	12.09	17.40	59.20	3.32
	23.04	5.57	54.72	28.61	83.33	119.97	408.17	
17	3.26	1.59	6.80	4.86	11.65	17.40	59.20	3.48
	22.50	10.98	46.85	33.49	80.34	119.97	408.17	
18	3.74	5.73	0.23	9.47	9.70	17.40	59.20	1.76
	25.82	39.49	1.60	65.31	66.90	119.97	408.17	
19	3.34	5.03	0.09	8.37	8.46	17.40	59.20	2.12
	23.01	34.69	0.60	57.70	58.30	119.97	408.17	
20	2.33	3.83	0.15	6.17	6.31	17.40	59.20	3.23
	16.09	26.41	1.03	42.51	43.53	119.97	408.17	
21	2.37	3.86	1.18	6.23	7.41	17.40	59.20	3.19
	16.33	26.60	8.14	42.93	51.07	119.97	408.17	
22	3.86	5.90	1.48	9.76	11.24	17.40	59.20	1.67
	26.59	40.69	10.22	67.28	77.51	119.97	408.17	

Min MS: 0.353, Location: 7, Combination: Pm+Pb

Table 2-252. Load Combination 105, Cold Environment with Maximum Decay Heat, Normal Conditions of Transport – Model AOS-165A

Load Cases: 105, 201, 202, 211
-40°F Ambient, Maximum-Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	1.25	1.04	2.30	20.00	61.80	>10
	4.35	2.84	8.65	7.18	15.83	137.90	426.10	
2	2.52	0.16	1.85	2.68	4.54	18.70	59.70	6.42
	17.39	1.11	12.78	18.49	31.28	128.93	411.62	
3	0.51	0.01	1.32	0.53	1.85	20.00	61.80	>10
	3.54	0.10	9.07	3.65	12.72	137.90	426.10	
4	0.65	0.31	2.63	0.96	3.59	20.00	61.80	>10
	4.50	2.15	18.14	6.65	24.78	137.90	426.10	
5	0.62	0.39	1.24	1.01	2.26	20.00	61.80	>10
	4.31	2.67	8.58	6.98	15.55	137.90	426.10	
6	2.58	0.86	1.78	3.44	5.21	18.70	59.70	6.25
	17.77	5.93	12.26	23.70	35.95	128.93	411.62	
7	7.40	11.89	20.21	19.29	39.50	18.70	59.70	0.42
	51.05	81.97	139.34	133.03	272.37	128.93	411.62	
8	6.05	7.71	21.69	13.77	35.45	18.70	59.70	0.58
	41.74	53.17	149.52	94.91	244.43	128.93	411.62	
9	2.81	3.98	9.52	6.79	16.31	18.70	59.70	2.44
	19.39	27.45	65.63	46.83	112.47	128.93	411.62	
10	0.49	0.06	2.79	0.55	3.35	18.70	59.70	>10
	3.38	0.43	19.25	3.81	23.06	128.93	411.62	
11	0.49	0.00	2.76	0.49	3.25	18.70	59.70	>10
	3.37	0.01	19.05	3.38	22.43	128.93	411.62	
12	0.49	0.04	2.75	0.53	3.29	18.70	59.70	>10
	3.38	0.30	18.99	3.68	22.66	128.93	411.62	
13	1.66	2.24	4.42	3.90	8.32	18.70	59.70	5.74
	11.42	15.47	30.50	26.88	57.38	128.93	411.62	

14	1.68	1.67	4.70	3.35	8.05	18.70	59.70	5.97
	11.59	11.49	32.44	23.08	55.51	128.93	411.62	
15	1.68	1.86	7.11	3.54	10.65	17.40	59.20	3.90
	11.61	12.79	49.00	24.41	73.41	119.97	408.17	
16	3.34	0.81	8.46	4.15	12.61	18.70	59.70	3.45
	23.04	5.57	58.34	28.61	86.95	128.93	411.62	
17	3.26	1.59	7.30	4.86	12.16	18.70	59.70	3.61
	22.50	10.98	50.36	33.49	83.85	128.93	411.62	
18	3.74	5.73	0.23	9.47	9.70	18.70	59.70	1.96
	25.82	39.49	1.59	65.31	66.89	128.93	411.62	
19	3.34	5.03	0.09	8.37	8.46	18.70	59.70	2.35
	23.01	34.69	0.60	57.70	58.30	128.93	411.62	
20	2.33	3.83	0.15	6.17	6.32	18.70	59.70	3.55
	16.09	26.41	1.06	42.51	43.57	128.93	411.62	
21	2.37	3.86	1.21	6.23	7.44	18.70	59.70	3.50
	16.33	26.60	8.35	42.93	51.29	128.93	411.62	
22	3.86	5.90	1.53	9.76	11.29	18.70	59.70	1.87
	26.59	40.69	10.57	67.28	77.86	128.93	411.62	

Min MS: 0.420, Location: 7, Combination: Pm+Pb+Q

Table 2-253. Load Combination 106, Maximum Pressure, Hot Environment, Normal Conditions of Transport – Model AOS-165A

Load Cases: 101, 201, 203, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Maximum Increase External Pressure, 140 kPa (20 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.64	0.42	1.15	1.05	2.21	17.40	59.20	>10
	4.40	2.87	7.95	7.27	15.22	119.97	408.17	
2	2.54	0.17	1.71	2.71	4.43	17.40	59.20	5.84
	17.54	1.15	11.82	18.69	30.51	119.97	408.17	
3	0.52	0.02	1.26	0.54	1.79	18.70	59.70	>10
	3.59	0.11	8.67	3.70	12.37	128.93	411.62	
4	0.67	0.31	2.47	0.99	3.46	17.40	59.20	>10
	4.65	2.15	17.06	6.80	23.86	119.97	408.17	
5	0.63	0.39	1.14	1.02	2.17	17.40	59.20	>10
	4.36	2.70	7.89	7.06	14.95	119.97	408.17	
6	2.60	0.87	1.67	3.47	5.14	17.40	59.20	5.69
	17.93	5.98	11.50	23.92	35.42	119.97	408.17	
7	7.66	12.43	18.18	20.09	38.28	17.40	59.20	0.30
	52.81	85.73	125.37	138.54	263.92	119.97	408.17	
8	6.40	8.21	19.30	14.61	33.91	17.40	59.20	0.54
	44.12	56.59	133.06	100.71	233.78	119.97	408.17	
9	2.97	4.25	8.57	7.21	15.78	17.40	59.20	2.31
	20.45	29.28	59.10	49.73	108.83	119.97	408.17	
10	0.56	0.06	2.55	0.63	3.18	16.40	59.20	>10
	3.88	0.44	17.60	4.32	21.92	113.07	408.17	
11	0.56	0.00	2.52	0.56	3.08	16.40	59.20	>10
	3.86	0.01	17.39	3.87	21.26	113.07	408.17	
12	0.56	0.04	2.51	0.60	3.12	16.40	59.20	>10
	3.87	0.30	17.33	4.17	21.50	113.07	408.17	
13	1.69	2.21	4.53	3.90	8.43	16.40	59.20	4.83
	11.68	15.21	31.25	26.89	58.14	113.07	408.17	

14	1.69	1.68	4.66	3.37	8.03	16.40	59.20	5.13
	11.62	11.59	32.16	23.21	55.38	113.07	408.17	
15	1.78	1.99	7.03	3.77	10.80	16.40	59.20	3.55
	12.28	13.75	48.46	26.03	74.49	113.07	408.17	
16	3.41	0.88	7.94	4.29	12.23	17.40	59.20	3.27
	23.51	6.07	54.72	29.58	84.30	119.97	408.17	
17	3.31	1.62	6.80	4.94	11.73	17.40	59.20	3.45
	22.83	11.20	46.85	34.03	80.88	119.97	408.17	
18	3.74	5.73	0.23	9.47	9.70	17.40	59.20	1.76
	25.82	39.49	1.60	65.31	66.90	119.97	408.17	
19	3.34	5.03	0.09	8.37	8.46	17.40	59.20	2.12
	23.01	34.69	0.60	57.70	58.30	119.97	408.17	
20	2.33	3.83	0.15	6.17	6.31	17.40	59.20	3.23
	16.09	26.41	1.03	42.51	43.53	119.97	408.17	
21	2.37	3.86	1.18	6.23	7.41	17.40	59.20	3.19
	16.33	26.60	8.14	42.93	51.07	119.97	408.17	
22	3.86	5.90	1.48	9.76	11.24	17.40	59.20	1.67
	26.59	40.69	10.22	67.28	77.51	119.97	408.17	

Min MS: 0.299, Location: 7, Combination: Pm+Pb

Table 2-254. Load Combination 107, Maximum Pressure, Cold Environment, Normal Conditions of Transport – Model AOS-165A

Load Cases: 105, 201, 203, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Maximum Increase External Pressure, 140 kPa (20 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.64	0.42	1.25	1.05	2.31	20.00	61.80	>10
	4.40	2.87	8.65	7.27	15.92	137.90	426.10	
2	2.54	0.17	1.85	2.71	4.57	18.70	59.70	6.35
	17.54	1.15	12.78	18.69	31.48	128.93	411.62	
3	0.52	0.02	1.32	0.54	1.85	20.00	61.80	>10
	3.59	0.11	9.07	3.70	12.77	137.90	426.10	
4	0.67	0.31	2.63	0.99	3.62	20.00	61.80	>10
	4.65	2.15	18.14	6.80	24.94	137.90	426.10	
5	0.63	0.39	1.24	1.02	2.27	20.00	61.80	>10
	4.36	2.70	8.58	7.06	15.64	137.90	426.10	
6	2.60	0.87	1.78	3.47	5.25	18.70	59.70	6.19
	17.93	5.98	12.26	23.92	36.17	128.93	411.62	
7	7.66	12.43	20.21	20.09	40.30	18.70	59.70	0.39
	52.81	85.73	139.34	138.54	277.89	128.93	411.62	
8	6.40	8.21	21.69	14.61	36.29	18.70	59.70	0.55
	44.12	56.59	149.52	100.71	250.23	128.93	411.62	
9	2.97	4.25	9.52	7.21	16.73	18.70	59.70	2.35
	20.45	29.28	65.63	49.73	115.36	128.93	411.62	
10	0.56	0.06	2.79	0.63	3.42	18.70	59.70	>10
	3.88	0.44	19.25	4.32	23.57	128.93	411.62	
11	0.56	0.00	2.76	0.56	3.32	18.70	59.70	>10
	3.86	0.01	19.05	3.87	22.92	128.93	411.62	
12	0.56	0.04	2.75	0.60	3.36	18.70	59.70	>10
	3.87	0.30	18.99	4.17	23.15	128.93	411.62	
13	1.69	2.21	4.42	3.90	8.32	18.70	59.70	5.74
	11.68	15.21	30.50	26.89	57.38	128.93	411.62	

14	1.69	1.68	4.70	3.37	8.07	18.70	59.70	5.95
	11.62	11.59	32.44	23.21	55.65	128.93	411.62	
15	1.78	1.99	7.11	3.77	10.88	17.40	59.20	3.80
	12.28	13.75	49.00	26.03	75.03	119.97	408.17	
16	3.41	0.88	8.46	4.29	12.75	18.70	59.70	3.40
	23.51	6.07	58.34	29.58	87.92	128.93	411.62	
17	3.31	1.62	7.30	4.94	12.24	18.70	59.70	3.58
	22.83	11.20	50.36	34.03	84.39	128.93	411.62	
18	3.74	5.73	0.23	9.47	9.70	18.70	59.70	1.96
	25.82	39.49	1.59	65.31	66.89	128.93	411.62	
19	3.34	5.03	0.09	8.37	8.46	18.70	59.70	2.35
	23.01	34.69	0.60	57.70	58.30	128.93	411.62	
20	2.33	3.83	0.15	6.17	6.32	18.70	59.70	3.55
	16.09	26.41	1.06	42.51	43.57	128.93	411.62	
21	2.37	3.86	1.21	6.23	7.44	18.70	59.70	3.50
	16.33	26.60	8.35	42.93	51.29	128.93	411.62	
22	3.86	5.90	1.53	9.76	11.29	18.70	59.70	1.87
	26.59	40.69	10.57	67.28	77.86	128.93	411.62	

Min MS: 0.392, Location: 7, Combination: Pm+Pb+Q

Table 2-255. Load Combination 215, Compression Load, Normal Conditions of Transport – Model AOS-165A

Load Cases: 215, 101, 201, 211
Compression Load (5x weight)
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.73	0.56	1.15	1.29	2.44	17.40	59.20	>10
	5.06	3.85	7.95	8.91	16.86	119.97	408.17	
2	2.71	0.21	1.71	2.91	4.63	17.40	59.20	5.43
	18.67	1.43	11.82	20.09	31.91	119.97	408.17	
3	0.62	0.02	1.26	0.64	1.90	18.70	59.70	>10
	4.26	0.17	8.67	4.43	13.10	128.93	411.62	
4	0.83	0.32	2.47	1.15	3.63	17.40	59.20	>10
	5.70	2.24	17.06	7.94	24.99	119.97	408.17	
5	0.74	0.42	1.14	1.17	2.31	17.40	59.20	>10
	5.13	2.92	7.89	8.05	15.94	119.97	408.17	
6	2.79	0.87	1.67	3.65	5.32	17.40	59.20	5.25
	19.20	5.97	11.50	25.17	36.67	119.97	408.17	
7	7.72	12.17	18.18	19.89	38.07	17.40	59.20	0.31
	53.21	83.91	125.37	137.11	262.49	119.97	408.17	
8	6.29	7.94	19.30	14.23	33.53	17.40	59.20	0.56
	43.36	54.73	133.06	98.08	231.15	119.97	408.17	
9	3.01	3.95	8.57	6.96	15.53	17.40	59.20	2.36
	20.74	27.25	59.10	47.99	107.08	119.97	408.17	
10	0.63	0.06	2.55	0.70	3.25	16.40	59.20	>10
	4.36	0.44	17.60	4.80	22.40	113.07	408.17	
11	0.59	0.00	2.52	0.59	3.11	16.40	59.20	>10
	4.07	0.01	17.39	4.08	21.47	113.07	408.17	
12	0.60	0.04	2.51	0.65	3.16	16.40	59.20	>10
	4.16	0.30	17.33	4.46	21.80	113.07	408.17	
13	1.79	2.27	4.53	4.06	8.59	16.40	59.20	4.73
	12.35	15.63	31.25	27.98	59.24	113.07	408.17	

14	1.76	1.74	4.66	3.50	8.16	16.40	59.20	5.03
	12.11	11.99	32.16	24.10	56.26	113.07	408.17	
15	1.76	2.05	7.03	3.81	10.84	16.40	59.20	3.54
	12.16	14.10	48.46	26.26	74.72	113.07	408.17	
16	3.54	1.00	7.94	4.54	12.48	17.40	59.20	3.18
	24.39	6.93	54.72	31.32	86.03	119.97	408.17	
17	3.44	1.70	6.80	5.13	11.93	17.40	59.20	3.38
	23.70	11.70	46.85	35.40	82.25	119.97	408.17	
18	5.19	5.50	0.23	10.69	10.92	17.40	59.20	1.44
	35.79	37.93	1.60	73.72	75.32	119.97	408.17	
19	3.50	5.15	0.09	8.65	8.73	17.40	59.20	2.02
	24.14	35.48	0.60	59.62	60.22	119.97	408.17	
20	2.49	3.87	0.15	6.37	6.52	17.40	59.20	3.10
	17.19	26.71	1.03	43.91	44.93	119.97	408.17	
21	2.43	3.74	1.18	6.18	7.36	17.40	59.20	3.23
	16.76	25.82	8.14	42.58	50.72	119.97	408.17	
22	3.92	5.87	1.48	9.79	11.28	17.40	59.20	1.66
	27.03	40.49	10.22	67.53	77.75	119.97	408.17	

Min MS: 0.312, Location: 7, Combination: Pm+Pb

Table 2-256. Load Combination 216, Rod Drop, Normal Conditions of Transport – Model AOS-165A

Load Cases: 216, 101, 201, 211
Rod Drop onto Cask
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	1.15	1.04	2.19	17.40	59.20	>10
	4.34	2.84	7.95	7.18	15.13	119.97	408.17	
2	2.52	0.16	1.71	2.68	4.40	17.40	59.20	5.90
	17.39	1.11	11.82	18.50	30.31	119.97	408.17	
3	0.52	0.02	1.26	0.53	1.79	18.70	59.70	>10
	3.55	0.10	8.67	3.66	12.32	128.93	411.62	
4	0.65	0.31	2.47	0.97	3.44	17.40	59.20	>10
	4.52	2.15	17.06	6.66	23.72	119.97	408.17	
5	0.63	0.39	1.14	1.01	2.16	17.40	59.20	>10
	4.32	2.67	7.89	6.99	14.88	119.97	408.17	
6	2.58	0.86	1.67	3.44	5.11	17.40	59.20	5.74
	17.80	5.92	11.50	23.72	35.22	119.97	408.17	
7	7.26	11.62	18.18	18.89	37.07	17.40	59.20	0.38
	50.09	80.14	125.37	130.23	255.61	119.97	408.17	
8	5.96	7.52	19.30	13.48	32.78	17.40	59.20	0.59
	41.08	51.85	133.06	92.92	225.99	119.97	408.17	
9	2.80	3.95	8.57	6.75	15.32	17.40	59.20	2.41
	19.28	27.26	59.10	46.54	105.63	119.97	408.17	
10	0.50	0.06	2.55	0.56	3.11	16.40	59.20	>10
	3.43	0.43	17.60	3.86	21.46	113.07	408.17	
11	0.49	0.00	2.52	0.49	3.01	16.40	59.20	>10
	3.38	0.01	17.39	3.39	20.78	113.07	408.17	
12	0.49	0.04	2.51	0.53	3.05	16.40	59.20	>10
	3.38	0.29	17.33	3.67	21.01	113.07	408.17	
13	1.62	2.20	4.53	3.82	8.35	16.40	59.20	4.89
	11.15	15.16	31.25	26.32	57.57	113.07	408.17	

14	1.66	1.66	4.66	3.32	7.99	16.40	59.20	5.16
	11.44	11.47	32.16	22.90	55.06	113.07	408.17	
15	1.65	1.86	7.03	3.51	10.54	16.40	59.20	3.67
	11.40	12.83	48.46	24.23	72.70	113.07	408.17	
16	3.30	0.77	7.94	4.08	12.01	17.40	59.20	3.35
	22.76	5.34	54.72	28.10	82.82	119.97	408.17	
17	3.23	1.55	6.80	4.78	11.58	17.40	59.20	3.51
	22.26	10.70	46.85	32.96	79.81	119.97	408.17	
18	4.38	5.47	0.23	9.85	10.08	17.40	59.20	1.65
	30.23	37.68	1.60	67.91	69.51	119.97	408.17	
19	3.23	4.85	0.09	8.08	8.16	17.40	59.20	2.23
	22.24	33.44	0.60	55.68	56.27	119.97	408.17	
20	2.26	3.70	0.15	5.96	6.11	17.40	59.20	3.38
	15.56	25.51	1.03	41.07	42.10	119.97	408.17	
21	2.29	3.71	1.18	6.00	7.18	17.40	59.20	3.35
	15.76	25.58	8.14	41.33	49.47	119.97	408.17	
22	3.70	5.63	1.48	9.33	10.81	17.40	59.20	1.80
	25.51	38.82	10.22	64.33	74.56	119.97	408.17	

Min MS: 0.382, Location: 7, Combination: Pm+Pb

Table 2-257. Load Combination 217, Rod Drop, Cold Environment, Normal Conditions of Transport – Model AOS-165A

Load Cases: 216, 104, 201, 211
Rod Drop onto Cask
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.00	1.04	1.04	20.00	70.00	>10
	4.34	2.84	0.02	7.18	7.20	137.90	482.63	
2	2.52	0.16	0.09	2.68	2.77	20.00	70.00	6.93
	17.39	1.11	0.61	18.50	19.10	137.90	482.63	
3	0.52	0.02	0.00	0.53	0.53	20.00	70.00	>10
	3.55	0.10	0.00	3.66	3.66	137.90	482.63	
4	0.65	0.31	0.09	0.97	1.05	20.00	70.00	>10
	4.52	2.15	0.60	6.66	7.27	137.90	482.63	
5	0.63	0.39	0.00	1.01	1.02	20.00	70.00	>10
	4.32	2.67	0.02	6.99	7.01	137.90	482.63	
6	2.58	0.86	0.09	3.44	3.53	20.00	70.00	6.75
	17.80	5.92	0.64	23.72	24.36	137.90	482.63	
7	7.26	11.62	5.43	18.89	24.32	20.00	70.00	0.59
	50.09	80.14	37.42	130.23	167.66	137.90	482.63	
8	5.96	7.52	7.18	13.48	20.66	20.00	70.00	1.23
	41.08	51.85	49.50	92.92	142.43	137.90	482.63	
9	2.80	3.95	3.31	6.75	10.06	20.00	70.00	3.44
	19.28	27.26	22.80	46.54	69.34	137.90	482.63	
10	0.50	0.06	1.40	0.56	1.96	20.00	70.00	>10
	3.43	0.43	9.67	3.86	13.53	137.90	482.63	
11	0.49	0.00	1.40	0.49	1.89	20.00	70.00	>10
	3.38	0.01	9.66	3.39	13.05	137.90	482.63	
12	0.49	0.04	1.40	0.53	1.93	20.00	70.00	>10
	3.38	0.29	9.66	3.67	13.33	137.90	482.63	
13	1.62	2.20	1.66	3.82	5.47	20.00	70.00	6.86
	11.15	15.16	11.42	26.32	37.73	137.90	482.63	

14	1.66	1.66	0.91	3.32	4.23	20.00	70.00	8.03
	11.44	11.47	6.25	22.90	29.15	137.90	482.63	
15	1.65	1.86	0.75	3.51	4.27	20.00	70.00	7.54
	11.40	12.83	5.19	24.23	29.42	137.90	482.63	
16	3.30	0.77	2.98	4.08	7.05	20.00	70.00	5.06
	22.76	5.34	20.53	28.10	48.63	137.90	482.63	
17	3.23	1.55	2.46	4.78	7.24	20.00	70.00	5.19
	22.26	10.70	16.99	32.96	49.95	137.90	482.63	
18	4.38	5.47	0.92	9.85	10.77	20.00	70.00	2.05
	30.23	37.68	6.37	67.91	74.28	137.90	482.63	
19	3.23	4.85	1.41	8.08	9.49	20.00	70.00	2.72
	22.24	33.44	9.73	55.68	65.41	137.90	482.63	
20	2.26	3.70	1.06	5.96	7.02	20.00	70.00	4.04
	15.56	25.51	7.34	41.07	48.41	137.90	482.63	
21	2.29	3.71	0.98	6.00	6.97	20.00	70.00	4.00
	15.76	25.58	6.73	41.33	48.07	137.90	482.63	
22	3.70	5.63	1.48	9.33	10.82	20.00	70.00	2.22
	25.51	38.82	10.24	64.33	74.57	137.90	482.63	

Min MS: 0.588, Location: 7, Combination: Pm+Pb

Table 2-258. Load Combination 221, Forward Vibration, Normal Conditions of Transport – Model AOS-165A

Load Cases: 221, 101, 201, 211
Forward 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.74	0.43	1.15	1.17	2.32	17.40	59.20	>10
	5.13	2.93	7.95	8.06	16.00	119.97	408.17	
2	2.65	0.18	1.71	2.82	4.54	17.40	59.20	5.57
	18.26	1.22	11.82	19.48	31.29	119.97	408.17	
3	2.31	0.57	1.26	2.88	4.14	18.70	59.70	7.10
	15.91	3.95	8.67	19.86	28.53	128.93	411.62	
4	0.72	0.33	2.47	1.05	3.52	17.40	59.20	>10
	4.94	2.27	17.06	7.21	24.26	119.97	408.17	
5	0.75	0.40	1.14	1.15	2.30	17.40	59.20	>10
	5.19	2.76	7.89	7.96	15.84	119.97	408.17	
6	2.71	0.87	1.67	3.59	5.25	17.40	59.20	5.42
	18.70	6.03	11.50	24.72	36.22	119.97	408.17	
7	7.49	11.92	18.18	19.42	37.60	17.40	59.20	0.34
	51.66	82.21	125.37	133.86	259.24	119.97	408.17	
8	6.57	8.02	19.30	14.59	33.89	17.40	59.20	0.54
	45.29	55.29	133.06	100.58	233.64	119.97	408.17	
9	3.14	4.35	8.57	7.48	16.06	17.40	59.20	2.25
	21.62	29.99	59.10	51.60	110.70	119.97	408.17	
10	0.57	0.07	2.55	0.64	3.19	16.40	59.20	>10
	3.93	0.46	17.60	4.39	21.99	113.07	408.17	
11	0.52	0.00	2.52	0.52	3.04	16.40	59.20	>10
	3.56	0.02	17.39	3.58	20.97	113.07	408.17	
12	0.62	0.05	2.51	0.67	3.18	16.40	59.20	>10
	4.25	0.34	17.33	4.59	21.92	113.07	408.17	
13	1.87	2.35	4.53	4.22	8.75	16.40	59.20	4.62
	12.86	16.24	31.25	29.10	60.35	113.07	408.17	

14	1.84	1.79	4.66	3.63	8.29	16.40	59.20	4.93
	12.69	12.31	32.16	25.01	57.17	113.07	408.17	
15	1.78	2.02	7.03	3.80	10.83	16.40	59.20	3.54
	12.27	13.92	48.46	26.19	74.66	113.07	408.17	
16	3.82	1.22	7.94	5.04	12.97	17.40	59.20	3.02
	26.35	8.39	54.72	34.74	89.46	119.97	408.17	
17	3.73	2.03	6.80	5.76	12.55	17.40	59.20	3.16
	25.72	13.98	46.85	39.69	86.54	119.97	408.17	
18	3.64	5.43	0.23	9.06	9.29	17.40	59.20	1.88
	25.08	37.40	1.60	62.48	64.08	119.97	408.17	
19	3.35	4.90	0.09	8.25	8.34	17.40	59.20	2.16
	23.12	33.77	0.60	56.88	57.48	119.97	408.17	
20	2.38	3.73	0.15	6.10	6.25	17.40	59.20	3.28
	16.40	25.69	1.03	42.09	43.12	119.97	408.17	
21	2.67	4.08	1.18	6.75	7.93	17.40	59.20	2.86
	18.41	28.16	8.14	46.57	54.71	119.97	408.17	
22	4.31	6.15	1.48	10.45	11.93	17.40	59.20	1.50
	29.69	42.38	10.22	72.06	82.29	119.97	408.17	

Min MS: 0.344, Location: 7, Combination: Pm+Pb

Table 2-259. Load Combination 222, Lateral Vibration, Normal Conditions of Transport – Model AOS-165A

Load Cases: 222, 101, 201, 211
Lateral 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.65	0.42	1.15	1.07	2.22	17.40	59.20	>10
	4.51	2.87	7.95	7.38	15.33	119.97	408.17	
2	2.57	0.16	1.71	2.74	4.45	17.40	59.20	5.76
	17.74	1.14	11.82	18.87	30.69	119.97	408.17	
3	0.69	0.07	1.26	0.76	2.02	18.70	59.70	>10
	4.73	0.50	8.67	5.23	13.90	128.93	411.62	
4	0.72	0.33	2.47	1.05	3.52	17.40	59.20	>10
	4.95	2.29	17.06	7.25	24.30	119.97	408.17	
5	0.65	0.39	1.14	1.04	2.18	17.40	59.20	>10
	4.47	2.71	7.89	7.18	15.06	119.97	408.17	
6	2.63	0.86	1.67	3.49	5.16	17.40	59.20	5.62
	18.11	5.96	11.50	24.07	35.57	119.97	408.17	
7	7.37	11.63	18.18	19.00	37.18	17.40	59.20	0.37
	50.82	80.17	125.37	130.98	256.36	119.97	408.17	
8	6.10	7.55	19.30	13.64	32.94	17.40	59.20	0.58
	42.03	52.03	133.06	94.07	227.13	119.97	408.17	
9	2.86	4.00	8.57	6.86	15.43	17.40	59.20	2.38
	19.73	27.55	59.10	47.27	106.37	119.97	408.17	
10	0.61	0.12	2.55	0.74	3.29	16.40	59.20	>10
	4.23	0.84	17.60	5.08	22.68	113.07	408.17	
11	0.63	0.07	2.52	0.71	3.23	16.40	59.20	>10
	4.37	0.49	17.39	4.86	22.25	113.07	408.17	
12	0.61	0.10	2.51	0.71	3.23	16.40	59.20	>10
	4.21	0.70	17.33	4.91	22.24	113.07	408.17	
13	1.72	2.30	4.53	4.02	8.55	16.40	59.20	4.75
	11.83	15.87	31.25	27.70	58.95	113.07	408.17	

14	1.76	1.67	4.66	3.43	8.09	16.40	59.20	5.08
	12.11	11.52	32.16	23.63	55.79	113.07	408.17	
15	1.77	1.88	7.03	3.65	10.68	16.40	59.20	3.61
	12.17	13.00	48.46	25.17	73.63	113.07	408.17	
16	3.44	0.80	7.94	4.25	12.18	17.40	59.20	3.29
	23.74	5.53	54.72	29.27	83.99	119.97	408.17	
17	3.35	1.55	6.80	4.90	11.70	17.40	59.20	3.46
	23.08	10.71	46.85	33.79	80.64	119.97	408.17	
18	3.63	5.42	0.23	9.05	9.28	17.40	59.20	1.88
	25.05	37.34	1.60	62.39	63.99	119.97	408.17	
19	3.27	4.81	0.09	8.08	8.17	17.40	59.20	2.23
	22.54	33.20	0.60	55.74	56.34	119.97	408.17	
20	2.31	3.67	0.15	5.98	6.13	17.40	59.20	3.37
	15.92	25.29	1.03	41.21	42.24	119.97	408.17	
21	2.36	3.70	1.18	6.06	7.24	17.40	59.20	3.31
	16.28	25.51	8.14	41.79	49.93	119.97	408.17	
22	3.81	5.64	1.48	9.45	10.94	17.40	59.20	1.76
	26.28	38.90	10.22	65.18	75.40	119.97	408.17	

Min MS: 0.374, Location: 7, Combination: Pm+Pb

Table 2-260. Load Combination 223, Vertical Vibration, Normal Conditions of Transport – Model AOS-165A

Load Cases: 223, 101, 201, 211
Vertical 10g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	1.68	0.92	1.15	2.59	3.75	17.40	59.20	9.06
	11.55	6.33	7.95	17.89	25.83	119.97	408.17	
2	5.01	1.25	1.71	6.25	7.97	17.40	59.20	2.48
	34.52	8.59	11.82	43.11	54.93	119.97	408.17	
3	4.28	1.60	1.26	5.87	7.13	18.70	59.70	3.37
	29.48	11.01	8.67	40.49	49.16	128.93	411.62	
4	0.92	0.46	2.47	1.38	3.86	17.40	59.20	>10
	6.34	3.20	17.06	9.54	26.60	119.97	408.17	
5	1.47	0.80	1.14	2.27	3.41	17.40	59.20	>10
	10.12	5.53	7.89	15.65	23.54	119.97	408.17	
6	4.29	1.65	1.67	5.94	7.61	17.40	59.20	3.05
	29.59	11.35	11.50	40.94	52.44	119.97	408.17	
7	11.51	14.58	18.18	26.10	44.28	17.40	59.20	0.00
	79.39	100.56	125.37	179.94	305.32	119.97	408.17	
8	11.48	11.00	19.30	22.48	41.78	17.40	59.20	0.16
	79.15	75.86	133.06	155.02	288.08	119.97	408.17	
9	5.81	5.41	8.57	11.22	19.79	17.40	59.20	1.33
	40.07	37.31	59.10	77.38	136.48	119.97	408.17	
10	1.52	0.29	2.55	1.81	4.36	16.40	59.20	9.80
	10.47	2.01	17.60	12.48	30.08	113.07	408.17	
11	1.87	0.28	2.52	2.15	4.67	16.40	59.20	7.78
	12.88	1.92	17.39	14.80	32.19	113.07	408.17	
12	1.69	0.29	2.51	1.99	4.50	16.40	59.20	8.70
	11.66	2.03	17.33	13.69	31.03	113.07	408.17	
13	2.96	2.78	4.53	5.74	10.28	16.40	59.20	3.28
	20.42	19.18	31.25	39.60	70.85	113.07	408.17	

14	2.61	2.39	4.66	5.01	9.67	16.40	59.20	3.91
	18.02	16.49	32.16	34.51	66.68	113.07	408.17	
15	2.20	1.90	7.03	4.10	11.13	16.40	59.20	3.42
	15.16	13.11	48.46	28.28	76.74	113.07	408.17	
16	5.41	1.86	7.94	7.27	15.20	17.40	59.20	2.22
	37.31	12.79	54.72	50.10	104.82	119.97	408.17	
17	5.52	2.31	6.80	7.83	14.63	17.40	59.20	2.15
	38.09	15.90	46.85	54.00	100.84	119.97	408.17	
18	3.65	5.50	0.23	9.15	9.38	17.40	59.20	1.85
	25.17	37.91	1.60	63.08	64.68	119.97	408.17	
19	3.67	5.22	0.09	8.89	8.98	17.40	59.20	1.94
	25.33	35.96	0.60	61.29	61.89	119.97	408.17	
20	2.51	4.15	0.15	6.66	6.81	17.40	59.20	2.92
	17.33	28.60	1.03	45.92	46.95	119.97	408.17	
21	2.61	4.07	1.18	6.68	7.86	17.40	59.20	2.91
	17.99	28.07	8.14	46.05	54.19	119.97	408.17	
22	4.12	5.72	1.48	9.84	11.32	17.40	59.20	1.65
	28.43	39.43	10.22	67.85	78.08	119.97	408.17	

Min MS: 0.000, Location: 7, Combination: Pm+Pb

Table 2-261. Load Combination 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-165A

Load Cases: 231, 102, 201, 211
4-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	1.70	0.91	1.12	2.61	3.73	17.40	59.20	9.00
	11.72	6.27	7.72	17.99	25.71	119.97	408.17	
2	3.87	0.55	1.70	4.42	6.12	17.40	59.20	3.49
	26.72	3.77	11.69	30.48	42.17	119.97	408.17	
3	1.26	0.03	1.25	1.29	2.53	17.40	59.20	>10
	8.69	0.17	8.60	8.87	17.47	119.97	408.17	
4	1.38	0.33	2.44	1.72	4.15	17.40	59.20	>10
	9.55	2.30	16.80	11.85	28.65	119.97	408.17	
5	1.09	0.45	1.11	1.54	2.65	17.40	59.20	>10
	7.51	3.12	7.66	10.62	18.28	119.97	408.17	
6	2.94	0.90	1.64	3.84	5.48	17.40	59.20	4.93
	20.24	6.23	11.30	26.47	37.77	119.97	408.17	
7	10.14	15.15	18.59	25.29	43.88	17.40	59.20	0.03
	69.92	104.47	128.14	174.39	302.53	119.97	408.17	
8	7.49	9.93	19.66	17.41	37.07	16.40	59.20	0.33
	51.62	68.44	135.54	120.06	255.59	113.07	408.17	
9	3.25	4.57	8.73	7.82	16.55	16.40	59.20	1.97
	22.43	31.48	60.20	53.90	114.10	113.07	408.17	
10	0.72	0.07	2.55	0.79	3.34	16.10	59.20	>10
	4.94	0.48	17.60	5.42	23.02	111.01	408.17	
11	0.66	0.00	2.52	0.66	3.18	16.10	59.20	>10
	4.55	0.01	17.38	4.57	21.94	111.01	408.17	
12	0.63	0.04	2.51	0.67	3.18	16.10	59.20	>10
	4.33	0.30	17.33	4.63	21.95	111.01	408.17	
13	1.74	2.33	4.51	4.08	8.59	16.40	59.20	4.73
	12.03	16.08	31.12	28.11	59.23	113.07	408.17	

14	1.83	1.72	4.69	3.55	8.24	16.40	59.20	4.97
	12.62	11.87	32.32	24.50	56.81	113.07	408.17	
15	1.77	2.07	7.04	3.84	10.88	16.10	59.20	3.44
	12.21	14.24	48.57	26.45	75.01	111.01	408.17	
16	3.47	0.88	7.96	4.35	12.32	16.40	59.20	2.99
	23.94	6.07	54.90	30.02	84.92	113.07	408.17	
17	3.40	1.58	6.82	4.98	11.80	16.40	59.20	3.17
	23.46	10.91	46.99	34.36	81.35	113.07	408.17	
18	3.97	5.44	0.23	9.41	9.64	16.40	59.20	1.61
	27.37	37.50	1.60	64.87	66.47	113.07	408.17	
19	3.62	5.19	0.09	8.80	8.89	16.40	59.20	1.79
	24.92	35.77	0.60	60.69	61.29	113.07	408.17	
20	2.70	4.25	0.15	6.95	7.10	16.40	59.20	2.54
	18.59	29.31	1.02	47.90	48.92	113.07	408.17	
21	3.10	4.88	1.17	7.99	9.16	16.40	59.20	2.08
	21.40	33.67	8.08	55.08	63.16	113.07	408.17	
22	4.50	6.51	1.47	11.01	12.48	16.40	59.20	1.23
	31.02	44.89	10.13	75.91	86.04	113.07	408.17	

Min MS: 0.032, Location: 7, Combination: Pm+Pb

2.10.3.2 Hypothetical Accident Conditions of Transport Summary of Damages (Stresses) – Model AOS-165A

Table 2-262 and Table 2-263 present Model AOS-165A transport package Load Cases and Load Combinations, respectively, under Hypothetical Accident conditions of transport:

- Table 2-264 through Table 2-276 present Load Case test case output data. Comparisons with allowable stress limits are included for Load Cases 111, 112, 113, 114, 115, and 116.
- Table 2-277 through Table 2-291 present Load Combination test case output data.

Table 2-262. Load Cases Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Case	Description	Data
111	Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat	Table 2-264
112	Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-265
113	Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-266
114	Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-267
115	Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-268
116	Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-269
301	30-ft. Head-On Drop	Table 2-270
302	30-ft. Side Drop	Table 2-271
303	30-ft. Cg/Corner Drop	Table 2-272
304	30-ft. Head-On Drop at -40°F	Table 2-273
305	30-ft. Side Drop at -40°F	Table 2-274
306	30-ft. Cg/Corner Drop at -40°F	Table 2-275
311	4-ft. Drop onto Rod	Table 2-276

Table 2-263. Load Combinations Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Combination	Load Cases[1]	Description	Data
301	301, 102, 201, 211	Head-On Orientation	Table 2-277
302	302, 102, 201, 211	Side Drop Orientation	Table 2-278
303	303, 102, 201, 211	Cg/Corner Orientation	Table 2-279
304	304, 105, 202, 211	Head-On Orientation at -40°F	Table 2-280
305	305, 105, 202, 211	Side Drop Orientation at -40°F	Table 2-281
306	306, 105, 202, 211	Cg/Corner Orientation at -40°F	Table 2-282
310	204, 101, 211	Additional Increase Evaluation Pressure	Table 2-283
311	311, 101, 201, 211	4-ft. Drop onto Rod	Table 2-284
312	311, 104, 201, 211	4-ft. Drop onto Rod at -40°F	Table 2-285
350	111, 201, 211	Fire at 30 Minutes	Table 2-286
351	112, 201, 211	Fire at 60 Minutes	Table 2-287
352	113, 201, 211	Fire at 90 Minutes	Table 2-288
353	114, 201, 211	Fire at 120 Minutes	Table 2-289
354	115, 201, 211	Fire at 150 Minutes	Table 2-290
355	116, 201, 211	Fire at 180 Minutes	Table 2-291

1. Some Normal conditions of transport Load Cases are included in Hypothetical Accident conditions of transport Load Combinations, to meet regulatory requirements

Table 2-264. Load Case 111, Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.9748E+03	-5.0518E+03	6.3375E+03	1.1027E+04	2.0119E+04
	4.1195E+01	-3.4831E+01	4.3695E+01	7.6025E+01	1.3872E+02
2	1.3480E+03	-2.5148E+02	2.4219E+02	1.5995E+03	2.9313E+03
	9.2940E+00	-1.7339E+00	1.6699E+00	1.1028E+01	2.0210E+01
3	9.7387E+03	-6.7253E+03	4.7614E+03	1.6464E+04	3.2623E+04
	6.7146E+01	-4.6369E+01	3.2829E+01	1.1352E+02	2.2493E+02
4	2.6583E+03	-1.3646E+03	1.1496E+03	4.0229E+03	7.3633E+03
	1.8328E+01	-9.4084E+00	7.9262E+00	2.7737E+01	5.0768E+01
5	5.9615E+03	-5.0433E+03	6.2348E+03	1.1005E+04	1.9992E+04
	4.1103E+01	-3.4772E+01	4.2988E+01	7.5875E+01	1.3784E+02
6	1.0582E+03	-4.6482E+02	3.4301E+02	1.5231E+03	2.3946E+03
	7.2962E+00	-3.2048E+00	2.3650E+00	1.0501E+01	1.6510E+01
7	4.0003E+01	-4.9814E+03	-1.2750E+03	5.0214E+03	9.0268E+03
	2.7581E-01	-3.4345E+01	-8.7910E+00	3.4621E+01	6.2237E+01
8	1.7705E+01	-5.4174E+03	-5.8152E+03	5.4351E+03	7.6971E+03
	1.2207E-01	-3.7352E+01	-4.0095E+01	3.7474E+01	5.3070E+01
9	2.0431E+02	-2.7811E+03	-7.8189E+03	2.9854E+03	1.3306E+03
	1.4087E+00	-1.9175E+01	-5.3910E+01	2.0583E+01	9.1739E+00
10	3.4306E+02	-1.7076E+03	-3.7377E+03	2.0507E+03	3.5102E+03
	2.3653E+00	-1.1774E+01	-2.5770E+01	1.4139E+01	2.4202E+01
11	3.3162E+02	-1.6944E+03	-3.8170E+03	2.0261E+03	3.4681E+03
	2.2864E+00	-1.1683E+01	-2.6317E+01	1.3969E+01	2.3912E+01
12	3.2773E+02	-1.6902E+03	-3.9191E+03	2.0179E+03	3.4550E+03
	2.2596E+00	-1.1653E+01	-2.7022E+01	1.3913E+01	2.3821E+01
13	1.1112E+03	-4.5031E+03	-1.0230E+02	5.6143E+03	9.3280E+03
	7.6615E+00	-3.1048E+01	-7.0534E-01	3.8709E+01	6.4315E+01
14	-1.2299E+03	-5.5526E+03	-2.6546E+03	4.3227E+03	1.6332E+03
	-8.4802E+00	-3.8284E+01	-1.8303E+01	2.9804E+01	1.1260E+01
15	1.7125E+01	-6.5382E+03	-6.4865E+03	6.5553E+03	1.9743E+03
	1.1807E-01	-4.5079E+01	-4.4723E+01	4.5197E+01	1.3612E+01

16	-1.7665E+02	-6.1983E+03	2.4857E+02	6.0216E+03	7.4497E+02
	-1.2179E+00	-4.2736E+01	1.7138E+00	4.1518E+01	5.1364E+00
17	-3.6148E+02	-5.2968E+03	1.4934E+03	4.9353E+03	1.5914E+03
	-2.4923E+00	-3.6520E+01	1.0296E+01	3.4028E+01	1.0972E+01
18	-4.0194E+00	-2.3659E+02	-2.3153E+02	2.3257E+02	1.5685E+01
	-2.7713E-02	-1.6312E+00	-1.5964E+00	1.6035E+00	1.0815E-01
19	8.7673E+00	-8.0432E+01	1.9910E+02	8.9199E+01	1.5923E+02
	6.0448E-02	-5.5456E-01	1.3727E+00	6.1501E-01	1.0978E+00
20	5.5696E+01	-9.5231E+01	1.7123E+01	1.5093E+02	1.4183E+02
	3.8401E-01	-6.5660E-01	1.1806E-01	1.0406E+00	9.7789E-01
21	5.2616E+02	-6.4971E+02	4.0769E+03	1.1759E+03	1.2363E+03
	3.6278E+00	-4.4796E+00	2.8109E+01	8.1074E+00	8.5239E+00
22	8.5968E+00	-1.4626E+03	5.2593E+03	1.4712E+03	3.2363E+02
	5.9273E-02	-1.0084E+01	3.6262E+01	1.0144E+01	2.2314E+00
23	-7.6446E+01	-3.9074E+03	1.3359E+03	3.8309E+03	4.7299E+01
	-5.2708E-01	-2.6940E+01	9.2110E+00	2.6413E+01	3.2611E-01
24	4.4189E-01	-9.3553E+02	-9.3221E+02	9.3597E+02	6.7057E+01
	3.0467E-03	-6.4502E+00	-6.4274E+00	6.4533E+00	4.6234E-01
25	-6.7719E+00	-1.2643E+03	-1.2592E+03	1.2576E+03	9.4410E+02
	-4.6691E-02	-8.7172E+00	-8.6817E+00	8.6706E+00	6.5094E+00

Allowable Stress for Load Case 111

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	582.11	574.80	17.40	19.40	59.20
2	574.83	569.63	17.40	19.40	59.20
3	972.41	799.86	15.50	17.20	59.20
4	653.26	609.11	16.40	18.40	59.20
5	584.82	576.74	17.40	19.40	59.20
6	576.71	571.59	17.40	19.40	59.20
7	595.99	594.50	17.40	19.40	59.20
8	619.83	615.46	16.40	18.40	59.20
9	632.90	628.06	16.40	18.40	59.20
10	659.27	647.48	16.40	18.40	59.20
11	660.04	648.31	16.40	18.40	59.20
12	659.60	647.82	16.40	18.40	59.20
13	649.69	637.57	16.40	18.40	59.20
14	656.94	635.51	16.40	18.40	59.20
15	686.41	660.89	16.10	18.00	59.20
16	615.00	608.07	16.40	18.40	59.20
17	600.86	598.33	17.40	19.40	59.20
18	602.86	602.02	16.40	18.40	59.20
19	600.72	599.32	17.40	19.40	59.20
20	602.22	600.39	16.40	18.40	59.20
21	607.46	606.20	16.40	18.40	59.20
22	610.28	608.68	16.40	18.40	59.20
23	643.79	636.24	16.40	18.40	59.20
24	587.17	585.68	17.40	19.40	59.20
25	588.96	587.63	17.40	19.40	59.20

Table 2-265. Load Case 112, Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.6192E+02	-5.9805E+02	2.6055E+03	1.3600E+03	2.0791E+03
	5.2533E+00	-4.1234E+00	1.7964E+01	9.3767E+00	1.4335E+01
2	2.1122E+03	-3.5873E+02	7.8754E+02	2.4709E+03	5.5505E+03
	1.4563E+01	-2.4733E+00	5.4299E+00	1.7036E+01	3.8269E+01
3	1.9690E+03	-2.4042E+03	-1.3986E+03	4.3732E+03	8.2188E+03
	1.3576E+01	-1.6576E+01	-9.6430E+00	3.0152E+01	5.6667E+01
4	6.5720E+02	-1.1564E+03	6.0134E+02	1.8136E+03	3.0696E+03
	4.5312E+00	-7.9729E+00	4.1461E+00	1.2504E+01	2.1164E+01
5	7.7472E+02	-6.0159E+02	2.6078E+03	1.3763E+03	2.1442E+03
	5.3415E+00	-4.1478E+00	1.7980E+01	9.4893E+00	1.4783E+01
6	3.7297E+03	4.9044E+00	6.3583E+02	3.7248E+03	8.1029E+03
	2.5715E+01	3.3815E-02	4.3839E+00	2.5681E+01	5.5867E+01
7	4.9572E+04	-2.5253E+04	9.2946E+03	7.4825E+04	1.4497E+05
	3.4179E+02	-1.7411E+02	6.4084E+01	5.1590E+02	9.9953E+02
8	5.3810E+04	-2.4279E+04	3.2706E+03	7.8090E+04	1.2139E+05
	3.7101E+02	-1.6740E+02	2.2550E+01	5.3841E+02	8.3696E+02
9	2.8556E+04	-3.7393E+03	8.7058E+03	3.2295E+04	4.9966E+04
	1.9689E+02	-2.5782E+01	6.0024E+01	2.2267E+02	3.4450E+02
10	9.7928E+03	-5.7481E+02	-4.0672E+03	1.0368E+04	3.0581E+03
	6.7519E+01	-3.9632E+00	-2.8042E+01	7.1482E+01	2.1085E+01
11	9.7847E+03	-5.7709E+02	-3.7720E+03	1.0362E+04	3.2422E+03
	6.7463E+01	-3.9789E+00	-2.6007E+01	7.1442E+01	2.2355E+01
12	9.7855E+03	-5.7672E+02	-3.9731E+03	1.0362E+04	3.2255E+03
	6.7469E+01	-3.9763E+00	-2.7394E+01	7.1445E+01	2.2239E+01
13	1.0530E+04	-3.7587E+03	4.6078E+03	1.4288E+04	1.2304E+04
	7.2599E+01	-2.5916E+01	3.1770E+01	9.8514E+01	8.4831E+01
14	1.7675E+03	-5.2819E+03	7.6801E+02	7.0494E+03	1.7432E+03
	1.2187E+01	-3.6417E+01	5.2952E+00	4.8604E+01	1.2019E+01
15	6.7887E+01	-2.5591E+03	-2.4696E+03	2.6270E+03	1.5092E+03
	4.6806E-01	-1.7644E+01	-1.7028E+01	1.8112E+01	1.0406E+01

16	1.6154E+04	-5.4164E+03	6.4078E+03	2.1571E+04	2.0634E+04
	1.1138E+02	-3.7345E+01	4.4180E+01	1.4872E+02	1.4226E+02
17	1.3807E+04	-4.3375E+03	7.8086E+03	1.8145E+04	1.6285E+04
	9.5199E+01	-2.9906E+01	5.3838E+01	1.2511E+02	1.1228E+02
18	-4.0149E+00	-2.3347E+02	-2.2846E+02	2.2946E+02	2.3424E+01
	-2.7682E-02	-1.6097E+00	-1.5751E+00	1.5821E+00	1.6150E-01
19	8.2827E+00	-7.8498E+01	1.8776E+02	8.6780E+01	1.5048E+02
	5.7107E-02	-5.4122E-01	1.2946E+00	5.9833E-01	1.0375E+00
20	5.7459E+01	-9.5661E+01	3.5823E+00	1.5312E+02	1.2916E+02
	3.9617E-01	-6.5956E-01	2.4699E-02	1.0557E+00	8.9053E-01
21	5.4183E+02	-6.5321E+02	4.0098E+03	1.1950E+03	1.2890E+03
	3.7358E+00	-4.5038E+00	2.7646E+01	8.2395E+00	8.8876E+00
22	1.2840E+01	-1.4388E+03	5.0817E+03	1.4516E+03	2.8113E+02
	8.8530E-02	-9.9202E+00	3.5037E+01	1.0009E+01	1.9383E+00
23	-6.4819E+01	-3.7892E+03	1.1979E+03	3.7244E+03	3.0755E+01
	-4.4691E-01	-2.6126E+01	8.2589E+00	2.5679E+01	2.1205E-01
24	7.8340E+02	-1.6373E+03	-8.5109E+02	2.4207E+03	4.5941E+03
	5.4013E+00	-1.1289E+01	-5.8681E+00	1.6690E+01	3.1675E+01
25	7.3690E+01	-1.6175E+03	-1.5307E+03	1.6912E+03	2.3283E+03
	5.0807E-01	-1.1153E+01	-1.0554E+01	1.1661E+01	1.6053E+01

Allowable Stress for Load Case 112

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	603.38	599.60	17.40	19.40	59.20
2	596.70	592.83	17.40	19.40	59.20
3	717.10	711.29	16.00	17.60	59.20
4	695.51	669.07	16.10	18.00	59.20
5	605.57	601.31	16.40	18.40	59.20
6	598.76	594.44	17.40	19.40	59.20
7	605.03	602.72	16.40	18.40	59.20
8	628.13	623.56	16.40	18.40	59.20
9	640.33	635.69	16.40	18.40	59.20
10	676.90	665.64	16.10	18.00	59.20
11	680.62	669.72	16.10	18.00	59.20
12	677.17	665.91	16.10	18.00	59.20
13	658.44	646.43	16.40	18.40	59.20
14	661.49	639.82	16.40	18.40	59.20
15	687.84	662.30	16.10	18.00	59.20
16	621.22	613.38	16.40	18.40	59.20
17	607.57	603.89	16.40	18.40	59.20
18	603.05	602.19	16.40	18.40	59.20
19	601.01	599.57	17.40	19.40	59.20
20	602.55	600.70	16.40	18.40	59.20
21	609.86	608.49	16.40	18.40	59.20
22	613.50	611.67	16.40	18.40	59.20
23	646.28	638.66	16.40	18.40	59.20
24	587.43	585.81	17.40	19.40	59.20
25	588.99	587.65	17.40	19.40	59.20

Table 2-266. Load Case 113, Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.4229E+02	-4.2984E+02	9.7418E+02	8.7212E+02	6.7600E+02
	3.0495E+00	-2.9636E+00	6.7168E+00	6.0131E+00	4.6609E+00
2	1.1034E+03	-9.4282E+01	3.1875E+02	1.1977E+03	1.4768E+03
	7.6078E+00	-6.5005E-01	2.1977E+00	8.2579E+00	1.0182E+01
3	1.9501E+03	-2.4899E+03	-1.4422E+03	4.4401E+03	8.7902E+03
	1.3446E+01	-1.7168E+01	-9.9433E+00	3.0613E+01	6.0606E+01
4	5.6071E+02	-8.2254E+02	-2.0025E+02	1.3832E+03	2.5875E+03
	3.8660E+00	-5.6712E+00	-1.3807E+00	9.5372E+00	1.7840E+01
5	4.2949E+02	-4.0990E+02	9.7850E+02	8.3939E+02	6.3611E+02
	2.9612E+00	-2.8262E+00	6.7465E+00	5.7874E+00	4.3858E+00
6	1.9075E+02	-3.9070E+02	4.5206E+02	5.8146E+02	1.2429E+02
	1.3152E+00	-2.6938E+00	3.1168E+00	4.0090E+00	8.5694E-01
7	2.5582E+03	-3.9929E+03	-2.1915E+02	6.5511E+03	1.0794E+04
	1.7638E+01	-2.7530E+01	-1.5110E+00	4.5168E+01	7.4425E+01
8	2.6135E+03	-3.7593E+03	-5.2957E+03	6.3728E+03	8.1981E+03
	1.8019E+01	-2.5920E+01	-3.6513E+01	4.3939E+01	5.6524E+01
9	1.9253E+03	-1.0996E+03	-5.9299E+03	3.0249E+03	5.0911E+03
	1.3274E+01	-7.5813E+00	-4.0885E+01	2.0856E+01	3.5102E+01
10	1.0484E+03	-1.0986E+03	-4.0857E+03	2.1470E+03	3.3319E+03
	7.2283E+00	-7.5746E+00	-2.8170E+01	1.4803E+01	2.2972E+01
11	1.0567E+03	-1.1150E+03	-4.1836E+03	2.1717E+03	3.3835E+03
	7.2858E+00	-7.6876E+00	-2.8845E+01	1.4973E+01	2.3328E+01
12	1.0517E+03	-1.1036E+03	-4.1934E+03	2.1553E+03	3.3535E+03
	7.2514E+00	-7.6090E+00	-2.8913E+01	1.4860E+01	2.3122E+01
13	1.8693E+03	-3.5360E+03	-4.8999E+02	5.4053E+03	8.1682E+03
	1.2888E+01	-2.4380E+01	-3.3784E+00	3.7268E+01	5.6318E+01
14	-9.2552E+02	-4.4416E+03	-2.2534E+03	3.5161E+03	5.8456E+02
	-6.3812E+00	-3.0624E+01	-1.5537E+01	2.4243E+01	4.0304E+00
15	1.8939E+01	-5.0673E+03	-5.0192E+03	5.0862E+03	7.9629E+02
	1.3058E-01	-3.4938E+01	-3.4606E+01	3.5068E+01	5.4902E+00

16	5.3718E+02	-4.5728E+03	4.6718E+02	5.1100E+03	6.2460E+02
	3.7037E+00	-3.1529E+01	3.2211E+00	3.5232E+01	4.3065E+00
17	4.2546E+02	-3.8561E+03	1.9065E+03	4.2816E+03	1.9063E+03
	2.9335E+00	-2.6587E+01	1.3145E+01	2.9520E+01	1.3143E+01
18	1.1602E+01	-2.1511E+02	-2.0147E+02	2.2671E+02	1.2649E+02
	7.9994E-02	-1.4831E+00	-1.3891E+00	1.5631E+00	8.7212E-01
19	1.3737E+01	-7.8160E+01	1.3329E+02	9.1897E+01	1.7032E+02
	9.4711E-02	-5.3889E-01	9.1901E-01	6.3360E-01	1.1743E+00
20	6.0164E+01	-1.0141E+02	-5.1672E+01	1.6157E+02	1.3991E+02
	4.1482E-01	-6.9918E-01	-3.5627E-01	1.1140E+00	9.6467E-01
21	5.6275E+02	-6.7115E+02	3.9904E+03	1.2339E+03	1.3279E+03
	3.8801E+00	-4.6274E+00	2.7513E+01	8.5075E+00	9.1552E+00
22	4.9997E+00	-1.4406E+03	4.9017E+03	1.4456E+03	3.1487E+02
	3.4472E-02	-9.9325E+00	3.3796E+01	9.9670E+00	2.1710E+00
23	-5.9198E+01	-3.6724E+03	9.3103E+02	3.6132E+03	5.3994E+01
	-4.0816E-01	-2.5320E+01	6.4192E+00	2.4912E+01	3.7227E-01
24	3.2472E-01	-7.8374E+02	-7.7940E+02	7.8406E+02	1.3496E+02
	2.2389E-03	-5.4037E+00	-5.3738E+00	5.4059E+00	9.3050E-01
25	-9.4391E+00	-1.0805E+03	-1.0752E+03	1.0710E+03	7.8248E+02
	-6.5080E-02	-7.4495E+00	-7.4132E+00	7.3844E+00	5.3950E+00

Allowable Stress for Load Case 113

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	603.17	601.09	16.40	18.40	59.20
2	609.84	603.90	16.40	18.40	59.20
3	672.72	666.56	16.10	18.00	59.20
4	672.31	667.43	16.10	18.00	59.20
5	605.16	602.91	16.40	18.40	59.20
6	611.15	605.37	16.40	18.40	59.20
7	619.74	616.40	16.40	18.40	59.20
8	643.44	638.32	16.40	18.40	59.20
9	655.56	650.91	16.10	18.00	59.20
10	703.55	692.10	16.10	18.00	59.20
11	709.79	698.78	16.10	18.00	59.20
12	703.59	692.13	16.10	18.00	59.20
13	675.04	662.73	16.10	18.00	59.20
14	673.27	651.03	16.10	18.00	59.20
15	695.24	669.57	16.10	18.00	59.20
16	633.83	624.77	16.40	18.40	59.20
17	619.92	615.02	16.40	18.40	59.20
18	604.69	603.72	16.40	18.40	59.20
19	603.15	601.53	16.40	18.40	59.20
20	604.85	602.90	16.40	18.40	59.20
21	616.10	614.55	16.40	18.40	59.20
22	621.14	618.88	16.40	18.40	59.20
23	653.64	645.79	16.40	18.40	59.20
24	589.40	587.15	17.40	19.40	59.20
25	589.44	588.00	17.40	19.40	59.20

Table 2-267. Load Case 114, Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.7953E+02	-6.3213E+02	3.7699E+02	1.2117E+03	1.6872E+03
	3.9957E+00	-4.3584E+00	2.5993E+00	8.3541E+00	1.1633E+01
2	6.2449E+02	-6.1099E+02	1.0170E+02	1.2355E+03	1.3266E+03
	4.3057E+00	-4.2126E+00	7.0118E-01	8.5183E+00	9.1464E+00
3	1.7177E+03	-2.2394E+03	-1.0006E+03	3.9570E+03	7.9067E+03
	1.1843E+01	-1.5440E+01	-6.8989E+00	2.7283E+01	5.4515E+01
4	1.0374E+03	-1.3804E+03	-4.0636E+02	2.4178E+03	4.7825E+03
	7.1529E+00	-9.5175E+00	-2.8017E+00	1.6670E+01	3.2974E+01
5	5.6269E+02	-6.0603E+02	3.8366E+02	1.1687E+03	1.6159E+03
	3.8796E+00	-4.1784E+00	2.6453E+00	8.0580E+00	1.1141E+01
6	4.6900E+02	-7.0346E+02	1.8396E+02	1.1725E+03	1.4838E+03
	3.2336E+00	-4.8502E+00	1.2684E+00	8.0838E+00	1.0230E+01
7	1.7818E+03	-9.8814E+03	-2.7817E+03	1.1663E+04	2.2816E+04
	1.2285E+01	-6.8130E+01	-1.9179E+01	8.0415E+01	1.5731E+02
8	1.9140E+03	-1.0965E+04	-7.7516E+03	1.2879E+04	2.0391E+04
	1.3196E+01	-7.5598E+01	-5.3445E+01	8.8795E+01	1.4059E+02
9	3.5550E+02	-5.6102E+03	-9.9091E+03	5.9657E+03	6.1114E+03
	2.4511E+00	-3.8681E+01	-6.8321E+01	4.1132E+01	4.2136E+01
10	-1.6060E+02	-2.2382E+03	-4.1690E+03	2.0776E+03	3.4903E+03
	-1.1073E+00	-1.5432E+01	-2.8744E+01	1.4325E+01	2.4065E+01
11	-1.6669E+02	-2.2391E+03	-4.3629E+03	2.0724E+03	3.5002E+03
	-1.1493E+00	-1.5438E+01	-3.0081E+01	1.4288E+01	2.4133E+01
12	-1.6800E+02	-2.2306E+03	-4.3305E+03	2.0626E+03	3.4796E+03
	-1.1583E+00	-1.5379E+01	-2.9858E+01	1.4221E+01	2.3991E+01
13	-4.7336E+00	-3.8120E+03	-1.7626E+03	3.8073E+03	7.1819E+03
	-3.2637E-02	-2.6283E+01	-1.2153E+01	2.6250E+01	4.9517E+01
14	-9.2607E+02	-4.8442E+03	-2.9084E+03	3.9182E+03	1.2963E+03
	-6.3851E+00	-3.3400E+01	-2.0053E+01	2.7015E+01	8.9378E+00
15	1.3601E+01	-5.6093E+03	-5.5665E+03	5.6229E+03	1.5033E+03
	9.3774E-02	-3.8674E+01	-3.8379E+01	3.8768E+01	1.0365E+01

16	-5.7560E+02	-6.8509E+03	-6.8731E+02	6.2753E+03	3.9188E+03
	-3.9686E+00	-4.7235E+01	-4.7388E+00	4.3267E+01	2.7019E+01
17	-4.3342E+02	-5.9675E+03	8.1563E+02	5.5340E+03	2.1640E+03
	-2.9883E+00	-4.1144E+01	5.6236E+00	3.8156E+01	1.4920E+01
18	1.1931E+00	-1.6333E+02	-1.5192E+02	1.6453E+02	3.0134E+01
	8.2260E-03	-1.1261E+00	-1.0475E+00	1.1344E+00	2.0776E-01
19	2.1149E+01	-5.9633E+01	7.4162E+01	8.0782E+01	1.2206E+02
	1.4582E-01	-4.1116E-01	5.1133E-01	5.5697E-01	8.4158E-01
20	6.5883E+01	-1.0086E+02	-1.2246E+02	1.6674E+02	1.3054E+02
	4.5425E-01	-6.9540E-01	-8.4434E-01	1.1496E+00	9.0001E-01
21	5.7981E+02	-6.9029E+02	4.0431E+03	1.2701E+03	1.3602E+03
	3.9977E+00	-4.7594E+00	2.7876E+01	8.7571E+00	9.3784E+00
22	1.9962E-01	-1.4641E+03	4.8955E+03	1.4643E+03	3.5605E+02
	1.3763E-03	-1.0095E+01	3.3754E+01	1.0096E+01	2.4549E+00
23	-5.7699E+01	-3.6722E+03	8.0806E+02	3.6145E+03	6.9011E+01
	-3.9782E-01	-2.5319E+01	5.5714E+00	2.4921E+01	4.7582E-01
24	-2.1790E-01	-6.5730E+02	-6.5264E+02	6.5708E+02	3.0263E+02
	-1.5024E-03	-4.5319E+00	-4.4998E+00	4.5304E+00	2.0866E+00
25	-7.0684E+00	-7.7691E+02	-7.7228E+02	7.6984E+02	3.2958E+02
	-4.8735E-02	-5.3566E+00	-5.3247E+00	5.3079E+00	2.2724E+00

Allowable Stress for Load Case 114

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	604.51	600.52	16.40	18.40	59.20
2	617.28	608.68	16.40	18.40	59.20
3	651.23	639.46	16.40	18.40	59.20
4	661.89	657.71	16.10	18.00	59.20
5	606.37	602.37	16.40	18.40	59.20
6	618.39	610.06	16.40	18.40	59.20
7	630.35	626.75	16.40	18.40	59.20
8	654.92	649.48	16.40	18.40	59.20
9	667.35	662.60	16.10	18.00	59.20
10	718.62	706.94	16.00	17.60	59.20
11	724.90	713.61	16.00	17.60	59.20
12	718.42	706.71	16.00	17.60	59.20
13	687.52	675.01	16.10	18.00	59.20
14	684.59	662.01	16.10	18.00	59.20
15	705.43	679.62	16.10	18.00	59.20
16	644.72	635.10	16.40	18.40	59.20
17	630.22	624.92	16.40	18.40	59.20
18	608.44	607.33	16.40	18.40	59.20
19	607.56	605.76	16.40	18.40	59.20
20	609.46	607.40	16.40	18.40	59.20
21	623.13	621.50	16.40	18.40	59.20
22	628.93	626.44	16.40	18.40	59.20
23	661.86	653.77	16.10	18.00	59.20
24	593.78	590.77	17.40	19.40	59.20
25	591.18	589.55	17.40	19.40	59.20

Table 2-268. Load Case 115, Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.4277E+02	-7.3030E+02	6.8779E+01	1.3731E+03	2.1562E+03
	4.4317E+00	-5.0352E+00	4.7421E-01	9.4669E+00	1.4866E+01
2	6.6972E+02	-1.0354E+03	-3.5857E+01	1.7051E+03	2.5796E+03
	4.6176E+00	-7.1386E+00	-2.4723E-01	1.1756E+01	1.7785E+01
3	1.5057E+03	-1.9920E+03	-6.5995E+02	3.4978E+03	7.0105E+03
	1.0382E+01	-1.3735E+01	-4.5502E+00	2.4116E+01	4.8336E+01
4	1.2299E+03	-1.6263E+03	-4.4095E+02	2.8562E+03	5.6617E+03
	8.4799E+00	-1.1213E+01	-3.0402E+00	1.9693E+01	3.9036E+01
5	6.2450E+02	-7.0106E+02	7.2003E+01	1.3256E+03	2.0678E+03
	4.3057E+00	-4.8337E+00	4.9644E-01	9.1394E+00	1.4257E+01
6	6.5111E+02	-9.3251E+02	4.3262E+01	1.5836E+03	2.3483E+03
	4.4892E+00	-6.4294E+00	2.9828E-01	1.0919E+01	1.6191E+01
7	3.7719E+03	-1.4317E+04	-3.6343E+03	1.8089E+04	3.5669E+04
	2.6006E+01	-9.8715E+01	-2.5057E+01	1.2472E+02	2.4593E+02
8	3.8039E+03	-1.5775E+04	-8.5255E+03	1.9579E+04	3.1117E+04
	2.6227E+01	-1.0877E+02	-5.8781E+01	1.3499E+02	2.1454E+02
9	5.9329E+02	-8.1376E+03	-1.1349E+04	8.7309E+03	1.0371E+04
	4.0906E+00	-5.6107E+01	-7.8248E+01	6.0197E+01	7.1503E+01
10	-3.8776E+02	-2.9031E+03	-4.2077E+03	2.5153E+03	3.5661E+03
	-2.6735E+00	-2.0016E+01	-2.9011E+01	1.7342E+01	2.4587E+01
11	-3.9710E+02	-2.8986E+03	-4.4278E+03	2.5015E+03	3.5440E+03
	-2.7379E+00	-1.9985E+01	-3.0529E+01	1.7247E+01	2.4435E+01
12	-3.9616E+02	-2.8931E+03	-4.3955E+03	2.4969E+03	3.5315E+03
	-2.7314E+00	-1.9947E+01	-3.0306E+01	1.7215E+01	2.4349E+01
13	-5.7289E+02	-4.1369E+03	-2.1254E+03	3.5640E+03	7.0655E+03
	-3.9499E+00	-2.8523E+01	-1.4654E+01	2.4573E+01	4.8715E+01
14	-9.4065E+02	-5.1744E+03	-3.1838E+03	4.2338E+03	1.6427E+03
	-6.4856E+00	-3.5677E+01	-2.1952E+01	2.9191E+01	1.1326E+01
15	1.2095E+01	-5.9979E+03	-5.9562E+03	6.0100E+03	1.8639E+03
	8.3393E-02	-4.1354E+01	-4.1067E+01	4.1438E+01	1.2851E+01

16	-6.3233E+02	-8.1542E+03	-1.0630E+03	7.5218E+03	5.4286E+03
	-4.3598E+00	-5.6221E+01	-7.3288E+00	5.1861E+01	3.7429E+01
17	-4.8472E+02	-7.1372E+03	4.5424E+02	6.6525E+03	3.9023E+03
	-3.3421E+00	-4.9209E+01	3.1318E+00	4.5867E+01	2.6905E+01
18	5.0736E+00	-1.2824E+02	-1.1303E+02	1.3331E+02	3.5399E+01
	3.4981E-02	-8.8417E-01	-7.7932E-01	9.1915E-01	2.4407E-01
19	3.0518E+01	-5.2960E+01	3.3210E+01	8.3478E+01	1.1039E+02
	2.1042E-01	-3.6514E-01	2.2898E-01	5.7556E-01	7.6115E-01
20	6.9068E+01	-1.0232E+02	-1.6833E+02	1.7139E+02	1.4349E+02
	4.7621E-01	-7.0546E-01	-1.1606E+00	1.1817E+00	9.8934E-01
21	5.8658E+02	-6.9892E+02	4.0936E+03	1.2855E+03	1.3746E+03
	4.0444E+00	-4.8189E+00	2.8224E+01	8.8632E+00	9.4776E+00
22	-9.0145E-01	-1.4824E+03	4.9528E+03	1.4815E+03	3.7169E+02
	-6.2153E-03	-1.0221E+01	3.4149E+01	1.0215E+01	2.5627E+00
23	-5.5393E+01	-3.7133E+03	8.0404E+02	3.6579E+03	9.1075E+01
	-3.8192E-01	-2.5602E+01	5.5436E+00	2.5220E+01	6.2794E-01
24	-4.1739E-01	-6.0648E+02	-6.0165E+02	6.0606E+02	6.1724E+02
	-2.8778E-03	-4.1815E+00	-4.1482E+00	4.1786E+00	4.2557E+00
25	-6.4851E+00	-5.5488E+02	-5.5016E+02	5.4839E+02	6.9747E+01
	-4.4713E-02	-3.8257E+00	-3.7932E+00	3.7810E+00	4.8089E-01

Allowable Stress for Load Case 115

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	604.93	600.00	17.40	19.40	59.20
2	621.00	611.04	16.40	18.40	59.20
3	636.02	621.67	16.40	18.40	59.20
4	658.37	648.47	16.40	18.40	59.20
5	606.69	601.85	16.40	18.40	59.20
6	622.04	612.38	16.40	18.40	59.20
7	636.78	633.30	16.40	18.40	59.20
8	661.79	656.27	16.10	18.00	59.20
9	674.46	669.64	16.10	18.00	59.20
10	724.51	712.73	16.00	17.60	59.20
11	730.04	718.59	16.00	17.60	59.20
12	724.19	712.38	16.00	17.60	59.20
13	694.81	682.27	16.10	18.00	59.20
14	692.63	670.00	16.10	18.00	59.20
15	714.12	688.28	16.10	18.00	59.20
16	652.18	642.55	16.40	18.40	59.20
17	637.33	632.10	16.40	18.40	59.20
18	613.48	612.27	16.40	18.40	59.20
19	613.09	611.16	16.40	18.40	59.20
20	615.12	612.98	16.40	18.40	59.20
21	629.47	627.83	16.40	18.40	59.20
22	635.42	632.88	16.40	18.40	59.20
23	668.76	660.58	16.10	18.00	59.20
24	599.58	596.15	17.40	19.40	59.20
25	594.52	592.72	17.40	19.40	59.20

Table 2-269. Load Case 116, Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.6658E+02	-7.7393E+02	-1.2253E+02	1.4405E+03	2.3856E+03
	4.5959E+00	-5.3361E+00	-8.4480E-01	9.9320E+00	1.6448E+01
2	7.0302E+02	-1.2334E+03	-1.1769E+02	1.9364E+03	3.2011E+03
	4.8471E+00	-8.5038E+00	-8.1143E-01	1.3351E+01	2.2071E+01
3	1.3308E+03	-1.7835E+03	-4.2624E+02	3.1144E+03	6.2546E+03
	9.1758E+00	-1.2297E+01	-2.9388E+00	2.1473E+01	4.3124E+01
4	1.2952E+03	-1.7124E+03	-4.3936E+02	3.0076E+03	5.9663E+03
	8.9302E+00	-1.1806E+01	-3.0293E+00	2.0737E+01	4.1136E+01
5	6.4750E+02	-7.4341E+02	-1.2145E+02	1.3909E+03	2.2892E+03
	4.4644E+00	-5.1256E+00	-8.3733E-01	9.5900E+00	1.5783E+01
6	7.3772E+02	-1.0450E+03	-3.9825E+01	1.7827E+03	2.8016E+03
	5.0864E+00	-7.2049E+00	-2.7458E-01	1.2291E+01	1.9316E+01
7	4.7637E+03	-1.6414E+04	-4.0012E+03	2.1177E+04	4.1734E+04
	3.2845E+01	-1.1317E+02	-2.7587E+01	1.4601E+02	2.8774E+02
8	4.7206E+03	-1.8016E+04	-8.8047E+03	2.2737E+04	3.6067E+04
	3.2547E+01	-1.2422E+02	-6.0706E+01	1.5677E+02	2.4867E+02
9	7.1366E+02	-9.3192E+03	-1.1991E+04	1.0033E+04	1.2368E+04
	4.9205E+00	-6.4253E+01	-8.2672E+01	6.9174E+01	8.5278E+01
10	-4.8600E+02	-3.2201E+03	-4.2151E+03	2.7341E+03	3.5967E+03
	-3.3508E+00	-2.2202E+01	-2.9062E+01	1.8851E+01	2.4798E+01
11	-4.9886E+02	-3.2103E+03	-4.4406E+03	2.7114E+03	3.5531E+03
	-3.4395E+00	-2.2134E+01	-3.0617E+01	1.8695E+01	2.4498E+01
12	-4.9773E+02	-3.2058E+03	-4.4199E+03	2.7081E+03	3.5441E+03
	-3.4317E+00	-2.2103E+01	-3.0474E+01	1.8672E+01	2.4435E+01
13	-7.8691E+02	-4.3936E+03	-2.1966E+03	3.6067E+03	7.1723E+03
	-5.4255E+00	-3.0293E+01	-1.5145E+01	2.4868E+01	4.9451E+01
14	-9.7748E+02	-5.4199E+03	-3.3159E+03	4.4425E+03	1.8778E+03
	-6.7395E+00	-3.7369E+01	-2.2862E+01	3.0630E+01	1.2947E+01
15	1.1535E+01	-6.3007E+03	-6.2586E+03	6.3122E+03	2.1192E+03
	7.9530E-02	-4.3442E+01	-4.3151E+01	4.3521E+01	1.4612E+01

16	-6.1935E+02	-8.8329E+03	-1.1942E+03	8.2136E+03	5.9923E+03
	-4.2703E+00	-6.0901E+01	-8.2339E+00	5.6630E+01	4.1315E+01
17	-4.9876E+02	-7.7413E+03	3.0344E+02	7.2425E+03	4.8460E+03
	-3.4388E+00	-5.3374E+01	2.0922E+00	4.9935E+01	3.3412E+01
18	7.5902E+00	-1.1188E+02	-9.4375E+01	1.1947E+02	3.6020E+01
	5.2332E-02	-7.7140E-01	-6.5069E-01	8.2373E-01	2.4835E-01
19	3.5566E+01	-5.0689E+01	1.8447E+01	8.6255E+01	1.0715E+02
	2.4522E-01	-3.4949E-01	1.2719E-01	5.9471E-01	7.3877E-01
20	7.0635E+01	-1.0337E+02	-1.8493E+02	1.7401E+02	1.5450E+02
	4.8701E-01	-7.1272E-01	-1.2751E+00	1.1997E+00	1.0653E+00
21	5.8440E+02	-6.9903E+02	4.1224E+03	1.2834E+03	1.3695E+03
	4.0293E+00	-4.8197E+00	2.8423E+01	8.8489E+00	9.4423E+00
22	-1.1332E+00	-1.4911E+03	5.0136E+03	1.4900E+03	3.7872E+02
	-7.8129E-03	-1.0281E+01	3.4568E+01	1.0273E+01	2.6112E+00
23	-5.5662E+01	-3.7550E+03	8.5104E+02	3.6993E+03	9.4873E+01
	-3.8378E-01	-2.5890E+01	5.8677E+00	2.5506E+01	6.5412E-01
24	-3.5464E-01	-6.1170E+02	-6.0683E+02	6.1135E+02	7.7055E+02
	-2.4452E-03	-4.2176E+00	-4.1839E+00	4.2151E+00	5.3127E+00
25	-5.9820E+00	-4.5246E+02	-4.4753E+02	4.4648E+02	3.9900E+01
	-4.1244E-02	-3.1196E+00	-3.0856E+00	3.0784E+00	2.7510E-01

Allowable Stress for Load Case 116

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	605.02	599.65	17.40	19.40	59.20
2	622.72	612.20	16.40	18.40	59.20
3	624.94	609.30	16.40	18.40	59.20
4	653.74	640.61	16.40	18.40	59.20
5	606.73	601.49	16.40	18.40	59.20
6	623.81	613.57	16.40	18.40	59.20
7	640.47	637.26	16.40	18.40	59.20
8	665.62	660.17	16.10	18.00	59.20
9	678.43	673.58	16.10	18.00	59.20
10	725.62	713.80	16.00	17.60	59.20
11	730.31	718.78	16.00	17.60	59.20
12	725.30	713.47	16.00	17.60	59.20
13	698.66	686.16	16.10	18.00	59.20
14	697.81	675.29	16.10	18.00	59.20
15	720.45	694.66	16.10	18.00	59.20
16	656.95	647.57	16.40	18.40	59.20
17	641.97	637.04	16.40	18.40	59.20
18	618.88	617.62	16.40	18.40	59.20
19	618.69	616.71	16.40	18.40	59.20
20	620.76	618.59	16.40	18.40	59.20
21	634.78	633.16	16.40	18.40	59.20
22	640.53	638.05	16.40	18.40	59.20
23	674.12	665.95	16.10	18.00	59.20
24	605.66	602.14	16.40	18.40	59.20
25	599.02	597.13	17.40	19.40	59.20

Table 2-270. Load Case 301, 30-ft. Head-On Drop, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-5.3589E+01	-3.8128E+03	-8.1400E+02	3.7592E+03	1.7416E+03
	-3.6948E-01	-2.6289E+01	-5.6123E+00	2.5919E+01	1.2008E+01
2	2.9106E+01	-4.7125E+03	-7.8313E+02	4.7416E+03	1.3332E+03
	2.0068E-01	-3.2492E+01	-5.3995E+00	3.2692E+01	9.1924E+00
3	1.0558E+01	-2.6737E+03	3.1340E+01	2.6842E+03	4.0202E+01
	7.2798E-02	-1.8434E+01	2.1608E-01	1.8507E+01	2.7718E-01
4	5.1548E+01	-2.5964E+03	-1.3754E+02	2.6479E+03	8.1897E+01
	3.5541E-01	-1.7901E+01	-9.4833E-01	1.8257E+01	5.6466E-01
5	1.9029E+01	-1.7292E+03	1.0463E+02	1.7482E+03	2.4464E+02
	1.3120E-01	-1.1922E+01	7.2137E-01	1.2054E+01	1.6867E+00
6	6.8413E+01	-1.3872E+03	-4.7712E+01	1.4556E+03	1.3845E+02
	4.7169E-01	-9.5646E+00	-3.2896E-01	1.0036E+01	9.5458E-01
7	2.6399E+03	-7.3981E+03	-1.9457E+03	1.0038E+04	1.2241E+04
	1.8201E+01	-5.1008E+01	-1.3415E+01	6.9209E+01	8.4396E+01
8	1.3651E+03	-4.0179E+03	-1.2152E+03	5.3830E+03	8.3720E+03
	9.4123E+00	-2.7702E+01	-8.3782E+00	3.7115E+01	5.7723E+01
9	-4.1651E+02	-2.0894E+03	-1.4121E+03	1.6728E+03	2.1516E+03
	-2.8717E+00	-1.4406E+01	-9.7360E+00	1.1534E+01	1.4835E+01
10	-3.3456E+00	-8.4683E+02	-1.0799E+01	8.4348E+02	2.7021E+01
	-2.3067E-02	-5.8387E+00	-7.4453E-02	5.8156E+00	1.8630E-01
11	-1.5832E+00	-6.7329E+02	-1.6293E+01	6.7170E+02	5.0604E-01
	-1.0916E-02	-4.6421E+00	-1.1233E-01	4.6312E+00	3.4890E-03
12	-7.5816E-01	-5.9586E+02	-1.7721E+01	5.9510E+02	2.8948E+00
	-5.2273E-03	-4.1083E+00	-1.2218E-01	4.1031E+00	1.9959E-02
13	-1.0545E+02	-7.3324E+02	7.0264E+01	6.2779E+02	5.2596E+02
	-7.2708E-01	-5.0555E+00	4.8445E-01	4.3285E+00	3.6264E+00
14	2.8147E+02	-4.0222E+02	1.1507E+02	6.8369E+02	2.9360E+02
	1.9407E+00	-2.7732E+00	7.9339E-01	4.7139E+00	2.0243E+00
15	2.1218E+02	-3.1219E+02	1.7945E+02	5.2436E+02	9.1244E+02
	1.4629E+00	-2.1525E+00	1.2373E+00	3.6154E+00	6.2910E+00

16	4.9561E+02	-1.5442E+02	2.4478E+02	6.5004E+02	1.2749E+02
	3.4171E+00	-1.0647E+00	1.6877E+00	4.4818E+00	8.7901E-01
17	5.0220E+02	-6.6833E+01	3.1050E+02	5.6903E+02	5.4738E+01
	3.4625E+00	-4.6080E-01	2.1409E+00	3.9233E+00	3.7740E-01
18	1.5163E+03	3.6960E+01	-1.1951E+02	1.4793E+03	1.0619E+02
	1.0454E+01	2.5483E-01	-8.2398E-01	1.0199E+01	7.3214E-01
19	7.2047E+02	-7.6998E+02	-2.0752E+02	1.4905E+03	1.3510E+03
	4.9675E+00	-5.3088E+00	-1.4308E+00	1.0276E+01	9.3146E+00
20	9.0643E+02	-7.0345E+02	-4.5076E+02	1.6099E+03	2.0358E+03
	6.2496E+00	-4.8501E+00	-3.1079E+00	1.1100E+01	1.4036E+01
21	1.0504E+03	-1.8428E+03	8.0577E+00	2.8932E+03	4.1098E+03
	7.2422E+00	-1.2706E+01	5.5556E-02	1.9948E+01	2.8336E+01
22	7.3628E+02	-2.1034E+03	-7.6203E+02	2.8397E+03	3.0772E+03
	5.0765E+00	-1.4502E+01	-5.2540E+00	1.9579E+01	2.1217E+01
23	5.7001E+02	-1.7509E+03	-7.1265E+02	2.3209E+03	4.2462E+03
	3.9301E+00	-1.2072E+01	-4.9136E+00	1.6002E+01	2.9276E+01
24	1.6846E+03	1.4540E+02	1.3718E+02	1.5392E+03	6.1954E+02
	1.1615E+01	1.0025E+00	9.4585E-01	1.0612E+01	4.2716E+00
25	1.2277E+03	1.3746E+01	7.6424E+02	1.2140E+03	1.5514E+03
	8.4650E+00	9.4776E-02	5.2692E+00	8.3702E+00	1.0696E+01

Table 2-271. Load Case 302, 30-ft. Side Drop, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.7249E+03	-4.5683E+03	-1.7807E+04	1.6300E+04	4.0006E+03
	1.1892E+01	-3.1498E+01	-1.2278E+02	1.1238E+02	2.7583E+01
2	1.2218E+03	-7.0847E+02	-1.1213E+04	1.1744E+04	1.4567E+03
	8.4243E+00	-4.8847E+00	-7.7312E+01	8.0970E+01	1.0044E+01
3	1.8760E+03	-5.2057E+03	-1.6194E+04	1.4823E+04	4.4313E+03
	1.2934E+01	-3.5892E+01	-1.1166E+02	1.0220E+02	3.0553E+01
4	1.2544E+03	-2.3954E+03	-9.0881E+03	9.3944E+03	1.1178E+03
	8.6487E+00	-1.6516E+01	-6.2660E+01	6.4772E+01	7.7070E+00
5	1.6917E+03	-4.4663E+03	-1.7542E+04	1.6174E+04	4.1658E+03
	1.1664E+01	-3.0794E+01	-1.2095E+02	1.1152E+02	2.8722E+01
6	1.3303E+03	-5.8495E+02	-1.0967E+04	1.1538E+04	1.4739E+03
	9.1723E+00	-4.0331E+00	-7.5612E+01	7.9554E+01	1.0162E+01
7	2.2732E+03	4.7640E+02	-7.5012E+03	9.4973E+03	2.6841E+03
	1.5673E+01	3.2847E+00	-5.1719E+01	6.5482E+01	1.8506E+01
8	2.0667E+03	5.8112E+02	-8.4278E+03	9.8992E+03	4.6051E+02
	1.4249E+01	4.0067E+00	-5.8108E+01	6.8252E+01	3.1751E+00
9	2.4732E+03	5.8735E+02	-7.0344E+03	8.7286E+03	6.5261E+02
	1.7052E+01	4.0496E+00	-4.8501E+01	6.0181E+01	4.4996E+00
10	4.6540E+03	2.5443E+03	7.6034E+01	8.3718E+03	9.0583E+02
	3.2088E+01	1.7542E+01	5.2423E-01	5.7721E+01	6.2455E+00
11	4.8550E+03	2.5698E+03	1.1910E+02	7.9730E+03	9.1356E+02
	3.3474E+01	1.7718E+01	8.2116E-01	5.4972E+01	6.2988E+00
12	4.6021E+03	2.5556E+03	7.0324E+01	8.2804E+03	9.1494E+02
	3.1730E+01	1.7620E+01	4.8487E-01	5.7092E+01	6.3083E+00
13	2.9040E+03	1.5996E+03	-5.9038E+03	8.5640E+03	1.2137E+03
	2.0022E+01	1.1029E+01	-4.0705E+01	5.9047E+01	8.3682E+00
14	1.7176E+03	-5.4970E+02	-7.8780E+03	8.7961E+03	2.9025E+03
	1.1843E+01	-3.7900E+00	-5.4317E+01	6.0647E+01	2.0012E+01
15	6.4662E+02	-1.4733E+02	-5.8589E+03	6.5055E+03	7.5293E+02
	4.4583E+00	-1.0158E+00	-4.0396E+01	4.4854E+01	5.1913E+00

16	2.0680E+03	3.2885E+02	-7.7680E+03	9.1744E+03	3.4983E+02
	1.4259E+01	2.2673E+00	-5.3559E+01	6.3255E+01	2.4120E+00
17	1.7125E+03	1.6678E+02	-7.7457E+03	8.9593E+03	1.8385E+03
	1.1807E+01	1.1499E+00	-5.3405E+01	6.1772E+01	1.2676E+01
18	4.3477E+02	-3.4990E+02	-4.5081E+03	4.9428E+03	1.8063E+02
	2.9977E+00	-2.4125E+00	-3.1082E+01	3.4080E+01	1.2454E+00
19	1.5186E+03	-1.6891E+02	-8.1050E+03	8.5048E+03	9.9258E+02
	1.0471E+01	-1.1646E+00	-5.5882E+01	5.8638E+01	6.8436E+00
20	1.5308E+03	6.8242E+02	-6.7316E+03	7.9376E+03	9.2619E+02
	1.0554E+01	4.7051E+00	-4.6413E+01	5.4728E+01	6.3859E+00
21	2.2478E+03	7.1034E+02	-6.5348E+03	8.4239E+03	5.0359E+02
	1.5498E+01	4.8977E+00	-4.5056E+01	5.8081E+01	3.4721E+00
22	1.6272E+03	-2.4893E+02	-9.2480E+03	1.0219E+04	4.6182E+02
	1.1219E+01	-1.7163E+00	-6.3762E+01	7.0460E+01	3.1841E+00
23	1.4173E+03	-1.4823E+01	-6.9713E+03	7.8641E+03	9.9024E+02
	9.7719E+00	-1.0220E-01	-4.8065E+01	5.4221E+01	6.8274E+00
24	3.6153E+02	-1.0719E+02	-4.9286E+03	5.2914E+03	5.3725E+02
	2.4926E+00	-7.3905E-01	-3.3982E+01	3.6483E+01	3.7042E+00
25	3.1647E+02	-9.2843E+01	-5.2663E+03	5.5852E+03	4.9776E+02
	2.1820E+00	-6.4013E-01	-3.6310E+01	3.8508E+01	3.4319E+00

Table 2-272. Load Case 303, 30-ft. Cg/Corner Drop, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.8132E+02	-1.8769E+02	-2.0324E+03	2.2179E+03	1.7482E+03
	3.3186E+00	-1.2941E+00	-1.4013E+01	1.5292E+01	1.2054E+01
2	3.9749E+02	1.0773E+02	-1.3510E+03	2.9202E+03	3.1184E+02
	2.7406E+00	7.4278E-01	-9.3151E+00	2.0134E+01	2.1500E+00
3	5.2015E+02	-1.4902E+02	-1.6943E+03	2.2144E+03	2.5893E+02
	3.5863E+00	-1.0275E+00	-1.1682E+01	1.5268E+01	1.7853E+00
4	2.9965E+02	-8.7296E+01	-9.2038E+02	1.7570E+03	4.6581E+01
	2.0660E+00	-6.0188E-01	-6.3458E+00	1.2114E+01	3.2116E-01
5	9.2333E+02	-6.7235E+01	-8.8086E+02	1.8042E+03	7.8475E+01
	6.3661E+00	-4.6357E-01	-6.0733E+00	1.2439E+01	5.4107E-01
6	3.4522E+02	-1.6482E+02	-4.8650E+02	8.3172E+02	1.0880E+02
	2.3802E+00	-1.1364E+00	-3.3543E+00	5.7345E+00	7.5016E-01
7	3.0818E+02	1.2932E+02	-1.4423E+03	4.4854E+03	8.0345E+02
	2.1248E+00	8.9166E-01	-9.9444E+00	3.0926E+01	5.5396E+00
8	3.8147E+02	-2.2525E+02	-2.0200E+03	2.1707E+03	4.6395E+02
	2.6301E+00	-1.5531E+00	-1.3928E+01	1.4966E+01	3.1988E+00
9	4.1724E+02	-4.7411E+02	-2.0221E+03	2.4825E+03	5.3450E+02
	2.8768E+00	-3.2688E+00	-1.3942E+01	1.7116E+01	3.6852E+00
10	4.8332E+02	1.0433E+02	-1.9151E+02	2.5925E+03	1.1843E+02
	3.3324E+00	7.1934E-01	-1.3204E+00	1.7875E+01	8.1655E-01
11	3.4023E+02	6.1855E+01	-2.3803E+02	2.1706E+03	5.2429E+01
	2.3458E+00	4.2648E-01	-1.6412E+00	1.4966E+01	3.6148E-01
12	3.4346E+02	2.3628E+01	-2.3887E+02	1.5370E+03	3.5996E+01
	2.3680E+00	1.6291E-01	-1.6469E+00	1.0597E+01	2.4818E-01
13	3.7699E+02	-7.4358E+01	-2.0896E+02	1.3426E+03	7.3672E+02
	2.5992E+00	-5.1268E-01	-1.4407E+00	9.2571E+00	5.0795E+00
14	4.2379E+02	8.1476E+01	-7.2541E+01	9.7591E+02	3.4486E+02
	2.9219E+00	5.6176E-01	-5.0015E-01	6.7287E+00	2.3777E+00
15	2.5701E+02	1.2432E+02	-2.8684E+01	2.8569E+02	1.5188E+02
	1.7720E+00	8.5714E-01	-1.9777E-01	1.9698E+00	1.0472E+00

16	3.4446E+02	-1.0722E+02	-2.3123E+02	8.2677E+02	1.1652E+02
	2.3750E+00	-7.3927E-01	-1.5943E+00	5.7004E+00	8.0337E-01
17	3.2677E+02	-1.3809E+02	-2.6730E+02	7.5173E+02	3.7808E+01
	2.2530E+00	-9.5208E-01	-1.8430E+00	5.1830E+00	2.6067E-01
18	5.4436E+02	1.0117E+02	-7.8578E+02	1.3674E+03	4.2326E+01
	3.7532E+00	6.9751E-01	-5.4178E+00	9.4276E+00	2.9183E-01
19	5.8322E+02	3.6595E+01	-1.1119E+03	2.7637E+03	3.3265E+02
	4.0212E+00	2.5231E-01	-7.6664E+00	1.9055E+01	2.2935E+00
20	4.8382E+02	1.4851E+02	-9.3228E+02	2.4984E+03	6.0299E+02
	3.3358E+00	1.0239E+00	-6.4279E+00	1.7226E+01	4.1574E+00
21	4.4984E+02	-1.5370E+01	-1.3407E+03	2.3167E+03	6.8542E+02
	3.1015E+00	-1.0597E-01	-9.2439E+00	1.5973E+01	4.7258E+00
22	4.4436E+02	-1.8093E+02	-2.0073E+03	2.1740E+03	5.7628E+02
	3.0638E+00	-1.2475E+00	-1.3840E+01	1.4990E+01	3.9733E+00
23	2.7282E+02	-3.4767E+02	-1.8007E+03	1.9606E+03	3.1673E+02
	1.8810E+00	-2.3971E+00	-1.2415E+01	1.3518E+01	2.1838E+00
24	1.8168E+02	-3.2454E+01	-1.7914E+02	3.5376E+02	3.6308E+01
	1.2527E+00	-2.2377E-01	-1.2351E+00	2.4391E+00	2.5033E-01
25	7.5926E+02	4.3072E+01	-7.7829E+02	1.5673E+03	1.6046E+02
	5.2349E+00	2.9697E-01	-5.3661E+00	1.0806E+01	1.1063E+00

Table 2-273. Load Case 304, 30-ft. Head-On Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-7.5024E+01	-5.3380E+03	-1.1396E+03	5.2629E+03	2.4383E+03
	-5.1727E-01	-3.6804E+01	-7.8572E+00	3.6287E+01	1.6811E+01
2	4.0749E+01	-6.5976E+03	-1.0964E+03	6.6383E+03	1.8665E+03
	2.8095E-01	-4.5489E+01	-7.5593E+00	4.5769E+01	1.2869E+01
3	1.4782E+01	-3.7431E+03	4.3876E+01	3.7579E+03	5.6283E+01
	1.0192E-01	-2.5808E+01	3.0252E-01	2.5910E+01	3.8806E-01
4	7.2167E+01	-3.6349E+03	-1.9256E+02	3.7071E+03	1.1466E+02
	4.9757E-01	-2.5062E+01	-1.3277E+00	2.5559E+01	7.9053E-01
5	2.6641E+01	-2.4209E+03	1.4648E+02	2.4475E+03	3.4250E+02
	1.8368E-01	-1.6691E+01	1.0099E+00	1.6875E+01	2.3614E+00
6	9.5779E+01	-1.9421E+03	-6.6797E+01	2.0379E+03	1.9383E+02
	6.6037E-01	-1.3390E+01	-4.6055E-01	1.4051E+01	1.3364E+00
7	3.6958E+03	-1.0357E+04	-2.7239E+03	1.4053E+04	1.7137E+04
	2.5482E+01	-7.1411E+01	-1.8781E+01	9.6893E+01	1.1815E+02
8	1.9112E+03	-5.6250E+03	-1.7012E+03	7.5362E+03	1.1721E+04
	1.3177E+01	-3.8783E+01	-1.1729E+01	5.1961E+01	8.0812E+01
9	-5.8311E+02	-2.9251E+03	-1.9769E+03	2.3420E+03	3.0122E+03
	-4.0204E+00	-2.0168E+01	-1.3630E+01	1.6147E+01	2.0769E+01
10	-4.6838E+00	-1.1856E+03	-1.5118E+01	1.1809E+03	3.7830E+01
	-3.2294E-02	-8.1741E+00	-1.0423E-01	8.1418E+00	2.6083E-01
11	-2.2164E+00	-9.4260E+02	-2.2810E+01	9.4038E+02	7.0846E-01
	-1.5282E-02	-6.4990E+00	-1.5727E-01	6.4837E+00	4.8847E-03
12	-1.0614E+00	-8.3420E+02	-2.4810E+01	8.3314E+02	4.0527E+00
	-7.3183E-03	-5.7516E+00	-1.7106E-01	5.7443E+00	2.7942E-02
13	-1.4764E+02	-1.0265E+03	9.8369E+01	8.7891E+02	7.3635E+02
	-1.0179E+00	-7.0778E+00	6.7823E-01	6.0598E+00	5.0769E+00
14	3.9406E+02	-5.6310E+02	1.6110E+02	9.5717E+02	4.1104E+02
	2.7170E+00	-3.8825E+00	1.1108E+00	6.5994E+00	2.8340E+00
15	2.9705E+02	-4.3707E+02	2.5123E+02	7.3411E+02	1.2774E+03
	2.0481E+00	-3.0135E+00	1.7322E+00	5.0615E+00	8.8074E+00

16	6.9386E+02	-2.1619E+02	3.4269E+02	9.1005E+02	1.7849E+02
	4.7840E+00	-1.4906E+00	2.3628E+00	6.2746E+00	1.2306E+00
17	7.0307E+02	-9.3567E+01	4.3471E+02	7.9664E+02	7.6633E+01
	4.8475E+00	-6.4512E-01	2.9972E+00	5.4926E+00	5.2837E-01
18	2.1228E+03	5.1745E+01	-1.6731E+02	2.0710E+03	1.4866E+02
	1.4636E+01	3.5677E-01	-1.1536E+00	1.4279E+01	1.0250E+00
19	1.0087E+03	-1.0780E+03	-2.9053E+02	2.0866E+03	1.8914E+03
	6.9544E+00	-7.4324E+00	-2.0031E+00	1.4387E+01	1.3040E+01
20	1.2690E+03	-9.8483E+02	-6.3107E+02	2.2538E+03	2.8501E+03
	8.7495E+00	-6.7901E+00	-4.3510E+00	1.5540E+01	1.9651E+01
21	1.4705E+03	-2.5800E+03	1.1281E+01	4.0505E+03	5.7537E+03
	1.0139E+01	-1.7788E+01	7.7778E-02	2.7927E+01	3.9671E+01
22	1.0308E+03	-2.9447E+03	-1.0668E+03	3.9755E+03	4.3081E+03
	7.1071E+00	-2.0303E+01	-7.3556E+00	2.7410E+01	2.9703E+01
23	7.9801E+02	-2.4512E+03	-9.9771E+02	3.2493E+03	5.9446E+03
	5.5021E+00	-1.6901E+01	-6.8790E+00	2.2403E+01	4.0987E+01
24	2.3584E+03	2.0356E+02	1.9206E+02	2.1549E+03	8.6736E+02
	1.6261E+01	1.4035E+00	1.3242E+00	1.4857E+01	5.9802E+00
25	1.7188E+03	1.9245E+01	1.0699E+03	1.6996E+03	2.1719E+03
	1.1851E+01	1.3269E-01	7.3769E+00	1.1718E+01	1.4975E+01

Table 2-274. Load Case 305, 30-ft. Side Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.9735E+03	-7.6581E+03	-3.0033E+04	2.7574E+04	6.7582E+03
	2.0501E+01	-5.2801E+01	-2.0707E+02	1.9011E+02	4.6596E+01
2	1.7253E+03	-1.1794E+03	-1.8748E+04	1.9707E+04	2.3989E+03
	1.1896E+01	-8.1315E+00	-1.2926E+02	1.3587E+02	1.6540E+01
3	2.7953E+03	-8.7158E+03	-2.7692E+04	2.5479E+04	6.1428E+03
	1.9273E+01	-6.0093E+01	-1.9093E+02	1.7567E+02	4.2353E+01
4	2.1675E+03	-3.9049E+03	-1.5483E+04	1.6145E+04	1.8665E+03
	1.4944E+01	-2.6923E+01	-1.0675E+02	1.1131E+02	1.2869E+01
5	2.9171E+03	-7.4918E+03	-2.9601E+04	2.7374E+04	7.0338E+03
	2.0113E+01	-5.1654E+01	-2.0409E+02	1.8874E+02	4.8496E+01
6	1.8367E+03	-9.7788E+02	-1.8336E+04	1.9362E+04	2.4115E+03
	1.2664E+01	-6.7423E+00	-1.2642E+02	1.3349E+02	1.6626E+01
7	3.2821E+03	7.6638E+02	-1.2166E+04	1.4385E+04	4.3223E+03
	2.2629E+01	5.2840E+00	-8.3879E+01	9.9178E+01	2.9801E+01
8	2.9415E+03	7.0887E+02	-1.3359E+04	1.5317E+04	7.3457E+02
	2.0281E+01	4.8875E+00	-9.2106E+01	1.0560E+02	5.0647E+00
9	3.5692E+03	8.4420E+02	-1.1117E+04	1.4084E+04	1.0258E+03
	2.4609E+01	5.8205E+00	-7.6649E+01	9.7103E+01	7.0726E+00
10	7.7197E+03	4.1098E+03	1.2320E+02	1.3094E+04	1.4597E+03
	5.3225E+01	2.8336E+01	8.4942E-01	9.0278E+01	1.0064E+01
11	8.0570E+03	4.1727E+03	1.8707E+02	1.2604E+04	1.4741E+03
	5.5551E+01	2.8770E+01	1.2898E+00	8.6902E+01	1.0163E+01
12	7.6331E+03	4.1310E+03	1.1197E+02	1.2948E+04	1.4732E+03
	5.2628E+01	2.8482E+01	7.7200E-01	8.9275E+01	1.0158E+01
13	4.2325E+03	2.7148E+03	-9.3201E+03	1.3357E+04	1.8656E+03
	2.9182E+01	1.8718E+01	-6.4260E+01	9.2091E+01	1.2863E+01
14	2.8671E+03	-8.1624E+02	-1.2411E+04	1.4053E+04	4.5677E+03
	1.9768E+01	-5.6278E+00	-8.5569E+01	9.6892E+01	3.1493E+01
15	1.2413E+03	-2.1471E+02	-8.9976E+03	1.0239E+04	1.1421E+03
	8.5582E+00	-1.4804E+00	-6.2037E+01	7.0595E+01	7.8742E+00

16	2.9370E+03	4.7607E+02	-1.2332E+04	1.4073E+04	5.4264E+02
	2.0250E+01	3.2824E+00	-8.5029E+01	9.7032E+01	3.7414E+00
17	2.4432E+03	5.6008E+02	-1.2488E+04	1.3964E+04	2.7752E+03
	1.6845E+01	3.8616E+00	-8.6104E+01	9.6279E+01	1.9135E+01
18	7.9986E+02	-5.2711E+02	-6.8534E+03	7.6532E+03	2.4989E+02
	5.5148E+00	-3.6343E+00	-4.7252E+01	5.2767E+01	1.7229E+00
19	2.5130E+03	-2.4977E+02	-1.2957E+04	1.3671E+04	1.5820E+03
	1.7327E+01	-1.7221E+00	-8.9334E+01	9.4262E+01	1.0908E+01
20	2.5244E+03	1.1230E+03	-1.0800E+04	1.2808E+04	1.3357E+03
	1.7405E+01	7.7427E+00	-7.4465E+01	8.8310E+01	9.2094E+00
21	3.1985E+03	1.2011E+03	-1.0575E+04	1.2579E+04	7.2058E+02
	2.2053E+01	8.2814E+00	-7.2911E+01	8.6732E+01	4.9682E+00
22	2.7095E+03	-2.8804E+02	-1.4861E+04	1.5573E+04	6.4802E+02
	1.8681E+01	-1.9859E+00	-1.0246E+02	1.0738E+02	4.4679E+00
23	2.2671E+03	5.8511E+01	-1.1041E+04	1.2526E+04	1.5554E+03
	1.5631E+01	4.0342E-01	-7.6128E+01	8.6363E+01	1.0724E+01
24	7.1547E+02	-1.5787E+02	-7.4932E+03	8.2087E+03	8.0159E+02
	4.9330E+00	-1.0885E+00	-5.1664E+01	5.6597E+01	5.5268E+00
25	6.4518E+02	-1.3598E+02	-8.0034E+03	8.6513E+03	7.5766E+02
	4.4483E+00	-9.3758E-01	-5.5182E+01	5.9648E+01	5.2239E+00

Table 2-275. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.7350E+02	-2.6496E+02	-2.8582E+03	3.1114E+03	2.4513E+03
	4.6436E+00	-1.8269E+00	-1.9707E+01	2.1453E+01	1.6901E+01
2	5.5579E+02	1.5158E+02	-1.8990E+03	4.0865E+03	4.3450E+02
	3.8320E+00	1.0451E+00	-1.3093E+01	2.8176E+01	2.9957E+00
3	7.2220E+02	-2.0934E+02	-2.3754E+03	3.0976E+03	3.6317E+02
	4.9794E+00	-1.4433E+00	-1.6378E+01	2.1357E+01	2.5040E+00
4	4.1896E+02	-1.2215E+02	-1.2902E+03	2.4599E+03	6.5283E+01
	2.8886E+00	-8.4217E-01	-8.8954E+00	1.6961E+01	4.5011E-01
5	1.2907E+03	-9.4079E+01	-1.2311E+03	2.5219E+03	1.1003E+02
	8.8993E+00	-6.4865E-01	-8.4885E+00	1.7388E+01	7.5861E-01
6	4.8243E+02	-2.3065E+02	-6.8027E+02	1.1627E+03	1.5243E+02
	3.3263E+00	-1.5902E+00	-4.6903E+00	8.0166E+00	1.0509E+00
7	4.3073E+02	1.8139E+02	-2.0258E+03	6.2808E+03	1.1266E+03
	2.9698E+00	1.2506E+00	-1.3967E+01	4.3305E+01	7.7679E+00
8	5.3449E+02	-3.1456E+02	-2.8346E+03	3.0418E+03	6.4951E+02
	3.6852E+00	-2.1688E+00	-1.9544E+01	2.0972E+01	4.4782E+00
9	5.8475E+02	-6.6299E+02	-2.8355E+03	3.4787E+03	7.4805E+02
	4.0317E+00	-4.5711E+00	-1.9550E+01	2.3984E+01	5.1576E+00
10	6.7937E+02	1.4656E+02	-2.6684E+02	3.6308E+03	1.6606E+02
	4.6841E+00	1.0105E+00	-1.8398E+00	2.5033E+01	1.1449E+00
11	4.7582E+02	8.6801E+01	-3.3199E+02	3.0385E+03	7.3778E+01
	3.2807E+00	5.9847E-01	-2.2890E+00	2.0950E+01	5.0868E-01
12	4.7889E+02	3.3464E+01	-3.3343E+02	2.1504E+03	5.0596E+01
	3.3018E+00	2.3072E-01	-2.2990E+00	1.4827E+01	3.4885E-01
13	5.2553E+02	-1.0372E+02	-2.9235E+02	1.8795E+03	1.0309E+03
	3.6234E+00	-7.1516E-01	-2.0157E+00	1.2959E+01	7.1079E+00
14	5.9152E+02	1.1423E+02	-1.0132E+02	1.3656E+03	4.8226E+02
	4.0784E+00	7.8762E-01	-6.9858E-01	9.4152E+00	3.3250E+00
15	3.5917E+02	1.7458E+02	-3.9994E+01	3.9917E+02	2.1275E+02
	2.4764E+00	1.2037E+00	-2.7575E-01	2.7522E+00	1.4669E+00

16	4.8111E+02	-1.4984E+02	-3.2354E+02	1.1561E+03	1.6326E+02
	3.3171E+00	-1.0331E+00	-2.2308E+00	7.9709E+00	1.1256E+00
17	4.5645E+02	-1.9281E+02	-3.7391E+02	1.0511E+03	5.3009E+01
	3.1471E+00	-1.3294E+00	-2.5780E+00	7.2473E+00	3.6549E-01
18	7.6232E+02	1.4125E+02	-1.1035E+03	1.9179E+03	5.9145E+01
	5.2560E+00	9.7389E-01	-7.6083E+00	1.3223E+01	4.0779E-01
19	8.1786E+02	5.1354E+01	-1.5645E+03	3.8737E+03	4.6634E+02
	5.6389E+00	3.5407E-01	-1.0787E+01	2.6708E+01	3.2153E+00
20	6.7855E+02	2.0841E+02	-1.3118E+03	3.5008E+03	8.4372E+02
	4.6784E+00	1.4369E+00	-9.0444E+00	2.4137E+01	5.8173E+00
21	6.3032E+02	-2.0927E+01	-1.8826E+03	3.2450E+03	9.5987E+02
	4.3459E+00	-1.4428E-01	-1.2980E+01	2.2374E+01	6.6181E+00
22	6.2288E+02	-2.5336E+02	-2.8179E+03	3.0462E+03	8.0718E+02
	4.2946E+00	-1.7468E+00	-1.9429E+01	2.1003E+01	5.5653E+00
23	3.8248E+02	-4.8682E+02	-2.5258E+03	2.7476E+03	4.4393E+02
	2.6371E+00	-3.3565E+00	-1.7415E+01	1.8944E+01	3.0608E+00
24	2.5388E+02	-4.5344E+01	-2.5085E+02	4.9493E+02	5.0719E+01
	1.7504E+00	-3.1264E-01	-1.7296E+00	3.4124E+00	3.4970E-01
25	1.0630E+03	6.0175E+01	-1.0936E+03	2.1983E+03	2.2462E+02
	7.3293E+00	4.1489E-01	-7.5403E+00	1.5157E+01	1.5487E+00

Table 2-276. Load Case 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-165A

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2284E-01	-1.0728E+02	9.3151E+01	1.0741E+02	1.0334E+02
	8.4693E-04	-7.3970E-01	6.4225E-01	7.4054E-01	7.1253E-01
2	7.4606E+01	-2.6287E+02	3.0234E+02	3.3747E+02	1.7564E+02
	5.1439E-01	-1.8124E+00	2.0845E+00	2.3268E+00	1.2110E+00
3	1.8012E-01	-9.6583E+01	2.0205E+01	9.6763E+01	1.1236E+01
	1.2419E-03	-6.6592E-01	1.3931E-01	6.6716E-01	7.7468E-02
4	1.5509E+00	-2.4426E+02	-1.1744E+01	2.4581E+02	3.8207E+01
	1.0693E-02	-1.6841E+00	-8.0973E-02	1.6948E+00	2.6342E-01
5	-5.8095E-01	-3.7114E+01	4.8995E+00	3.6533E+01	2.0775E+00
	-4.0055E-03	-2.5589E-01	3.3781E-02	2.5188E-01	1.4324E-02
6	-1.6304E+00	-9.9380E+01	2.9778E+00	9.7749E+01	1.2227E+00
	-1.1241E-02	-6.8520E-01	2.0532E-02	6.7396E-01	8.4304E-03
7	1.0194E+03	-4.1449E+02	6.7381E+02	1.4339E+03	3.9771E+02
	7.0287E+00	-2.8578E+00	4.6458E+00	9.8865E+00	2.7421E+00
8	8.7444E+02	-6.3279E+02	4.6684E+02	1.5072E+03	9.4238E+02
	6.0291E+00	-4.3629E+00	3.2188E+00	1.0392E+01	6.4975E+00
9	-1.1168E+02	-1.6587E+03	-5.4768E+01	1.5470E+03	6.9404E+02
	-7.7002E-01	-1.1436E+01	-3.7761E-01	1.0666E+01	4.7852E+00
10	-1.8205E+00	-7.2198E+02	-2.4325E+01	7.2016E+02	1.1792E+01
	-1.2552E-02	-4.9779E+00	-1.6772E-01	4.9653E+00	8.1302E-02
11	-1.5299E+00	-3.5965E+02	-1.1769E+01	3.5812E+02	4.6325E-01
	-1.0548E-02	-2.4797E+00	-8.1148E-02	2.4691E+00	3.1940E-03
12	-1.4230E+00	-2.3316E+02	-9.5176E+00	2.3173E+02	1.8417E+00
	-9.8113E-03	-1.6076E+00	-6.5622E-02	1.5977E+00	1.2698E-02
13	-3.0161E+01	-2.4893E+02	-7.4038E+00	2.1877E+02	1.2882E+02
	-2.0796E-01	-1.7163E+00	-5.1048E-02	1.5083E+00	8.8815E-01
14	5.0146E+01	-1.1204E+02	3.0769E+00	1.6218E+02	8.8051E+01
	3.4574E-01	-7.7248E-01	2.1215E-02	1.1182E+00	6.0709E-01
15	2.6150E+01	-1.3118E+02	1.6050E+01	1.5733E+02	2.7218E+02
	1.8030E-01	-9.0446E-01	1.1066E-01	1.0848E+00	1.8766E+00

16	7.4530E+01	-1.1969E+02	7.3599E+00	1.9422E+02	1.3774E+02
	5.1387E-01	-8.2524E-01	5.0745E-02	1.3391E+00	9.4966E-01
17	6.1480E+01	-7.5500E+01	2.0313E+01	1.3698E+02	8.5774E+01
	4.2389E-01	-5.2055E-01	1.4005E-01	9.4444E-01	5.9139E-01
18	-5.7724E+03	-2.8799E+04	-2.9336E+03	2.3027E+04	8.3368E+02
	-3.9799E+01	-1.9856E+02	-2.0226E+01	1.5876E+02	5.7480E+00
19	1.3004E+03	-2.4318E+03	4.3577E+02	3.7322E+03	4.0845E+03
	8.9659E+00	-1.6767E+01	3.0045E+00	2.5733E+01	2.8162E+01
20	-3.6320E+02	-2.6795E+03	1.3123E+02	2.3163E+03	2.6773E+03
	-2.5042E+00	-1.8474E+01	9.0483E-01	1.5970E+01	1.8459E+01
21	5.2584E+01	-1.4130E+03	-1.9332E+02	1.4656E+03	7.6099E+02
	3.6256E-01	-9.7423E+00	-1.3329E+00	1.0105E+01	5.2469E+00
22	7.2137E+02	-4.9704E+02	3.2801E+02	1.2184E+03	8.1010E+02
	4.9737E+00	-3.4270E+00	2.2615E+00	8.4006E+00	5.5854E+00
23	1.2077E+03	-8.4146E+02	6.6182E+01	2.0492E+03	1.0802E+03
	8.3268E+00	-5.8016E+00	4.5631E-01	1.4128E+01	7.4476E+00
24	-1.1119E+01	-5.7553E+01	-2.1116E+01	4.6434E+01	8.4158E+00
	-7.6666E-02	-3.9681E-01	-1.4559E-01	3.2015E-01	5.8025E-02
25	-1.3311E+03	-1.0184E+04	-1.3318E+03	8.8530E+03	9.8439E+02
	-9.1775E+00	-7.0217E+01	-9.1826E+00	6.1039E+01	6.7871E+00

Table 2-277. Load Combination 301, Head-On Orientation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 301, 102, 201, 211
30-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	4.39	2.15	6.54	17.40	59.20	8.05
	30.25	14.84	45.09	119.97	408.17	
2	7.26	1.49	8.75	17.40	59.20	4.71
	50.06	10.29	60.35	119.97	408.17	
3	3.20	0.06	3.25	17.40	59.20	>10
	22.04	0.38	22.42	119.97	408.17	
4	3.30	0.39	3.69	17.40	59.20	>10
	22.74	2.71	25.45	119.97	408.17	
5	2.37	0.63	3.00	17.40	59.20	>10
	16.35	4.35	20.70	119.97	408.17	
6	4.03	1.00	5.03	17.40	59.20	9.28
	27.78	6.87	34.66	119.97	408.17	
7	17.28	23.86	41.14	17.40	59.20	0.44
	119.15	164.51	283.65	119.97	408.17	
8	11.32	15.88	27.20	16.40	59.20	1.17
	78.04	109.52	187.55	113.07	408.17	
9	4.44	6.09	10.53	16.40	59.20	4.61
	30.62	41.98	72.60	113.07	408.17	
10	1.33	0.09	1.42	16.10	59.20	>10
	9.16	0.61	9.77	111.01	408.17	
11	1.15	0.00	1.16	16.10	59.20	>10
	7.96	0.02	7.97	111.01	408.17	
12	1.08	0.05	1.12	16.10	59.20	>10
	7.44	0.31	7.75	111.01	408.17	
13	2.24	2.72	4.96	16.40	59.20	>10
	15.43	18.77	34.20	113.07	408.17	

14	2.34	1.95	4.29	16.40	59.20	>10
	16.12	13.47	29.59	113.07	408.17	
15	2.17	2.77	4.94	16.10	59.20	>10
	14.99	19.07	34.05	111.01	408.17	
16	3.94	0.89	4.83	16.40	59.20	8.99
	27.17	6.15	33.31	113.07	408.17	
17	3.79	1.60	5.39	16.40	59.20	9.39
	26.12	11.03	37.15	113.07	408.17	
18	5.02	5.51	10.53	16.40	59.20	4.61
	34.59	38.02	72.60	113.07	408.17	
19	4.67	6.14	10.81	16.40	59.20	4.46
	32.17	42.33	74.50	113.07	408.17	
20	3.83	5.69	9.52	16.40	59.20	5.20
	26.41	39.21	65.62	113.07	408.17	
21	5.15	7.80	12.95	16.40	59.20	3.56
	35.53	53.76	89.29	113.07	408.17	
22	6.52	8.70	15.22	16.40	59.20	2.88
	44.95	60.00	104.95	113.07	408.17	

Min MS: 0.439, Location: 7, Combination: Pm+Pb

Table 2-278. Load Combination 302, Side Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 302, 102, 201, 211
30-ft. Side Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	16.93	4.41	21.34	17.40	59.20	1.45
	116.72	30.42	147.13	119.97	408.17	
2	14.26	1.62	15.88	17.40	59.20	1.91
	98.34	11.15	109.48	119.97	408.17	
3	15.34	4.45	19.78	17.40	59.20	1.70
	105.73	30.66	136.39	119.97	408.17	
4	10.04	1.43	11.47	17.40	59.20	3.13
	69.25	9.85	79.10	119.97	408.17	
5	16.80	4.55	21.35	17.40	59.20	1.47
	115.81	31.39	147.20	119.97	408.17	
6	14.11	2.33	16.44	17.40	59.20	1.94
	97.30	16.08	113.38	119.97	408.17	
7	16.74	14.30	31.04	17.40	59.20	0.91
	115.42	98.62	214.03	119.97	408.17	
8	15.83	7.97	23.81	16.40	59.20	1.48
	109.17	54.97	164.14	113.07	408.17	
9	11.50	4.59	16.09	16.40	59.20	2.42
	79.27	31.65	110.91	113.07	408.17	
10	8.86	0.97	9.82	16.10	59.20	3.36
	61.07	6.67	67.74	111.01	408.17	
11	8.46	0.92	9.37	16.10	59.20	3.57
	58.30	6.31	64.61	111.01	408.17	
12	8.76	0.96	9.72	16.10	59.20	3.41
	60.43	6.60	67.03	111.01	408.17	
13	10.17	3.41	13.58	16.40	59.20	2.87
	70.15	23.51	93.66	113.07	408.17	

14	10.45	4.56	15.01	16.40	59.20	2.77
	72.05	31.46	103.51	113.07	408.17	
15	8.15	2.61	10.76	16.10	59.20	3.74
	56.22	17.97	74.19	111.01	408.17	
16	12.46	1.11	13.58	16.40	59.20	2.16
	85.94	7.68	93.62	113.07	408.17	
17	12.18	3.38	15.56	16.40	59.20	2.23
	83.97	23.33	107.30	113.07	408.17	
18	8.48	5.59	14.07	16.40	59.20	3.20
	58.47	38.53	97.00	113.07	408.17	
19	11.68	5.78	17.46	16.40	59.20	2.37
	80.54	39.86	120.39	113.07	408.17	
20	10.16	4.58	14.74	16.40	59.20	2.87
	70.04	31.56	101.60	113.07	408.17	
21	10.68	4.19	14.88	16.40	59.20	2.68
	73.66	28.90	102.56	113.07	408.17	
22	13.90	6.09	19.99	16.40	59.20	1.83
	95.83	41.97	137.80	113.07	408.17	

Min MS: 0.907, Location: 7, Combination: Pm+Pb

Table 2-279. Load Combination 303, Cg/Corner Orientation, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 303, 102, 201, 211
30-ft. Cg/Corner Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	2.85	2.16	5.01	17.40	59.20	>10
	19.63	14.89	34.51	119.97	408.17	
2	5.44	0.47	5.91	17.40	59.20	6.62
	37.50	3.25	40.75	119.97	408.17	
3	2.73	0.27	3.00	17.40	59.20	>10
	18.80	1.89	20.69	119.97	408.17	
4	2.41	0.36	2.76	17.40	59.20	>10
	16.59	2.47	19.06	119.97	408.17	
5	2.43	0.47	2.89	17.40	59.20	>10
	16.73	3.21	19.94	119.97	408.17	
6	3.41	0.97	4.37	17.40	59.20	>10
	23.48	6.67	30.15	119.97	408.17	
7	11.73	12.42	24.15	17.40	59.20	1.45
	80.86	85.65	166.51	119.97	408.17	
8	8.11	7.98	16.08	16.40	59.20	2.67
	55.89	54.99	110.88	113.07	408.17	
9	5.25	4.47	9.72	16.40	59.20	5.07
	36.20	30.83	67.03	113.07	408.17	
10	3.08	0.18	3.26	16.10	59.20	>10
	21.22	1.24	22.46	111.01	408.17	
11	2.65	0.05	2.71	16.10	59.20	>10
	18.29	0.37	18.67	111.01	408.17	
12	2.02	0.08	2.10	16.10	59.20	>10
	13.93	0.54	14.48	111.01	408.17	
13	2.95	2.93	5.89	16.40	59.20	9.03
	20.36	20.22	40.58	113.07	408.17	

14	2.63	2.00	4.63	16.40	59.20	>10
	18.13	13.82	31.96	113.07	408.17	
15	1.93	2.00	3.94	16.10	59.20	>10
	13.34	13.82	27.16	111.01	408.17	
16	4.12	0.88	5.00	16.40	59.20	8.56
	28.38	6.07	34.46	113.07	408.17	
17	3.97	1.58	5.55	16.40	59.20	8.91
	27.38	10.92	38.29	113.07	408.17	
18	4.90	5.45	10.35	16.40	59.20	4.70
	33.82	37.57	71.39	113.07	408.17	
19	5.94	5.12	11.06	16.40	59.20	4.34
	40.95	35.30	76.26	113.07	408.17	
20	4.72	4.25	8.97	16.40	59.20	5.58
	32.54	29.33	61.87	113.07	408.17	
21	4.58	4.37	8.95	16.40	59.20	5.60
	31.55	30.15	61.71	113.07	408.17	
22	5.85	6.20	12.06	16.40	59.20	3.90
	40.36	42.76	83.12	113.07	408.17	

Min MS: 1.451, Location: 7, Combination: Pm+Pb

Table 2-280. Load Combination 304, Head-On Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 304, 105, 202, 211
30-ft. Head-On Drop at -40°F
-40°F Ambient, Maximum Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	5.89	2.85	8.73	20.00	61.80	6.08
	40.59	19.63	60.22	137.90	426.10	
2	9.15	2.03	11.18	18.70	59.70	3.57
	63.09	13.96	77.05	128.93	411.62	
3	4.27	0.07	4.34	20.00	61.80	9.14
	29.41	0.49	29.90	137.90	426.10	
4	4.35	0.42	4.77	20.00	61.80	8.94
	30.00	2.92	32.92	137.90	426.10	
5	3.07	0.73	3.79	20.00	61.80	>10
	21.14	5.02	26.15	137.90	426.10	
6	4.61	1.05	5.65	18.70	59.70	8.07
	31.75	7.21	38.97	128.93	411.62	
7	17.39	21.75	39.14	18.70	59.70	0.53
	119.93	149.95	269.88	128.93	411.62	
8	10.16	13.75	23.91	18.70	59.70	1.50
	70.06	94.81	164.87	128.93	411.62	
9	3.82	5.29	9.11	18.70	59.70	5.55
	26.32	36.51	62.83	128.93	411.62	
10	1.55	0.09	1.65	18.70	59.70	>10
	10.71	0.64	11.35	128.93	411.62	
11	1.31	0.00	1.31	18.70	59.70	>10
	9.04	0.02	9.05	128.93	411.62	
12	1.20	0.04	1.24	18.70	59.70	>10
	8.31	0.26	8.57	128.93	411.62	
13	1.89	2.21	4.10	18.70	59.70	>10
	13.00	15.26	28.26	128.93	411.62	

14	2.22	1.90	4.12	18.70	59.70	>10
	15.33	13.07	28.39	128.93	411.62	
15	2.05	2.79	4.84	17.40	59.20	>10
	14.12	19.23	33.35	119.97	408.17	
16	3.70	0.55	4.24	18.70	59.70	>10
	25.48	3.76	29.25	128.93	411.62	
17	3.54	1.11	4.65	18.70	59.70	>10
	24.44	7.63	32.06	128.93	411.62	
18	2.71	1.09	3.80	18.70	59.70	>10
	18.69	7.52	26.21	128.93	411.62	
19	3.01	3.28	6.29	18.70	59.70	8.50
	20.74	22.61	43.35	128.93	411.62	
20	2.89	3.99	6.88	18.70	59.70	7.68
	19.94	27.51	47.44	128.93	411.62	
21	4.79	7.06	11.85	18.70	59.70	4.04
	33.03	48.70	81.73	128.93	411.62	
22	5.18	6.07	11.26	18.70	59.70	4.30
	35.74	41.87	77.61	128.93	411.62	

Min MS: 0.525, Location: 7, Combination: Pm+Pb

Table 2-281. Load Combination 305, Side Drop Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 305, 105, 202, 211
30-ft. Side Drop at -40°F
-40°F Ambient, Maximum Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	28.20	7.17	35.36	20.00	61.80	0.53
	194.42	49.42	243.83	137.90	426.10	
2	22.22	2.56	24.78	18.70	59.70	0.88
	153.19	17.63	170.83	128.93	411.62	
3	25.99	6.16	32.14	20.00	61.80	0.66
	179.17	42.46	221.63	137.90	426.10	
4	16.79	2.18	18.96	20.00	61.80	1.58
	115.75	15.00	130.76	137.90	426.10	
5	27.99	7.42	35.41	20.00	61.80	0.55
	193.00	51.15	244.15	137.90	426.10	
6	21.93	3.26	25.19	18.70	59.70	0.91
	151.20	22.50	173.70	128.93	411.62	
7	17.73	8.93	26.66	18.70	59.70	1.24
	122.22	61.59	183.82	128.93	411.62	
8	17.94	2.76	20.71	18.70	59.70	1.33
	123.71	19.06	142.77	128.93	411.62	
9	15.56	3.31	18.87	18.70	59.70	1.69
	107.28	22.81	130.09	128.93	411.62	
10	13.47	1.51	14.98	18.70	59.70	2.10
	92.84	10.45	103.29	128.93	411.62	
11	12.97	1.48	14.45	18.70	59.70	2.22
	89.45	10.17	99.63	128.93	411.62	
12	13.32	1.51	14.83	18.70	59.70	2.14
	91.83	10.39	102.23	128.93	411.62	
13	14.36	3.34	17.71	18.70	59.70	1.91
	99.04	23.04	122.08	128.93	411.62	

14	15.32	6.05	21.37	18.70	59.70	1.73
	105.62	41.73	147.35	128.93	411.62	
15	11.55	2.65	14.21	17.40	59.20	2.59
	79.66	18.30	97.95	119.97	408.17	
16	16.86	0.91	17.77	18.70	59.70	1.48
	116.24	6.28	122.51	128.93	411.62	
17	16.71	3.80	20.52	18.70	59.70	1.50
	115.22	26.23	141.45	128.93	411.62	
18	8.29	1.19	9.49	18.70	59.70	4.04
	57.18	8.22	65.40	128.93	411.62	
19	14.59	2.97	17.56	18.70	59.70	1.86
	100.61	20.48	121.09	128.93	411.62	
20	13.45	2.48	15.92	18.70	59.70	2.11
	92.71	17.07	109.77	128.93	411.62	
21	13.32	2.03	15.35	18.70	59.70	2.14
	91.83	14.00	105.83	128.93	411.62	
22	16.78	2.41	19.19	18.70	59.70	1.49
	115.70	16.64	132.34	128.93	411.62	

Min MS: 0.534, Location: 1, Combination: Pm

Table 2-282. Load Combination 306, Cg/Corner Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 306, 105, 202, 211
30-ft. Cg/Corner Drop at -40°F
-40°F Ambient, Maximum Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	3.73	2.86	6.60	20.00	61.80	8.37
	25.75	19.72	45.47	137.90	426.10	
2	6.60	0.59	7.19	18.70	59.70	5.33
	45.49	4.09	49.58	128.93	411.62	
3	3.61	0.38	3.98	20.00	61.80	>10
	24.86	2.61	27.46	137.90	426.10	
4	3.10	0.37	3.48	20.00	61.80	>10
	21.40	2.58	23.98	137.90	426.10	
5	3.14	0.50	3.64	20.00	61.80	>10
	21.65	3.42	25.06	137.90	426.10	
6	3.73	1.00	4.74	18.70	59.70	>10
	25.72	6.93	32.65	128.93	411.62	
7	9.62	5.74	15.36	18.70	59.70	2.89
	66.34	39.56	105.91	128.93	411.62	
8	5.67	2.68	8.35	18.70	59.70	6.15
	39.08	18.47	57.55	128.93	411.62	
9	4.95	3.03	7.99	18.70	59.70	6.48
	34.16	20.90	55.06	128.93	411.62	
10	4.00	0.22	4.22	18.70	59.70	9.44
	27.60	1.53	29.12	128.93	411.62	
11	3.41	0.08	3.48	18.70	59.70	>10
	23.50	0.52	24.02	128.93	411.62	
12	2.52	0.08	2.61	18.70	59.70	>10
	17.39	0.58	17.97	128.93	411.62	
13	2.89	2.51	5.39	18.70	59.70	>10
	19.90	17.29	37.19	128.93	411.62	

14	2.63	1.97	4.60	18.70	59.70	>10
	18.14	13.56	31.70	128.93	411.62	
15	1.71	1.72	3.44	17.40	59.20	>10
	11.81	11.89	23.70	119.97	408.17	
16	3.94	0.53	4.47	18.70	59.70	9.60
	27.18	3.66	30.84	128.93	411.62	
17	3.80	1.08	4.88	18.70	59.70	>10
	26.19	7.46	33.65	128.93	411.62	
18	2.56	1.00	3.56	18.70	59.70	>10
	17.64	6.90	24.54	128.93	411.62	
19	4.79	1.85	6.65	18.70	59.70	7.72
	33.06	12.79	45.84	128.93	411.62	
20	4.14	1.98	6.12	18.70	59.70	8.75
	28.54	13.67	42.21	128.93	411.62	
21	3.99	2.27	6.25	18.70	59.70	8.54
	27.48	15.65	43.12	128.93	411.62	
22	4.25	2.57	6.83	18.70	59.70	7.75
	29.33	17.73	47.06	128.93	411.62	

Min MS: 2.887, Location: 7, Combination: Pm+Pb

Table 2-283. Load Combination 310, Additional Increase Evaluation Pressure, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 204, 101, 211
Additional Increased External Pressure, 2 MPa (290 psia)
100°F Ambient, Maximum Decay Heat
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.76	0.48	1.25	17.40	59.20	>10
	5.27	3.32	8.59	119.97	408.17	
2	2.90	0.27	3.17	17.40	59.20	>10
	20.01	1.85	21.86	119.97	408.17	
3	0.63	0.02	0.65	18.70	59.70	>10
	4.36	0.14	4.51	128.93	411.62	
4	1.02	0.32	1.34	17.40	59.20	>10
	7.06	2.20	9.26	119.97	408.17	
5	0.76	0.46	1.22	17.40	59.20	>10
	5.23	3.15	8.38	119.97	408.17	
6	2.98	1.00	3.97	17.40	59.20	>10
	20.52	6.89	27.41	119.97	408.17	
7	12.88	22.68	35.56	17.40	59.20	0.66
	88.79	156.40	245.19	119.97	408.17	
8	12.19	17.01	29.20	17.40	59.20	1.03
	84.06	117.29	201.35	119.97	408.17	
9	5.46	8.25	13.72	17.40	59.20	3.32
	37.66	56.91	94.57	119.97	408.17	
10	1.59	0.09	1.68	16.40	59.20	>10
	10.95	0.61	11.55	113.07	408.17	
11	1.58	0.00	1.59	16.40	59.20	>10
	10.92	0.02	10.94	113.07	408.17	
12	1.59	0.05	1.63	16.40	59.20	>10
	10.93	0.34	11.27	113.07	408.17	
13	2.09	2.05	4.14	16.40	59.20	>10
	14.41	14.11	28.51	113.07	408.17	

14	1.91	1.95	3.86	16.40	59.20	>10
	13.19	13.45	26.65	113.07	408.17	
15	3.03	4.01	7.03	16.40	59.20	7.39
	20.88	27.62	48.50	113.07	408.17	
16	3.95	1.62	5.57	17.40	59.20	9.48
	27.27	11.17	38.44	119.97	408.17	
17	3.57	1.53	5.10	17.40	59.20	>10
	24.61	10.57	35.18	119.97	408.17	
18	0.64	0.94	1.58	17.40	59.20	>10
	4.42	6.49	10.91	119.97	408.17	
19	0.92	1.39	2.31	17.40	59.20	>10
	6.35	9.57	15.92	119.97	408.17	
20	0.64	1.14	1.78	17.40	59.20	>10
	4.40	7.86	12.25	119.97	408.17	
21	0.74	1.31	2.05	17.40	59.20	>10
	5.10	9.03	14.14	119.97	408.17	
22	1.21	1.77	2.97	17.40	59.20	>10
	8.33	12.17	20.50	119.97	408.17	

Min MS: 0.665, Location: 7, Combination: Pm+Pb

Table 2-284. Load Combination 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 311, 101, 201, 211
4-ft. Drop onto Rod
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.74	0.51	1.25	17.40	59.20	>10
	5.07	3.55	8.62	119.97	408.17	
2	2.86	0.34	3.19	17.40	59.20	>10
	19.69	2.31	22.00	119.97	408.17	
3	0.61	0.03	0.64	18.70	59.70	>10
	4.20	0.18	4.38	128.93	411.62	
4	0.90	0.35	1.24	17.40	59.20	>10
	6.17	2.41	8.58	119.97	408.17	
5	0.66	0.39	1.05	17.40	59.20	>10
	4.55	2.68	7.23	119.97	408.17	
6	2.67	0.86	3.53	17.40	59.20	>10
	18.42	5.93	24.35	119.97	408.17	
7	8.68	12.02	20.69	17.40	59.20	1.86
	59.82	82.85	142.67	119.97	408.17	
8	7.44	8.45	15.90	17.40	59.20	2.72
	51.31	58.29	109.60	119.97	408.17	
9	4.32	4.63	8.95	17.40	59.20	5.62
	29.75	31.93	61.68	119.97	408.17	
10	1.21	0.07	1.28	16.40	59.20	>10
	8.31	0.51	8.82	113.07	408.17	
11	0.84	0.00	0.84	16.40	59.20	>10
	5.80	0.02	5.81	113.07	408.17	
12	0.72	0.04	0.76	16.40	59.20	>10
	4.94	0.31	5.24	113.07	408.17	
13	1.83	2.33	4.15	16.40	59.20	>10
	12.61	16.03	28.64	113.07	408.17	

14	1.82	1.75	3.56	16.40	59.20	>10
	12.52	12.05	24.57	113.07	408.17	
15	1.81	2.13	3.93	16.40	59.20	>10
	12.46	14.65	27.11	113.07	408.17	
16	3.48	0.90	4.39	17.40	59.20	>10
	24.02	6.22	30.24	119.97	408.17	
17	3.36	1.63	4.99	17.40	59.20	>10
	23.14	11.25	34.39	119.97	408.17	
18	26.56	6.24	32.81	17.40	59.20	0.56
	183.15	43.03	226.18	119.97	408.17	
19	6.91	8.87	15.78	17.40	59.20	2.75
	47.63	61.17	108.80	119.97	408.17	
20	4.54	6.33	10.87	17.40	59.20	4.45
	31.28	43.63	74.91	119.97	408.17	
21	3.73	4.45	8.17	17.40	59.20	6.24
	25.68	30.68	56.36	119.97	408.17	
22	4.90	6.44	11.33	17.40	59.20	4.22
	33.77	44.37	78.14	119.97	408.17	

Min MS: 0.560, Location: 18, Combination: Pm

Table 2-285. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 311, 104, 201, 211
4-ft. Drop onto Rod
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.74	0.51	1.25	20.00	70.00	>10
	5.07	3.55	8.62	137.90	482.63	
2	2.86	0.34	3.19	20.00	70.00	>10
	19.69	2.31	22.00	137.90	482.63	
3	0.61	0.03	0.64	20.00	70.00	>10
	4.20	0.18	4.38	137.90	482.63	
4	0.90	0.35	1.24	20.00	70.00	>10
	6.17	2.41	8.58	137.90	482.63	
5	0.66	0.39	1.05	20.00	70.00	>10
	4.55	2.68	7.23	137.90	482.63	
6	2.67	0.86	3.53	20.00	70.00	>10
	18.42	5.93	24.35	137.90	482.63	
7	8.68	12.02	20.69	20.00	70.00	2.38
	59.82	82.85	142.67	137.90	482.63	
8	7.44	8.45	15.90	20.00	70.00	3.40
	51.31	58.29	109.60	137.90	482.63	
9	4.32	4.63	8.95	20.00	70.00	6.82
	29.75	31.93	61.68	137.90	482.63	
10	1.21	0.07	1.28	20.00	70.00	>10
	8.31	0.51	8.82	137.90	482.63	
11	0.84	0.00	0.84	20.00	70.00	>10
	5.80	0.02	5.81	137.90	482.63	
12	0.72	0.04	0.76	20.00	70.00	>10
	4.94	0.31	5.24	137.90	482.63	
13	1.83	2.33	4.15	20.00	70.00	>10
	12.61	16.03	28.64	137.90	482.63	

14	1.82	1.75	3.56	20.00	70.00	>10
	12.52	12.05	24.57	137.90	482.63	
15	1.81	2.13	3.93	20.00	70.00	>10
	12.46	14.65	27.11	137.90	482.63	
16	3.48	0.90	4.39	20.00	70.00	>10
	24.02	6.22	30.24	137.90	482.63	
17	3.36	1.63	4.99	20.00	70.00	>10
	23.14	11.25	34.39	137.90	482.63	
18	26.56	6.24	32.81	20.00	70.00	0.81
	183.15	43.03	226.18	137.90	482.63	
19	6.91	8.87	15.78	20.00	70.00	3.44
	47.63	61.17	108.80	137.90	482.63	
20	4.54	6.33	10.87	20.00	70.00	5.44
	31.28	43.63	74.91	137.90	482.63	
21	3.73	4.45	8.17	20.00	70.00	7.56
	25.68	30.68	56.36	137.90	482.63	
22	4.90	6.44	11.33	20.00	70.00	5.18
	33.77	44.37	78.14	137.90	482.63	

Min MS: 0.807, Location: 18, Combination: Pm

Table 2-286. Load Combination 350, Fire at 30 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 111, 201, 211
Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	17.40	59.20	>10
	4.33	2.83	7.17	119.97	408.17	
2	2.52	0.16	2.68	17.40	59.20	>10
	17.36	1.10	18.47	119.97	408.17	
3	0.51	0.01	0.53	15.50	59.20	>10
	3.53	0.10	3.64	106.87	408.17	
4	0.65	0.31	0.96	16.40	59.20	>10
	4.48	2.15	6.62	113.07	408.17	
5	0.62	0.39	1.01	17.40	59.20	>10
	4.30	2.67	6.96	119.97	408.17	
6	2.57	0.86	3.43	17.40	59.20	>10
	17.75	5.92	23.67	119.97	408.17	
7	7.24	11.62	18.86	17.40	59.20	2.14
	49.94	80.11	130.05	119.97	408.17	
8	5.94	7.51	13.45	16.40	59.20	3.39
	40.92	51.79	92.71	113.07	408.17	
9	2.77	3.94	6.71	16.40	59.20	7.80
	19.09	27.15	46.23	113.07	408.17	
10	0.49	0.06	0.55	16.40	59.20	>10
	3.34	0.43	3.77	113.07	408.17	
11	0.48	0.00	0.48	16.40	59.20	>10
	3.33	0.01	3.34	113.07	408.17	
12	0.48	0.04	0.53	16.40	59.20	>10
	3.34	0.29	3.63	113.07	408.17	
13	1.61	2.20	3.81	16.40	59.20	>10
	11.10	15.14	26.24	113.07	408.17	

14	1.65	1.66	3.31	16.40	59.20	>10
	11.41	11.44	22.85	113.07	408.17	
15	1.65	1.85	3.50	16.10	59.20	>10
	11.37	12.78	24.15	111.01	408.17	
16	3.29	0.76	4.05	16.40	59.20	>10
	22.68	5.27	27.95	113.07	408.17	
17	3.22	1.55	4.76	17.40	59.20	>10
	22.19	10.66	32.85	119.97	408.17	
18	3.54	5.41	8.94	16.40	59.20	5.60
	24.39	37.28	61.67	113.07	408.17	
19	3.18	4.79	7.96	17.40	59.20	6.43
	21.90	33.01	54.91	119.97	408.17	
20	2.22	3.65	5.87	16.40	59.20	9.05
	15.31	25.17	40.49	113.07	408.17	
21	2.26	3.69	5.95	16.40	59.20	8.93
	15.58	25.43	41.01	113.07	408.17	
22	3.68	5.63	9.31	16.40	59.20	5.34
	25.37	38.79	64.16	113.07	408.17	

Min MS: 2.139, Location: 7, Combination: Pm+Pb

Table 2-287. Load Combination 351, Fire at 60 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 112, 201, 211
Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	17.40	59.20	>10
	4.33	2.83	7.17	119.97	408.17	
2	2.52	0.16	2.68	17.40	59.20	>10
	17.36	1.10	18.47	119.97	408.17	
3	0.51	0.01	0.53	16.00	59.20	>10
	3.53	0.10	3.64	110.32	408.17	
4	0.65	0.31	0.96	16.10	59.20	>10
	4.48	2.15	6.62	111.01	408.17	
5	0.62	0.39	1.01	16.40	59.20	>10
	4.30	2.67	6.96	113.07	408.17	
6	2.57	0.86	3.43	17.40	59.20	>10
	17.75	5.92	23.67	119.97	408.17	
7	7.24	11.62	18.86	16.40	59.20	2.13
	49.94	80.11	130.05	113.07	408.17	
8	5.94	7.51	13.45	16.40	59.20	3.39
	40.92	51.79	92.71	113.07	408.17	
9	2.77	3.94	6.71	16.40	59.20	7.80
	19.09	27.15	46.23	113.07	408.17	
10	0.49	0.06	0.55	16.10	59.20	>10
	3.34	0.43	3.77	111.01	408.17	
11	0.48	0.00	0.48	16.10	59.20	>10
	3.33	0.01	3.34	111.01	408.17	
12	0.48	0.04	0.53	16.10	59.20	>10
	3.34	0.29	3.63	111.01	408.17	
13	1.61	2.20	3.81	16.40	59.20	>10
	11.10	15.14	26.24	113.07	408.17	

14	1.65	1.66	3.31	16.40	59.20	>10
	11.41	11.44	22.85	113.07	408.17	
15	1.65	1.85	3.50	16.10	59.20	>10
	11.37	12.78	24.15	111.01	408.17	
16	3.29	0.76	4.05	16.40	59.20	>10
	22.68	5.27	27.95	113.07	408.17	
17	3.22	1.55	4.76	16.40	59.20	>10
	22.19	10.66	32.85	113.07	408.17	
18	3.54	5.41	8.94	16.40	59.20	5.60
	24.39	37.28	61.67	113.07	408.17	
19	3.18	4.79	7.96	17.40	59.20	6.43
	21.90	33.01	54.91	119.97	408.17	
20	2.22	3.65	5.87	16.40	59.20	9.05
	15.31	25.17	40.49	113.07	408.17	
21	2.26	3.69	5.95	16.40	59.20	8.93
	15.58	25.43	41.01	113.07	408.17	
22	3.68	5.63	9.31	16.40	59.20	5.34
	25.37	38.79	64.16	113.07	408.17	

Min MS: 2.130, Location: 7, Combination: Pm+Pb

Table 2-288. Load Combination 352, Fire at 90 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 113, 201, 211
Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	16.40	59.20	>10
	4.33	2.83	7.17	113.07	408.17	
2	2.52	0.16	2.68	16.40	59.20	>10
	17.36	1.10	18.47	113.07	408.17	
3	0.51	0.01	0.53	16.10	59.20	>10
	3.53	0.10	3.64	111.01	408.17	
4	0.65	0.31	0.96	16.10	59.20	>10
	4.48	2.15	6.62	111.01	408.17	
5	0.62	0.39	1.01	16.40	59.20	>10
	4.30	2.67	6.96	113.07	408.17	
6	2.57	0.86	3.43	16.40	59.20	>10
	17.75	5.92	23.67	113.07	408.17	
7	7.24	11.62	18.86	16.40	59.20	2.13
	49.94	80.11	130.05	113.07	408.17	
8	5.94	7.51	13.45	16.40	59.20	3.39
	40.92	51.79	92.71	113.07	408.17	
9	2.77	3.94	6.71	16.10	59.20	7.64
	19.09	27.15	46.23	111.01	408.17	
10	0.49	0.06	0.55	16.10	59.20	>10
	3.34	0.43	3.77	111.01	408.17	
11	0.48	0.00	0.48	16.10	59.20	>10
	3.33	0.01	3.34	111.01	408.17	
12	0.48	0.04	0.53	16.10	59.20	>10
	3.34	0.29	3.63	111.01	408.17	
13	1.61	2.20	3.81	16.10	59.20	>10
	11.10	15.14	26.24	111.01	408.17	

14	1.65	1.66	3.31	16.10	59.20	>10
	11.41	11.44	22.85	111.01	408.17	
15	1.65	1.85	3.50	16.10	59.20	>10
	11.37	12.78	24.15	111.01	408.17	
16	3.29	0.76	4.05	16.40	59.20	>10
	22.68	5.27	27.95	113.07	408.17	
17	3.22	1.55	4.76	16.40	59.20	>10
	22.19	10.66	32.85	113.07	408.17	
18	3.54	5.41	8.94	16.40	59.20	5.60
	24.39	37.28	61.67	113.07	408.17	
19	3.18	4.79	7.96	16.40	59.20	6.41
	21.90	33.01	54.91	113.07	408.17	
20	2.22	3.65	5.87	16.40	59.20	9.05
	15.31	25.17	40.49	113.07	408.17	
21	2.26	3.69	5.95	16.40	59.20	8.93
	15.58	25.43	41.01	113.07	408.17	
22	3.68	5.63	9.31	16.40	59.20	5.34
	25.37	38.79	64.16	113.07	408.17	

Min MS: 2.130, Location: 7, Combination: Pm+Pb

Table 2-289. Load Combination 353, Fire at 120 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 114, 201, 211
Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	16.40	59.20	>10
	4.33	2.83	7.17	113.07	408.17	
2	2.52	0.16	2.68	16.40	59.20	>10
	17.36	1.10	18.47	113.07	408.17	
3	0.51	0.01	0.53	16.40	59.20	>10
	3.53	0.10	3.64	113.07	408.17	
4	0.65	0.31	0.96	16.10	59.20	>10
	4.48	2.15	6.62	111.01	408.17	
5	0.62	0.39	1.01	16.40	59.20	>10
	4.30	2.67	6.96	113.07	408.17	
6	2.57	0.86	3.43	16.40	59.20	>10
	17.75	5.92	23.67	113.07	408.17	
7	7.24	11.62	18.86	16.40	59.20	2.13
	49.94	80.11	130.05	113.07	408.17	
8	5.94	7.51	13.45	16.40	59.20	3.39
	40.92	51.79	92.71	113.07	408.17	
9	2.77	3.94	6.71	16.10	59.20	7.64
	19.09	27.15	46.23	111.01	408.17	
10	0.49	0.06	0.55	16.00	59.20	>10
	3.34	0.43	3.77	110.32	408.17	
11	0.48	0.00	0.48	16.00	59.20	>10
	3.33	0.01	3.34	110.32	408.17	
12	0.48	0.04	0.53	16.00	59.20	>10
	3.34	0.29	3.63	110.32	408.17	
13	1.61	2.20	3.81	16.10	59.20	>10
	11.10	15.14	26.24	111.01	408.17	

14	1.65	1.66	3.31	16.10	59.20	>10
	11.41	11.44	22.85	111.01	408.17	
15	1.65	1.85	3.50	16.10	59.20	>10
	11.37	12.78	24.15	111.01	408.17	
16	3.29	0.76	4.05	16.40	59.20	>10
	22.68	5.27	27.95	113.07	408.17	
17	3.22	1.55	4.76	16.40	59.20	>10
	22.19	10.66	32.85	113.07	408.17	
18	3.54	5.41	8.94	16.40	59.20	5.60
	24.39	37.28	61.67	113.07	408.17	
19	3.18	4.79	7.96	16.40	59.20	6.41
	21.90	33.01	54.91	113.07	408.17	
20	2.22	3.65	5.87	16.40	59.20	9.05
	15.31	25.17	40.49	113.07	408.17	
21	2.26	3.69	5.95	16.40	59.20	8.93
	15.58	25.43	41.01	113.07	408.17	
22	3.68	5.63	9.31	16.40	59.20	5.34
	25.37	38.79	64.16	113.07	408.17	

Min MS: 2.130, Location: 7, Combination: Pm+Pb

Table 2-290. Load Combination 354, Fire at 150 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 115, 201, 211
Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	17.40	59.20	>10
	4.33	2.83	7.17	119.97	408.17	
2	2.52	0.16	2.68	16.40	59.20	>10
	17.36	1.10	18.47	113.07	408.17	
3	0.51	0.01	0.53	16.40	59.20	>10
	3.53	0.10	3.64	113.07	408.17	
4	0.65	0.31	0.96	16.40	59.20	>10
	4.48	2.15	6.62	113.07	408.17	
5	0.62	0.39	1.01	16.40	59.20	>10
	4.30	2.67	6.96	113.07	408.17	
6	2.57	0.86	3.43	16.40	59.20	>10
	17.75	5.92	23.67	113.07	408.17	
7	7.24	11.62	18.86	16.40	59.20	2.13
	49.94	80.11	130.05	113.07	408.17	
8	5.94	7.51	13.45	16.10	59.20	3.31
	40.92	51.79	92.71	111.01	408.17	
9	2.77	3.94	6.71	16.10	59.20	7.64
	19.09	27.15	46.23	111.01	408.17	
10	0.49	0.06	0.55	16.00	59.20	>10
	3.34	0.43	3.77	110.32	408.17	
11	0.48	0.00	0.48	16.00	59.20	>10
	3.33	0.01	3.34	110.32	408.17	
12	0.48	0.04	0.53	16.00	59.20	>10
	3.34	0.29	3.63	110.32	408.17	
13	1.61	2.20	3.81	16.10	59.20	>10
	11.10	15.14	26.24	111.01	408.17	

14	1.65	1.66	3.31	16.10	59.20	>10
	11.41	11.44	22.85	111.01	408.17	
15	1.65	1.85	3.50	16.10	59.20	>10
	11.37	12.78	24.15	111.01	408.17	
16	3.29	0.76	4.05	16.40	59.20	>10
	22.68	5.27	27.95	113.07	408.17	
17	3.22	1.55	4.76	16.40	59.20	>10
	22.19	10.66	32.85	113.07	408.17	
18	3.54	5.41	8.94	16.40	59.20	5.60
	24.39	37.28	61.67	113.07	408.17	
19	3.18	4.79	7.96	16.40	59.20	6.41
	21.90	33.01	54.91	113.07	408.17	
20	2.22	3.65	5.87	16.40	59.20	9.05
	15.31	25.17	40.49	113.07	408.17	
21	2.26	3.69	5.95	16.40	59.20	8.93
	15.58	25.43	41.01	113.07	408.17	
22	3.68	5.63	9.31	16.40	59.20	5.34
	25.37	38.79	64.16	113.07	408.17	

Min MS: 2.130, Location: 7, Combination: Pm+Pb

Table 2-291. Load Combination 355, Fire at 180 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165A

Load Cases: 116, 201, 211
Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	17.40	59.20	>10
	4.33	2.83	7.17	119.97	408.17	
2	2.52	0.16	2.68	16.40	59.20	>10
	17.36	1.10	18.47	113.07	408.17	
3	0.51	0.01	0.53	16.40	59.20	>10
	3.53	0.10	3.64	113.07	408.17	
4	0.65	0.31	0.96	16.40	59.20	>10
	4.48	2.15	6.62	113.07	408.17	
5	0.62	0.39	1.01	16.40	59.20	>10
	4.30	2.67	6.96	113.07	408.17	
6	2.57	0.86	3.43	16.40	59.20	>10
	17.75	5.92	23.67	113.07	408.17	
7	7.24	11.62	18.86	16.40	59.20	2.13
	49.94	80.11	130.05	113.07	408.17	
8	5.94	7.51	13.45	16.10	59.20	3.31
	40.92	51.79	92.71	111.01	408.17	
9	2.77	3.94	6.71	16.10	59.20	7.64
	19.09	27.15	46.23	111.01	408.17	
10	0.49	0.06	0.55	16.00	59.20	>10
	3.34	0.43	3.77	110.32	408.17	
11	0.48	0.00	0.48	16.00	59.20	>10
	3.33	0.01	3.34	110.32	408.17	
12	0.48	0.04	0.53	16.00	59.20	>10
	3.34	0.29	3.63	110.32	408.17	
13	1.61	2.20	3.81	16.10	59.20	>10
	11.10	15.14	26.24	111.01	408.17	

14	1.65	1.66	3.31	16.10	59.20	>10
	11.41	11.44	22.85	111.01	408.17	
15	1.65	1.85	3.50	16.10	59.20	>10
	11.37	12.78	24.15	111.01	408.17	
16	3.29	0.76	4.05	16.40	59.20	>10
	22.68	5.27	27.95	113.07	408.17	
17	3.22	1.55	4.76	16.40	59.20	>10
	22.19	10.66	32.85	113.07	408.17	
18	3.54	5.41	8.94	16.40	59.20	5.60
	24.39	37.28	61.67	113.07	408.17	
19	3.18	4.79	7.96	16.40	59.20	6.41
	21.90	33.01	54.91	113.07	408.17	
20	2.22	3.65	5.87	16.40	59.20	9.05
	15.31	25.17	40.49	113.07	408.17	
21	2.26	3.69	5.95	16.40	59.20	8.93
	15.58	25.43	41.01	113.07	408.17	
22	3.68	5.63	9.31	16.40	59.20	5.34
	25.37	38.79	64.16	113.07	408.17	

Min MS: 2.130, Location: 7, Combination: Pm+Pb

2.10.3.3 Minimum Margins of Safety – Model AOS-165A

Table 2-292 and Table 2-293 list the Model AOS-165A transport package Minimum Margins of Safety (Min MS), for Normal and Hypothetical Accident conditions of transport, respectively.

Table 2-292. Min MS for Normal Conditions of Transport – Model AOS-165A

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
101	101 201 211 0 0	3.838E-01	7	Pm+Pb
102	104 201 211 0 0	5.905E-01	7	Pm+Pb
103	103 201 211 0 0	5.905E-01	7	Pm+Pb
104	101 201 202 211 0	3.528E-01	7	Pm+Pb
105	105 201 202 211 0	4.201E-01	7	Pm+Pb+Q
106	101 201 203 211 0	2.989E-01	7	Pm+Pb
107	105 201 203 211 0	3.919E-01	7	Pm+Pb+Q
215	215 101 201 211 0	3.124E-01	7	Pm+Pb
216	216 101 201 211 0	3.818E-01	7	Pm+Pb
217	216 104 201 211 0	5.883E-01	7	Pm+Pb
221	221 101 201 211 0	3.443E-01	7	Pm+Pb
222	222 101 201 211 0	3.739E-01	7	Pm+Pb
223	223 101 201 211 0	5.743E-05	7	Pm+Pb
231	231 102 201 211 0	3.188E-02	7	Pm+Pb

Table 2-293. Min MS for Hypothetical Accident Conditions of Transport – Model AOS-165A

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
301	301 102 201 211 0	4.390E-01	7	Pm+Pb
302	302 102 201 211 0	9.070E-01	7	Pm+Pb
303	303 102 201 211 0	1.451E+00	7	Pm+Pb
304	304 105 202 211 0	5.252E-01	7	Pm+Pb
305	305 105 202 211 0	5.342E-01	1	Pm
306	306 105 202 211 0	2.887E+00	7	Pm+Pb
310	204 101 211 0 0	6.647E-01	7	Pm+Pb
311	311 101 201 211 0	5.600E-01	18	Pm
312	311 104 201 211 0	8.069E-01	18	Pm
350	111 201 211 0 0	2.139E+00	7	Pm+Pb
351	112 201 211 0 0	2.130E+00	7	Pm+Pb
352	113 201 211 0 0	2.130E+00	7	Pm+Pb
353	114 201 211 0 0	2.130E+00	7	Pm+Pb
354	115 201 211 0 0	2.130E+00	7	Pm+Pb

2.10.3.4 Free Drop – Model AOS-165A and AOS-165B

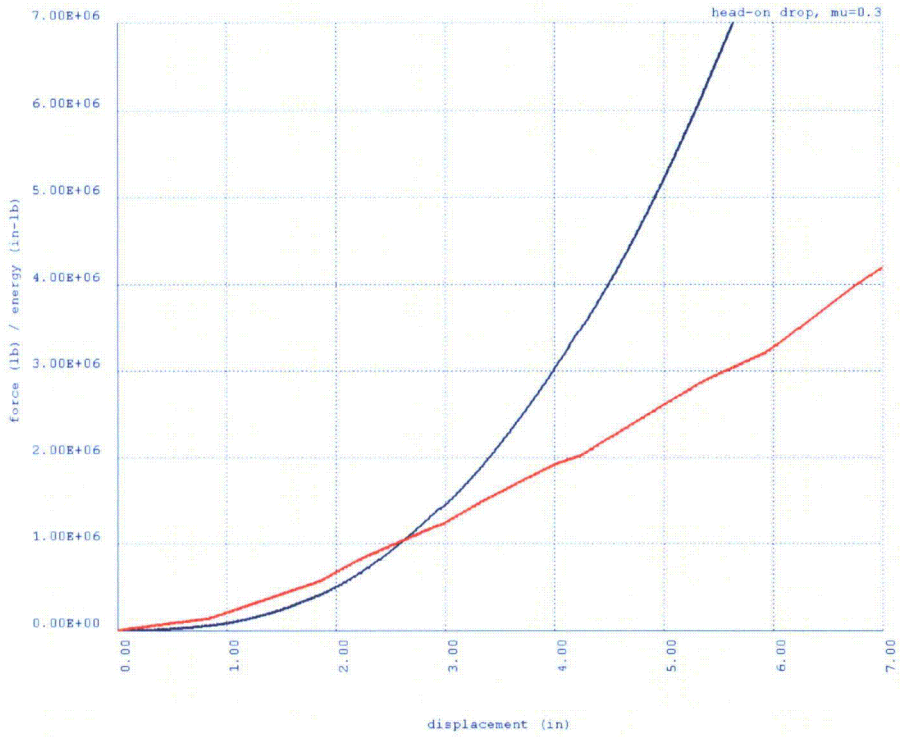

Figure 2-46. Head-On Drop Force and Energy – Model AOS-165A and AOS-165B

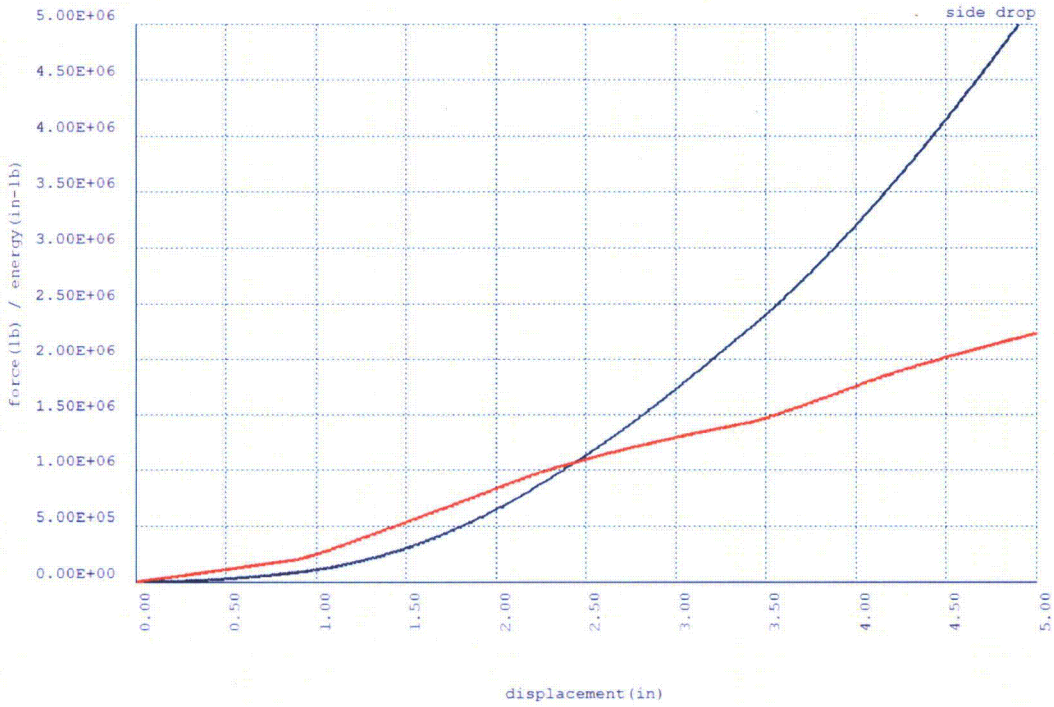

Figure 2-47. Side Drop Force and Energy – Model AOS-165A and AOS-165B

2.10.4 Model AOS-165B Transport Package

This appendix presents the following information, specific to the Model AOS-165B transport package:

- Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-165B
- Hypothetical Accident Conditions of Transport Summary of Damages (Stresses) – Model AOS-165B
- Minimum Margins of Safety – Model AOS-165B

For the Free drop results, refer to Appendix 2.10.3.4, "Free Drop – Model AOS-165A and AOS-165B."

2.10.4.1 Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-165B

Table 2-294 and Table 2-295 present Model AOS-165B transport package Load Cases and Load Combinations, respectively, under Normal conditions of transport:

- Table 2-296 through Table 2-313 present Load Case test case output data. Comparisons with allowable stress limits are included for Load Cases 101, 102, 103, 104, 105, and 106.
- Table 2-314 through Table 2-326 present Load Combination test case output data.

Table 2-294. Load Cases Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-165B

Load Case	Description	Data
101	100°F Ambient, 2.5 kW Decay Heat	Table 2-296
102	100°F Ambient, 2.5 kW Decay Heat, Maximum Insolation	Table 2-297
103	-20°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-298
104	-40°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-299
105	-40°F Ambient, 2.5 kW Decay Heat	Table 2-300
106	-20°F Ambient, 2.5 kW Decay Heat	Table 2-301
201	Maximum Internal Pressure, 1,517 kPa (220 psia)	Table 2-302
202	Minimum External Pressure, 24 kPa (3.5 psia)	Table 2-303
203	Maximum Increase External Pressure, 140 kPa (20 psia)	Table 2-304
204	Additional Increased External Pressure, 2 MPa (290 psia)	Table 2-305
211	Fabrication Stress	Table 2-306
215	Compression Load (5x weight)	Table 2-307
216	Rod Drop onto Cask	Table 2-308
221	Forward 5g Vibration Inertia Load	Table 2-309
222	Lateral 5g Vibration Inertia Load	Table 2-310
223	Vertical 10g Vibration Inertia Load	Table 2-311
231	4-ft. Head-On Drop	Table 2-312
232	Impact Test, Normal Condition	Table 2-313

Table 2-295. Load Combinations Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-165B

Load Combination	Load Cases	Description	Data
101	101, 201, 211	Hot Environment	Table 2-314
102	104, 201, 211	Cold Environment	Table 2-315
103	103, 201, 211	Increased External Pressure	Table 2-316
104	101, 201, 202, 211	Minimum External Pressure	Table 2-317
105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat	Table 2-318
106	101, 201, 203, 211	Maximum Pressure, Hot Environment	Table 2-319
107	105, 201, 203, 211	Maximum Pressure, Cold Environment	Table 2-320
215	215, 101, 201, 211	Compression Load	Table 2-321
216	216, 101, 201, 211	Rod Drop	Table 2-322
217	216, 104, 201, 211	Rod Drop, Cold Environment	Table 2-323
221	221, 101, 201, 211	Forward Vibration	Table 2-324
222	222, 101, 201, 211	Lateral Vibration	Table 2-325
223	223, 101, 201, 211	Vertical Vibration	Table 2-326
231	231, 102, 201, 211	4-ft. Head-On Drop	Table 2-327
232[1]	232, 102, 201, 211	Impact Test	–

1. Load Combination 232 is documented only for the Model AOS-025 and AOS-050 transport packages, and demonstrates compliance with the requirements of Reference **[2.2]**, *Paragraph 737.*

Table 2-296. Load Case 101, 100°F Ambient, 2.5 kW Decay Heat, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.0678E+02	-2.5789E+02	-2.2192E+02	4.6468E+02	8.7650E+02
	1.4257E+00	-1.7781E+00	-1.5301E+00	3.2038E+00	6.0433E+00
2	2.7835E+02	-4.1969E+02	-9.4436E+01	6.9804E+02	1.2218E+03
	1.9192E+00	-2.8937E+00	-6.5111E-01	4.8128E+00	8.4241E+00
3	2.0546E+02	-3.1014E+02	7.9719E+01	5.1560E+02	1.0290E+03
	1.4166E+00	-2.1383E+00	5.4964E-01	3.5549E+00	7.0944E+00
4	4.2037E+02	-5.8717E+02	-1.4686E+02	1.0075E+03	1.9948E+03
	2.8983E+00	-4.0484E+00	-1.0126E+00	6.9467E+00	1.3754E+01
5	2.0512E+02	-2.5495E+02	-2.3074E+02	4.6007E+02	8.6611E+02
	1.4142E+00	-1.7578E+00	-1.5909E+00	3.1721E+00	5.9716E+00
6	2.7053E+02	-4.0582E+02	-6.7293E+01	6.7636E+02	1.2194E+03
	1.8653E+00	-2.7980E+00	-4.6397E-01	4.6633E+00	8.4073E+00
7	1.5336E+03	-5.6927E+03	-1.2657E+03	7.2263E+03	1.4269E+04
	1.0574E+01	-3.9250E+01	-8.7267E+00	4.9824E+01	9.8379E+01
8	1.4836E+03	-6.2714E+03	-2.9860E+03	7.7550E+03	1.2281E+04
	1.0229E+01	-4.3240E+01	-2.0588E+01	5.3469E+01	8.4671E+01
9	2.3424E+02	-3.1828E+03	-4.1504E+03	3.4170E+03	4.0031E+03
	1.6150E+00	-2.1945E+01	-2.8616E+01	2.3560E+01	2.7600E+01
10	-1.0169E+02	-1.1507E+03	-1.0324E+03	1.0490E+03	1.5020E+03
	-7.0115E-01	-7.9339E+00	-7.1181E+00	7.2327E+00	1.0356E+01
11	-1.0738E+02	-1.1441E+03	-1.0962E+03	1.0367E+03	1.4757E+03
	-7.4036E-01	-7.8881E+00	-7.5578E+00	7.1477E+00	1.0174E+01
12	-1.0795E+02	-1.1430E+03	-1.1157E+03	1.0351E+03	1.4717E+03
	-7.4429E-01	-7.8809E+00	-7.6926E+00	7.1366E+00	1.0147E+01
13	-1.1718E+02	-1.8446E+03	-2.0075E+02	1.7275E+03	3.4405E+03
	-8.0791E-01	-1.2718E+01	-1.3841E+00	1.1910E+01	2.3722E+01
14	-4.6350E+02	-2.2502E+03	-1.1382E+03	1.7867E+03	8.0787E+02
	-3.1957E+00	-1.5515E+01	-7.8477E+00	1.2319E+01	5.5701E+00
15	5.8209E+00	-2.6928E+03	-2.6724E+03	2.6986E+03	9.5198E+02
	4.0134E-02	-1.8566E+01	-1.8426E+01	1.8606E+01	6.5637E+00

16	-2.3857E+02	-3.3786E+03	-2.0091E+02	3.1401E+03	1.9559E+03
	-1.6449E+00	-2.3295E+01	-1.3852E+00	2.1650E+01	1.3486E+01
17	-2.2446E+02	-2.9334E+03	2.9184E+02	2.7090E+03	1.7807E+03
	-1.5476E+00	-2.0225E+01	2.0122E+00	1.8678E+01	1.2278E+01
18	1.3890E+02	-2.7671E+02	-1.0646E+02	4.1561E+02	6.7804E+02
	9.5768E-01	-1.9078E+00	-7.3404E-01	2.8655E+00	4.6749E+00
19	5.0443E+01	-1.3123E+02	4.6748E+01	1.8168E+02	3.3031E+02
	3.4779E-01	-9.0483E-01	3.2232E-01	1.2526E+00	2.2774E+00
20	3.3264E+01	-9.8702E+01	1.2961E+01	1.3197E+02	2.2840E+02
	2.2935E-01	-6.8052E-01	8.9366E-02	9.0987E-01	1.5748E+00
21	1.8039E+02	-2.5707E+02	1.6007E+03	4.3746E+02	4.0204E+02
	1.2437E+00	-1.7724E+00	1.1037E+01	3.0162E+00	2.7720E+00
22	-1.1935E+01	-5.7965E+02	2.0998E+03	5.6771E+02	2.1561E+02
	-8.2286E-02	-3.9965E+00	1.4477E+01	3.9143E+00	1.4866E+00
23	-6.9473E+01	-1.5610E+03	5.5782E+02	1.4915E+03	3.7703E+02
	-4.7900E-01	-1.0763E+01	3.8460E+00	1.0284E+01	2.5995E+00
24	3.0565E-01	-3.4705E+02	-3.4567E+02	3.4736E+02	2.7768E+02
	2.1074E-03	-2.3928E+00	-2.3833E+00	2.3949E+00	1.9145E+00
25	-2.7268E+01	-5.1542E+02	-5.1049E+02	4.8815E+02	3.6351E+02
	-1.8801E-01	-3.5537E+00	-3.5197E+00	3.3657E+00	2.5063E+00

Allowable Stress for Load Case 101

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	287.58	285.41	20.00	23.60	66.30
2	294.27	290.59	20.00	23.60	66.30
3	279.90	273.70	20.00	23.60	66.30
4	295.10	287.69	20.00	23.60	66.30
5	288.16	285.99	20.00	23.60	66.30
6	294.76	291.18	20.00	23.60	66.30
7	304.20	303.44	20.00	22.40	61.80
8	313.76	312.00	20.00	22.40	61.80
9	319.32	317.33	20.00	22.40	61.80
10	330.91	325.93	20.00	22.40	61.80
11	331.06	326.09	20.00	22.40	61.80
12	330.87	325.89	20.00	22.40	61.80
13	326.14	321.01	20.00	22.40	61.80
14	328.64	319.56	20.00	22.40	61.80
15	340.47	329.60	20.00	22.40	61.80
16	311.00	308.16	20.00	22.40	61.80
17	305.22	304.28	20.00	22.40	61.80
18	309.07	308.73	20.00	22.40	61.80
19	308.30	307.72	20.00	22.40	61.80
20	308.87	308.15	20.00	22.40	61.80
21	310.25	309.73	20.00	22.40	61.80
22	310.92	310.39	20.00	22.40	61.80
23	324.44	321.28	20.00	22.40	61.80
24	300.38	299.76	20.00	23.60	66.30
25	301.79	301.23	20.00	22.40	61.80

Table 2-297. Load Case 102, 100°F Ambient, 2.5 kW Decay Heat, Maximum Insolation, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.9330E+02	-2.4214E+02	-2.0034E+02	4.3544E+02	8.2224E+02
	1.3328E+00	-1.6695E+00	-1.3813E+00	3.0022E+00	5.6691E+00
2	2.6909E+02	-4.0573E+02	-8.9132E+01	6.7481E+02	1.1789E+03
	1.8553E+00	-2.7974E+00	-6.1455E-01	4.6527E+00	8.1281E+00
3	2.0832E+02	-3.1085E+02	6.1658E+01	5.1917E+02	1.0393E+03
	1.4363E+00	-2.1432E+00	4.2512E-01	3.5795E+00	7.1659E+00
4	4.1086E+02	-5.7161E+02	-1.4346E+02	9.8247E+02	1.9465E+03
	2.8328E+00	-3.9411E+00	-9.8912E-01	6.7739E+00	1.3421E+01
5	1.9184E+02	-2.3944E+02	-2.0891E+02	4.3128E+02	8.1241E+02
	1.3227E+00	-1.6508E+00	-1.4404E+00	2.9735E+00	5.6013E+00
6	2.6193E+02	-3.9285E+02	-6.1683E+01	6.5478E+02	1.1768E+03
	1.8059E+00	-2.7086E+00	-4.2529E-01	4.5145E+00	8.1139E+00
7	1.5454E+03	-5.5402E+03	-1.2778E+03	7.0856E+03	1.3995E+04
	1.0655E+01	-3.8199E+01	-8.8099E+00	4.8854E+01	9.6490E+01
8	1.4733E+03	-6.0381E+03	-2.9909E+03	7.5113E+03	1.1885E+04
	1.0158E+01	-4.1631E+01	-2.0621E+01	5.1789E+01	8.1943E+01
9	2.1367E+02	-3.1211E+03	-4.2736E+03	3.3347E+03	3.9844E+03
	1.4732E+00	-2.1519E+01	-2.9466E+01	2.2992E+01	2.7472E+01
10	-1.3086E+02	-1.1454E+03	-1.4735E+03	1.0145E+03	1.4652E+03
	-9.0227E-01	-7.8971E+00	-1.0159E+01	6.9948E+00	1.0102E+01
11	-1.3708E+02	-1.1380E+03	-1.5344E+03	1.0010E+03	1.4360E+03
	-9.4514E-01	-7.8465E+00	-1.0579E+01	6.9014E+00	9.9007E+00
12	-1.3752E+02	-1.1372E+03	-1.5601E+03	9.9967E+02	1.4328E+03
	-9.4819E-01	-7.8407E+00	-1.0757E+01	6.8925E+00	9.8791E+00
13	-1.1845E+02	-1.9016E+03	-4.1725E+02	1.7831E+03	3.4057E+03
	-8.1671E-01	-1.3111E+01	-2.8768E+00	1.2294E+01	2.3482E+01
14	-4.7703E+02	-2.3008E+03	-1.2119E+03	1.8238E+03	9.3433E+02
	-3.2890E+00	-1.5863E+01	-8.3558E+00	1.2574E+01	6.4420E+00
15	5.4345E+00	-2.7337E+03	-2.7140E+03	2.7391E+03	1.0798E+03
	3.7470E-02	-1.8848E+01	-1.8712E+01	1.8886E+01	7.4449E+00

16	-2.1998E+02	-3.3076E+03	-2.0734E+02	3.0877E+03	1.7838E+03
	-1.5167E+00	-2.2805E+01	-1.4295E+00	2.1289E+01	1.2299E+01
17	-2.2836E+02	-2.8766E+03	2.7057E+02	2.6482E+03	1.8540E+03
	-1.5745E+00	-1.9833E+01	1.8655E+00	1.8259E+01	1.2783E+01
18	1.8827E+02	-3.3956E+02	-1.1270E+02	5.2783E+02	8.7087E+02
	1.2981E+00	-2.3412E+00	-7.7704E-01	3.6393E+00	6.0045E+00
19	6.4894E+01	-1.6068E+02	3.8170E+01	2.2557E+02	4.0148E+02
	4.4743E-01	-1.1078E+00	2.6317E-01	1.5552E+00	2.7681E+00
20	3.8319E+01	-1.1704E+02	1.6620E+01	1.5536E+02	2.7064E+02
	2.6420E-01	-8.0694E-01	1.1459E-01	1.0711E+00	1.8660E+00
21	1.7105E+02	-2.5692E+02	1.5791E+03	4.2797E+02	3.6867E+02
	1.1793E+00	-1.7714E+00	1.0888E+01	2.9508E+00	2.5419E+00
22	-1.9032E+01	-5.7450E+02	2.0538E+03	5.5547E+02	2.6588E+02
	-1.3122E-01	-3.9611E+00	1.4160E+01	3.8298E+00	1.8332E+00
23	-7.4000E+01	-1.5358E+03	5.3916E+02	1.4618E+03	4.1822E+02
	-5.1021E-01	-1.0589E+01	3.7174E+00	1.0079E+01	2.8835E+00
24	3.0921E-01	-3.3826E+02	-3.3691E+02	3.3857E+02	2.7087E+02
	2.1319E-03	-2.3322E+00	-2.3229E+00	2.3344E+00	1.8676E+00
25	-3.3850E+01	-5.0163E+02	-4.9586E+02	4.6778E+02	3.6694E+02
	-2.3339E-01	-3.4586E+00	-3.4188E+00	3.2252E+00	2.5300E+00

Allowable Stress for Load Case 102

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	342.61	340.42	20.00	22.40	61.80
2	349.23	345.61	20.00	22.40	61.80
3	335.66	329.76	20.00	22.40	61.80
4	350.26	343.15	20.00	22.40	61.80
5	343.13	340.95	20.00	22.40	61.80
6	349.68	346.14	20.00	22.40	61.80
7	358.92	358.21	20.00	22.40	61.80
8	368.29	366.56	20.00	22.40	61.80
9	373.66	371.73	20.00	22.40	61.80
10	384.81	379.96	20.00	22.40	61.80
11	384.99	380.15	20.00	22.40	61.80
12	384.78	379.93	20.00	22.40	61.80
13	380.26	375.29	20.00	22.40	61.80
14	382.80	374.00	20.00	22.40	61.80
15	394.42	383.87	20.00	22.40	61.80
16	365.67	362.90	20.00	22.40	61.80
17	360.03	359.09	20.00	22.40	61.80
18	363.28	362.94	20.00	22.40	61.80
19	362.50	361.93	20.00	22.40	61.80
20	363.07	362.36	20.00	22.40	61.80
21	364.53	364.06	20.00	22.40	61.80
22	365.31	364.77	20.00	22.40	61.80
23	378.54	375.47	20.00	22.40	61.80
24	355.13	354.52	20.00	22.40	61.80
25	356.52	355.98	20.00	22.40	61.80

Table 2-298. Load Case 103, -20°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2951E+00	-5.8820E-01	1.0939E-01	1.8833E+00	3.1680E+00
	8.9297E-03	-4.0555E-03	7.5424E-04	1.2985E-02	2.1842E-02
2	6.7979E+01	-3.8563E+00	-2.0937E+01	7.1836E+01	2.9080E+01
	4.6870E-01	-2.6589E-02	-1.4436E-01	4.9529E-01	2.0050E-01
3	5.2501E-01	-6.5141E-03	-2.8145E-01	5.3152E-01	2.9765E-01
	3.6198E-03	-4.4913E-05	-1.9405E-03	3.6647E-03	2.0522E-03
4	7.1683E+01	-8.7654E-02	7.2954E-01	7.1770E+01	6.0909E+00
	4.9424E-01	-6.0435E-04	5.0300E-03	4.9484E-01	4.1995E-02
5	1.3835E+00	-6.6105E-01	1.2606E-01	2.0445E+00	3.4524E+00
	9.5386E-03	-4.5578E-03	8.6914E-04	1.4096E-02	2.3804E-02
6	7.4591E+01	-1.2610E+00	-2.2987E+01	7.5852E+01	4.0063E+01
	5.1429E-01	-8.6945E-03	-1.5849E-01	5.2298E-01	2.7623E-01
7	2.7406E+03	-1.6977E+03	-1.0279E+02	4.4382E+03	9.1943E+03
	1.8896E+01	-1.1705E+01	-7.0873E-01	3.0601E+01	6.3392E+01
8	4.0632E+03	-1.8091E+03	-1.2826E+02	5.8723E+03	8.1020E+03
	2.8015E+01	-1.2473E+01	-8.8434E-01	4.0488E+01	5.5862E+01
9	2.5194E+03	-1.8523E+02	7.3513E+02	2.7047E+03	4.5409E+03
	1.7371E+01	-1.2771E+00	5.0685E+00	1.8648E+01	3.1308E+01
10	1.1475E+03	1.3002E-01	-3.2463E+01	1.1474E+03	3.4692E+01
	7.9116E+00	8.9645E-04	-2.2383E-01	7.9107E+00	2.3919E-01
11	1.1460E+03	8.1307E-03	1.3523E+00	1.1460E+03	2.2980E-01
	7.9012E+00	5.6059E-05	9.3240E-03	7.9011E+00	1.5844E-03
12	1.1466E+03	5.6616E-03	-2.0646E+01	1.1466E+03	1.4436E+01
	7.9055E+00	3.9036E-05	-1.4235E-01	7.9054E+00	9.9534E-02
13	1.1751E+03	-1.7997E+02	6.4409E+02	1.3551E+03	8.9647E+02
	8.1020E+00	-1.2408E+00	4.4408E+00	9.3428E+00	6.1809E+00
14	3.4313E+02	-3.9837E+02	9.2259E+01	7.4150E+02	5.2612E+02
	2.3658E+00	-2.7467E+00	6.3610E-01	5.1124E+00	3.6274E+00
15	1.5738E+02	-4.5857E+02	8.5142E+01	6.1595E+02	1.2308E+03
	1.0851E+00	-3.1618E+00	5.8703E-01	4.2469E+00	8.4858E+00

16	1.7958E+03	-6.4056E+02	1.8071E+02	2.4364E+03	1.6397E+03
	1.2382E+01	-4.4165E+00	1.2460E+00	1.6798E+01	1.1305E+01
17	1.4523E+03	-5.6417E+02	1.8291E+02	2.0165E+03	2.4508E+03
	1.0013E+01	-3.8898E+00	1.2611E+00	1.3903E+01	1.6898E+01
18	4.2629E+02	-2.5785E+02	1.7979E+02	6.8414E+02	1.0650E+03
	2.9391E+00	-1.7778E+00	1.2396E+00	4.7170E+00	7.3428E+00
19	8.0095E+02	-3.3952E+02	2.6638E+02	1.1405E+03	1.7497E+03
	5.5223E+00	-2.3409E+00	1.8366E+00	7.8632E+00	1.2064E+01
20	7.1043E+02	-1.5130E+02	-6.6441E+01	8.6173E+02	1.5147E+03
	4.8982E+00	-1.0432E+00	-4.5809E-01	5.9414E+00	1.0443E+01
21	6.8304E+02	-1.2565E+02	-1.1527E+02	8.0869E+02	1.4146E+03
	4.7094E+00	-8.6632E-01	-7.9475E-01	5.5758E+00	9.7531E+00
22	8.4616E+02	-3.7330E+02	1.6922E+02	1.2195E+03	1.9202E+03
	5.8340E+00	-2.5738E+00	1.1667E+00	8.4079E+00	1.3240E+01
23	1.0030E+03	-5.3416E+02	4.5863E+01	1.5371E+03	2.8805E+03
	6.9151E+00	-3.6829E+00	3.1621E-01	1.0598E+01	1.9860E+01
24	7.2197E+01	-5.6346E+02	-5.3911E+01	6.3565E+02	1.5483E+03
	4.9778E-01	-3.8849E+00	-3.7170E-01	4.3827E+00	1.0675E+01
25	2.8986E+01	-1.7472E+01	1.9857E+01	4.6458E+01	6.8650E+01
	1.9985E-01	-1.2047E-01	1.3691E-01	3.2032E-01	4.7333E-01

Allowable Stress for Load Case 103

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	0.00	-20.00	20.00	30.00	70.00
2	0.00	-20.00	20.00	30.00	70.00
3	0.00	-20.00	20.00	30.00	70.00
4	0.00	-20.00	20.00	30.00	70.00
5	0.00	-20.00	20.00	30.00	70.00
6	0.00	-20.00	20.00	30.00	70.00
7	0.00	-20.00	20.00	30.00	70.00
8	0.00	-20.00	20.00	30.00	70.00
9	0.00	-20.00	20.00	30.00	70.00
10	0.00	-20.00	20.00	30.00	70.00
11	0.00	-20.00	20.00	30.00	70.00
12	0.00	-20.00	20.00	30.00	70.00
13	0.00	-20.00	20.00	30.00	70.00
14	0.00	-20.00	20.00	30.00	70.00
15	0.00	-20.00	20.00	30.00	70.00
16	0.00	-20.00	20.00	30.00	70.00
17	0.00	-20.00	20.00	30.00	70.00
18	0.00	-20.00	20.00	30.00	70.00
19	0.00	-20.00	20.00	30.00	70.00
20	0.00	-20.00	20.00	30.00	70.00
21	0.00	-20.00	20.00	30.00	70.00
22	0.00	-20.00	20.00	30.00	70.00
23	0.00	-20.00	20.00	30.00	70.00
24	0.00	-20.00	20.00	30.00	70.00
25	0.00	-20.00	20.00	30.00	70.00

Table 2-299. Load Case 104, -40°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5829E+00	-7.1891E-01	1.3370E-01	2.3019E+00	3.8720E+00
	1.0914E-02	-4.9567E-03	9.2184E-04	1.5871E-02	2.6696E-02
2	8.3086E+01	-4.7133E+00	-2.5590E+01	8.7799E+01	3.5542E+01
	5.7286E-01	-3.2497E-02	-1.7644E-01	6.0535E-01	2.4505E-01
3	6.4167E-01	-7.9616E-03	-3.4400E-01	6.4963E-01	3.6380E-01
	4.4242E-03	-5.4894E-05	-2.3718E-03	4.4791E-03	2.5083E-03
4	8.7612E+01	-1.0713E-01	8.9166E-01	8.7719E+01	7.4444E+00
	6.0407E-01	-7.3865E-04	6.1477E-03	6.0480E-01	5.1327E-02
5	1.6909E+00	-8.0795E-01	1.5407E-01	2.4988E+00	4.2196E+00
	1.1658E-02	-5.5706E-03	1.0623E-03	1.7229E-02	2.9093E-02
6	9.1167E+01	-1.5413E+00	-2.8096E+01	9.2708E+01	4.8966E+01
	6.2857E-01	-1.0627E-02	-1.9371E-01	6.3920E-01	3.3761E-01
7	3.3496E+03	-2.0749E+03	-1.2564E+02	5.4245E+03	1.1237E+04
	2.3095E+01	-1.4306E+01	-8.6623E-01	3.7401E+01	7.7479E+01
8	4.9661E+03	-2.2111E+03	-1.5677E+02	7.1772E+03	9.9025E+03
	3.4240E+01	-1.5245E+01	-1.0809E+00	4.9485E+01	6.8275E+01
9	3.0793E+03	-2.2639E+02	8.9849E+02	3.3057E+03	5.5499E+03
	2.1231E+01	-1.5609E+00	6.1949E+00	2.2792E+01	3.8265E+01
10	1.4025E+03	1.5891E-01	-3.9677E+01	1.4023E+03	4.2402E+01
	9.6697E+00	1.0957E-03	-2.7356E-01	9.6687E+00	2.9235E-01
11	1.4006E+03	9.9375E-03	1.6529E+00	1.4006E+03	2.8087E-01
	9.6570E+00	6.8517E-05	1.1396E-02	9.6569E+00	1.9365E-03
12	1.4014E+03	6.9198E-03	-2.5235E+01	1.4014E+03	1.7644E+01
	9.6622E+00	4.7710E-05	-1.7399E-01	9.6622E+00	1.2165E-01
13	1.4362E+03	-2.1996E+02	7.8722E+02	1.6562E+03	1.0957E+03
	9.9024E+00	-1.5166E+00	5.4277E+00	1.1419E+01	7.5545E+00
14	4.1938E+02	-4.8690E+02	1.1276E+02	9.0627E+02	6.4303E+02
	2.8915E+00	-3.3570E+00	7.7746E-01	6.2485E+00	4.4335E+00
15	1.9235E+02	-5.6048E+02	1.0406E+02	7.5283E+02	1.5043E+03
	1.3262E+00	-3.8644E+00	7.1749E-01	5.1906E+00	1.0372E+01

16	2.1949E+03	-7.8291E+02	2.2087E+02	2.9778E+03	2.0041E+03
	1.5133E+01	-5.3980E+00	1.5228E+00	2.0531E+01	1.3818E+01
17	1.7750E+03	-6.8955E+02	2.2356E+02	2.4646E+03	2.9954E+03
	1.2238E+01	-4.7543E+00	1.5414E+00	1.6993E+01	2.0653E+01
18	5.2102E+02	-3.1515E+02	2.1974E+02	8.3617E+02	1.3017E+03
	3.5923E+00	-2.1729E+00	1.5151E+00	5.7652E+00	8.9746E+00
19	9.7893E+02	-4.1497E+02	3.2558E+02	1.3939E+03	2.1385E+03
	6.7495E+00	-2.8611E+00	2.2448E+00	9.6106E+00	1.4744E+01
20	8.6830E+02	-1.8492E+02	-8.1205E+01	1.0532E+03	1.8513E+03
	5.9867E+00	-1.2750E+00	-5.5989E-01	7.2617E+00	1.2764E+01
21	8.3483E+02	-1.5357E+02	-1.4088E+02	9.8840E+02	1.7289E+03
	5.7560E+00	-1.0588E+00	-9.7137E-01	6.8148E+00	1.1920E+01
22	1.0342E+03	-4.5626E+02	2.0683E+02	1.4904E+03	2.3470E+03
	7.1305E+00	-3.1458E+00	1.4260E+00	1.0276E+01	1.6182E+01
23	1.2258E+03	-6.5287E+02	5.6054E+01	1.8787E+03	3.5206E+03
	8.4518E+00	-4.5014E+00	3.8648E-01	1.2953E+01	2.4274E+01
24	8.8241E+01	-6.8867E+02	-6.5891E+01	7.7691E+02	1.8923E+03
	6.0840E-01	-4.7482E+00	-4.5430E-01	5.3566E+00	1.3047E+01
25	3.5427E+01	-2.1355E+01	2.4269E+01	5.6782E+01	8.3906E+01
	2.4426E-01	-1.4724E-01	1.6733E-01	3.9150E-01	5.7851E-01

Allowable Stress for Load Case 104

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	0.00	-40.00	20.00	30.00	70.00
2	0.00	-40.00	20.00	30.00	70.00
3	0.00	-40.00	20.00	30.00	70.00
4	0.00	-40.00	20.00	30.00	70.00
5	0.00	-40.00	20.00	30.00	70.00
6	0.00	-40.00	20.00	30.00	70.00
7	0.00	-40.00	20.00	30.00	70.00
8	0.00	-40.00	20.00	30.00	70.00
9	0.00	-40.00	20.00	30.00	70.00
10	0.00	-40.00	20.00	30.00	70.00
11	0.00	-40.00	20.00	30.00	70.00
12	0.00	-40.00	20.00	30.00	70.00
13	0.00	-40.00	20.00	30.00	70.00
14	0.00	-40.00	20.00	30.00	70.00
15	0.00	-40.00	20.00	30.00	70.00
16	0.00	-40.00	20.00	30.00	70.00
17	0.00	-40.00	20.00	30.00	70.00
18	0.00	-40.00	20.00	30.00	70.00
19	0.00	-40.00	20.00	30.00	70.00
20	0.00	-40.00	20.00	30.00	70.00
21	0.00	-40.00	20.00	30.00	70.00
22	0.00	-40.00	20.00	30.00	70.00
23	0.00	-40.00	20.00	30.00	70.00
24	0.00	-40.00	20.00	30.00	70.00
25	0.00	-40.00	20.00	30.00	70.00

Table 2-300. Load Case 105, -40°F Ambient, 2.5 kW Decay Heat, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.3418E+02	-2.9074E+02	-2.5472E+02	5.2492E+02	9.8648E+02
	1.6146E+00	-2.0046E+00	-1.7562E+00	3.6192E+00	6.8016E+00
2	3.0415E+02	-4.5822E+02	-1.0372E+02	7.6236E+02	1.3328E+03
	2.0970E+00	-3.1593E+00	-7.1514E-01	5.2563E+00	9.1892E+00
3	2.1332E+02	-3.2618E+02	1.0560E+02	5.3950E+02	1.0728E+03
	1.4708E+00	-2.2490E+00	7.2809E-01	3.7197E+00	7.3965E+00
4	4.5356E+02	-6.3648E+02	-1.5907E+02	1.0900E+03	2.1568E+03
	3.1272E+00	-4.3884E+00	-1.0968E+00	7.5156E+00	1.4870E+01
5	2.3183E+02	-2.8698E+02	-2.6586E+02	5.1881E+02	9.7466E+02
	1.5984E+00	-1.9786E+00	-1.8330E+00	3.5771E+00	6.7200E+00
6	2.9373E+02	-4.4047E+02	-7.7275E+01	7.3420E+02	1.3280E+03
	2.0252E+00	-3.0369E+00	-5.3279E-01	5.0621E+00	9.1565E+00
7	1.5581E+03	-6.1689E+03	-1.2828E+03	7.7270E+03	1.5246E+04
	1.0743E+01	-4.2533E+01	-8.8445E+00	5.3276E+01	1.0512E+02
8	1.5661E+03	-6.9452E+03	-3.0769E+03	8.5112E+03	1.3493E+04
	1.0798E+01	-4.7885E+01	-2.1214E+01	5.8683E+01	9.3033E+01
9	2.8943E+02	-3.4172E+03	-4.0245E+03	3.7066E+03	4.1919E+03
	1.9955E+00	-2.3561E+01	-2.7748E+01	2.5556E+01	2.8902E+01
10	-2.8819E+01	-1.1841E+03	7.8969E+01	1.1552E+03	1.6198E+03
	-1.9870E-01	-8.1639E+00	5.4447E-01	7.9652E+00	1.1168E+01
11	-3.5317E+01	-1.1769E+03	-2.5653E-01	1.1416E+03	1.5913E+03
	-2.4350E-01	-8.1145E+00	-1.7687E-03	7.8710E+00	1.0971E+01
12	-3.5663E+01	-1.1762E+03	-3.4546E+00	1.1405E+03	1.5883E+03
	-2.4589E-01	-8.1095E+00	-2.3818E-02	7.8636E+00	1.0951E+01
13	-9.7784E+01	-1.7448E+03	3.0552E+02	1.6470E+03	3.5263E+03
	-6.7419E-01	-1.2030E+01	2.1065E+00	1.1356E+01	2.4313E+01
14	-4.2668E+02	-2.1563E+03	-9.8411E+02	1.7297E+03	4.9607E+02
	-2.9419E+00	-1.4867E+01	-6.7852E+00	1.1926E+01	3.4203E+00
15	7.1007E+00	-2.6234E+03	-2.6007E+03	2.6305E+03	6.3670E+02
	4.8957E-02	-1.8087E+01	-1.7931E+01	1.8136E+01	4.3899E+00

16	-2.8853E+02	-3.6014E+03	-1.9915E+02	3.3129E+03	2.4297E+03
	-1.9894E+00	-2.4831E+01	-1.3731E+00	2.2842E+01	1.6752E+01
17	-2.1542E+02	-3.1160E+03	3.4043E+02	2.9005E+03	1.6251E+03
	-1.4852E+00	-2.1484E+01	2.3472E+00	1.9999E+01	1.1205E+01
18	1.3036E+01	-1.1414E+02	-8.9736E+01	1.2717E+02	1.6486E+02
	8.9878E-02	-7.8695E-01	-6.1871E-01	8.7683E-01	1.1367E+00
19	1.4038E+01	-5.4722E+01	6.9943E+01	6.8760E+01	1.4005E+02
	9.6787E-02	-3.7729E-01	4.8224E-01	4.7408E-01	9.6564E-01
20	2.2926E+01	-5.2697E+01	3.2695E+00	7.5623E+01	1.1531E+02
	1.5807E-01	-3.6334E-01	2.2542E-02	5.2140E-01	7.9506E-01
21	2.0819E+02	-2.5980E+02	1.6671E+03	4.6799E+02	4.9578E+02
	1.4354E+00	-1.7912E+00	1.1494E+01	3.2267E+00	3.4183E+00
22	9.9125E+00	-5.9859E+02	2.2375E+03	6.0850E+02	7.5856E+01
	6.8344E-02	-4.1271E+00	1.5427E+01	4.1954E+00	5.2301E-01
23	-5.5792E+01	-1.6373E+03	6.0900E+02	1.5815E+03	2.6301E+02
	-3.8467E-01	-1.1289E+01	4.1989E+00	1.0904E+01	1.8134E+00
24	2.9021E-01	-3.7697E+02	-3.7550E+02	3.7726E+02	2.9957E+02
	2.0009E-03	-2.5991E+00	-2.5890E+00	2.6011E+00	2.0655E+00
25	-9.4585E+00	-5.5510E+02	-5.5214E+02	5.4564E+02	3.5236E+02
	-6.5214E-02	-3.8273E+00	-3.8069E+00	3.7621E+00	2.4294E+00

Allowable Stress for Load Case 105

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	144.68	142.43	20.00	30.00	70.00
2	151.80	147.84	20.00	30.00	70.00
3	135.89	129.01	20.00	30.00	70.00
4	152.53	144.39	20.00	30.00	70.00
5	145.48	143.22	20.00	30.00	70.00
6	152.43	148.63	20.00	30.00	70.00
7	162.55	161.65	20.00	26.70	70.00
8	172.78	170.89	20.00	26.70	70.00
9	178.89	176.76	20.00	26.70	70.00
10	192.13	186.75	20.00	26.70	70.00
11	192.25	186.88	20.00	26.70	70.00
12	192.07	186.69	20.00	26.70	70.00
13	186.39	180.83	20.00	26.70	70.00
14	188.67	178.79	20.00	26.70	70.00
15	201.07	189.25	20.00	26.70	70.00
16	169.51	166.44	20.00	26.70	70.00
17	163.30	162.33	20.00	26.70	70.00
18	168.97	168.60	20.00	26.70	70.00
19	168.20	167.59	20.00	26.70	70.00
20	168.79	168.04	20.00	26.70	70.00
21	169.92	169.26	20.00	26.70	70.00
22	170.31	169.75	20.00	26.70	70.00
23	184.67	181.26	20.00	26.70	70.00
24	158.55	157.89	20.00	26.70	70.00
25	159.93	159.32	20.00	26.70	70.00

Table 2-301. Load Case 106, -20°F Ambient, 2.5 kW Decay Heat, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.2918E+02	-2.8479E+02	-2.4803E+02	5.1398E+02	9.6636E+02
	1.5802E+00	-1.9636E+00	-1.7101E+00	3.5437E+00	6.6629E+00
2	2.9965E+02	-4.5162E+02	-1.0203E+02	7.5127E+02	1.3136E+03
	2.0660E+00	-3.1138E+00	-7.0348E-01	5.1798E+00	9.0570E+00
3	2.1235E+02	-3.2384E+02	1.0077E+02	5.3618E+02	1.0670E+03
	1.4641E+00	-2.2328E+00	6.9480E-01	3.6969E+00	7.3565E+00
4	4.4788E+02	-6.2804E+02	-1.5687E+02	1.0759E+03	2.1291E+03
	3.0880E+00	-4.3302E+00	-1.0816E+00	7.4182E+00	1.4680E+01
5	2.2696E+02	-2.8118E+02	-2.5877E+02	5.0814E+02	9.5480E+02
	1.5649E+00	-1.9387E+00	-1.7842E+00	3.5035E+00	6.5831E+00
6	2.8970E+02	-4.3458E+02	-7.5413E+01	7.2428E+02	1.3093E+03
	1.9974E+00	-2.9963E+00	-5.1995E-01	4.9937E+00	9.0273E+00
7	1.5365E+03	-6.0903E+03	-1.2670E+03	7.6268E+03	1.5049E+04
	1.0594E+01	-4.1991E+01	-8.7356E+00	5.2585E+01	1.0376E+02
8	1.5404E+03	-6.8514E+03	-3.0360E+03	8.3918E+03	1.3304E+04
	1.0621E+01	-4.7239E+01	-2.0932E+01	5.7860E+01	9.1726E+01
9	2.8421E+02	-3.3713E+03	-3.9731E+03	3.6555E+03	4.1241E+03
	1.9596E+00	-2.3245E+01	-2.7394E+01	2.5204E+01	2.8435E+01
10	-3.9541E+01	-1.1738E+03	-6.6796E+01	1.1342E+03	1.5915E+03
	-2.7262E-01	-8.0930E+00	-4.6054E-01	7.8203E+00	1.0973E+01
11	-4.4207E+01	-1.1686E+03	-1.3916E+02	1.1244E+03	1.5715E+03
	-3.0479E-01	-8.0570E+00	-9.5948E-01	7.7522E+00	1.0835E+01
12	-4.4887E+01	-1.1673E+03	-1.4391E+02	1.1224E+03	1.5663E+03
	-3.0948E-01	-8.0480E+00	-9.9221E-01	7.7385E+00	1.0799E+01
13	-9.7539E+01	-1.7477E+03	2.6233E+02	1.6501E+03	3.5212E+03
	-6.7251E-01	-1.2050E+01	1.8087E+00	1.1377E+01	2.4278E+01
14	-4.3097E+02	-2.1512E+03	-9.8772E+02	1.7202E+03	5.2346E+02
	-2.9714E+00	-1.4832E+01	-6.8101E+00	1.1860E+01	3.6091E+00
15	6.9378E+00	-2.6131E+03	-2.5908E+03	2.6200E+03	6.6393E+02
	4.7835E-02	-1.8017E+01	-1.7863E+01	1.8065E+01	4.5777E+00

16	-2.8211E+02	-3.5647E+03	-1.9603E+02	3.2826E+03	2.3682E+03
	-1.9451E+00	-2.4578E+01	-1.3516E+00	2.2633E+01	1.6328E+01
17	-2.1586E+02	-3.0851E+03	3.3563E+02	2.8692E+03	1.6318E+03
	-1.4883E+00	-2.1271E+01	2.3141E+00	1.9783E+01	1.1251E+01
18	2.8260E+01	-1.3457E+02	-9.2054E+01	1.6283E+02	2.3301E+02
	1.9485E-01	-9.2780E-01	-6.3469E-01	1.1226E+00	1.6065E+00
19	1.8217E+01	-6.4259E+01	6.6831E+01	8.2476E+01	1.6524E+02
	1.2560E-01	-4.4305E-01	4.6078E-01	5.6865E-01	1.1393E+00
20	2.3762E+01	-5.8293E+01	4.6203E+00	8.2055E+01	1.3019E+02
	1.6383E-01	-4.0192E-01	3.1856E-02	5.6575E-01	8.9764E-01
21	2.0390E+02	-2.5899E+02	1.6553E+03	4.6289E+02	4.8181E+02
	1.4058E+00	-1.7857E+00	1.1413E+01	3.1915E+00	3.3220E+00
22	6.4979E+00	-5.9480E+02	2.2135E+03	6.0129E+02	9.6526E+01
	4.4802E-02	-4.1010E+00	1.5261E+01	4.1458E+00	6.6552E-01
23	-5.7722E+01	-1.6236E+03	6.0025E+02	1.5659E+03	2.7737E+02
	-3.9798E-01	-1.1194E+01	4.1386E+00	1.0796E+01	1.9124E+00
24	2.8967E-01	-3.7198E+02	-3.7052E+02	3.7227E+02	2.9553E+02
	1.9972E-03	-2.5647E+00	-2.5546E+00	2.5667E+00	2.0376E+00
25	-1.1873E+01	-5.4905E+02	-5.4585E+02	5.3717E+02	3.5486E+02
	-8.1863E-02	-3.7855E+00	-3.7635E+00	3.7037E+00	2.4467E+00

Allowable Stress for Load Case 106

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	166.25	164.01	20.00	26.70	70.00
2	173.31	169.40	20.00	26.70	70.00
3	157.68	150.93	20.00	26.70	70.00
4	174.07	166.05	20.00	26.70	70.00
5	167.01	164.76	20.00	26.70	70.00
6	173.91	170.15	20.00	26.70	70.00
7	183.91	183.03	20.00	26.70	70.00
8	194.02	192.15	20.00	26.70	70.00
9	200.04	197.93	20.00	26.70	70.00
10	212.97	207.66	20.00	25.00	66.30
11	213.09	207.79	20.00	25.00	66.30
12	212.91	207.60	20.00	25.00	66.30
13	207.41	201.93	20.00	25.00	66.30
14	209.74	200.00	20.00	26.70	70.00
15	222.04	210.39	20.00	25.00	66.30
16	190.84	187.82	20.00	26.70	70.00
17	184.71	183.75	20.00	26.70	70.00
18	190.05	189.69	20.00	26.70	70.00
19	189.28	188.67	20.00	26.70	70.00
20	189.86	189.12	20.00	26.70	70.00
21	191.05	190.41	20.00	26.70	70.00
22	191.48	190.93	20.00	26.70	70.00
23	205.69	202.33	20.00	25.00	66.30
24	179.94	179.29	20.00	26.70	70.00
25	181.33	180.73	20.00	26.70	70.00

Table 2-302. Load Case 201, Maximum Internal Pressure, 1,517 kPa (220 psia), Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-8.4024E+00	-1.5149E+01	-6.5658E+01	6.7468E+00	2.7045E+00
	-5.7933E-02	-1.0445E-01	-4.5269E-01	4.6518E-02	1.8647E-02
2	6.6360E+00	-3.1767E+00	-1.0501E+01	9.8127E+00	2.0560E+00
	4.5754E-02	-2.1903E-02	-7.2403E-02	6.7656E-02	1.4175E-02
3	-8.5608E+00	-1.4816E+01	-6.5103E+01	6.2547E+00	1.0087E-01
	-5.9025E-02	-1.0215E-01	-4.4887E-01	4.3125E-02	6.9548E-04
4	8.4340E+00	-4.4047E-01	-2.4887E+00	8.8745E+00	1.7101E+00
	5.8151E-02	-3.0369E-03	-1.7159E-02	6.1188E-02	1.1790E-02
5	-8.4193E+00	-1.5062E+01	-6.5880E+01	6.6429E+00	2.2584E+00
	-5.8049E-02	-1.0385E-01	-4.5423E-01	4.5801E-02	1.5571E-02
6	7.3687E+00	-2.4578E+00	-8.2993E+00	9.8265E+00	7.0022E+00
	5.0805E-02	-1.6946E-02	-5.7222E-02	6.7751E-02	4.8279E-02
7	2.8008E+03	-1.2621E+03	1.2505E+03	4.0629E+03	7.2778E+03
	1.9311E+01	-8.7022E+00	8.6222E+00	2.8013E+01	5.0179E+01
8	2.2942E+03	-1.1342E+03	1.2535E+03	3.4284E+03	5.6816E+03
	1.5818E+01	-7.8200E+00	8.6423E+00	2.3638E+01	3.9173E+01
9	9.5708E+02	-3.7891E+02	1.5665E+03	1.3360E+03	1.6977E+03
	6.5988E+00	-2.6125E+00	1.0801E+01	9.2113E+00	1.1705E+01
10	2.1848E+01	-9.7081E+01	8.4915E+02	1.1893E+02	6.6934E+00
	1.5064E-01	-6.6935E-01	5.8547E+00	8.1999E-01	4.6149E-02
11	2.1448E+01	-9.6916E+01	8.6356E+02	1.1836E+02	1.9168E-01
	1.4788E-01	-6.6821E-01	5.9540E+00	8.1609E-01	1.3216E-03
12	2.1380E+01	-9.7161E+01	8.8750E+02	1.1854E+02	9.2110E+00
	1.4741E-01	-6.6990E-01	6.1191E+00	8.1731E-01	6.3507E-02
13	4.0891E+02	-2.4004E+02	1.0376E+02	6.4895E+02	7.6681E+02
	2.8194E+00	-1.6550E+00	7.1539E-01	4.4743E+00	5.2870E+00
14	2.7103E+02	-1.4417E+02	7.2515E+01	4.1520E+02	1.8189E+02
	1.8687E+00	-9.9401E-01	4.9997E-01	2.8627E+00	1.2541E+00
15	-9.7671E+00	-3.8010E+02	-1.7073E+01	3.7033E+02	3.4394E+02
	-6.7342E-02	-2.6207E+00	-1.1771E-01	2.5533E+00	2.3714E+00

16	6.5404E+01	-4.9042E+02	-7.2002E+01	5.5582E+02	4.3986E+02
	4.5095E-01	-3.3813E+00	-4.9643E-01	3.8323E+00	3.0327E+00
17	7.6744E+01	-4.3985E+02	-8.3757E+01	5.1660E+02	5.6337E+02
	5.2913E-01	-3.0327E+00	-5.7748E-01	3.5618E+00	3.8843E+00
18	7.4751E+00	-3.0968E+03	-1.0137E+03	3.1043E+03	4.7853E+03
	5.1539E-02	-2.1352E+01	-6.9893E+00	2.1403E+01	3.2994E+01
19	3.7867E+02	-2.0379E+03	-1.0248E+03	2.4166E+03	3.6430E+03
	2.6109E+00	-1.4051E+01	-7.0658E+00	1.6662E+01	2.5118E+01
20	5.2355E+01	-1.6440E+03	-8.2506E+02	1.6963E+03	2.6914E+03
	3.6098E-01	-1.1335E+01	-5.6886E+00	1.1696E+01	1.8557E+01
21	1.4095E+01	-1.6143E+03	-7.8817E+02	1.6284E+03	2.5487E+03
	9.7184E-02	-1.1130E+01	-5.4342E+00	1.1228E+01	1.7573E+01
22	4.7820E+02	-2.1584E+03	-9.4404E+02	2.6366E+03	4.1676E+03
	3.2971E+00	-1.4882E+01	-6.5089E+00	1.8179E+01	2.8734E+01
23	4.1728E+02	-1.8133E+03	-7.1410E+02	2.2306E+03	4.2758E+03
	2.8770E+00	-1.2502E+01	-4.9236E+00	1.5379E+01	2.9480E+01
24	-4.0811E+00	-1.8618E+02	-1.7994E+01	1.8210E+02	3.1540E+02
	-2.8138E-02	-1.2837E+00	-1.2406E-01	1.2555E+00	2.1746E+00
25	8.6369E+02	-6.3564E+02	3.6655E+02	1.4993E+03	2.9080E+03
	5.9550E+00	-4.3826E+00	2.5273E+00	1.0338E+01	2.0050E+01

Table 2-303. Load Case 202, Minimum External Pressure, 24 kPa (3.5 psia), Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.9936E+00	-3.6737E+00	-1.5532E+01	1.6801E+00	8.2822E-01
	-1.3745E-02	-2.5329E-02	-1.0709E-01	1.1584E-02	5.7103E-03
2	-2.8216E-01	-3.4700E+00	-8.5586E-01	3.1879E+00	9.2561E-01
	-1.9455E-03	-2.3925E-02	-5.9010E-03	2.1980E-02	6.3819E-03
3	-2.0443E+00	-3.5609E+00	-1.5425E+01	1.5166E+00	6.0362E-02
	-1.4095E-02	-2.4552E-02	-1.0635E-01	1.0457E-02	4.1618E-04
4	-1.0814E-01	-3.1255E+00	-7.1165E-01	3.0174E+00	1.1405E-02
	-7.4563E-04	-2.1550E-02	-4.9066E-03	2.0804E-02	7.8638E-05
5	-1.9890E+00	-3.6621E+00	-1.5612E+01	1.6731E+00	7.8549E-01
	-1.3714E-02	-2.5250E-02	-1.0764E-01	1.1536E-02	5.4157E-03
6	-3.0689E-01	-3.6386E+00	-6.2272E-01	3.3317E+00	9.4940E-01
	-2.1159E-03	-2.5087E-02	-4.2935E-03	2.2971E-02	6.5459E-03
7	1.1314E+02	-4.8943E+01	7.1220E+01	1.6208E+02	2.7027E+02
	7.8004E-01	-3.3745E-01	4.9105E-01	1.1175E+00	1.8634E+00
8	7.5208E+01	-4.3872E+01	7.3600E+01	1.1908E+02	1.9989E+02
	5.1854E-01	-3.0249E-01	5.0745E-01	8.2102E-01	1.3782E+00
9	2.3013E+01	-2.0980E+01	8.4130E+01	4.3993E+01	4.3279E+01
	1.5867E-01	-1.4465E-01	5.8006E-01	3.0332E-01	2.9840E-01
10	-6.4633E+00	-1.2285E+01	5.7296E+01	5.8222E+00	4.8831E-02
	-4.4563E-02	-8.4705E-02	3.9504E-01	4.0143E-02	3.3668E-04
11	-6.4757E+00	-1.2272E+01	5.7690E+01	5.7962E+00	7.7986E-03
	-4.4649E-02	-8.4612E-02	3.9776E-01	3.9963E-02	5.3770E-05
12	-6.4265E+00	-1.2335E+01	5.9311E+01	5.9083E+00	4.9178E-01
	-4.4309E-02	-8.5045E-02	4.0893E-01	4.0736E-02	3.3907E-03
13	2.1088E+01	-2.4914E+01	5.4156E+00	4.6003E+01	4.6971E+01
	1.4540E-01	-1.7178E-01	3.7340E-02	3.1718E-01	3.2385E-01
14	1.5953E+01	-1.0520E+01	3.9919E+00	2.6473E+01	6.5664E+00
	1.0999E-01	-7.2532E-02	2.7523E-02	1.8252E-01	4.5274E-02
15	-3.9084E+00	-3.9117E+01	-3.0845E+00	3.5209E+01	2.3727E+00
	-2.6947E-02	-2.6970E-01	-2.1267E-02	2.4275E-01	1.6359E-02

16	8.0654E+00	-4.3587E+01	-6.7230E+00	5.1653E+01	4.3331E+01
	5.5609E-02	-3.0052E-01	-4.6353E-02	3.5613E-01	2.9876E-01
17	7.8801E+00	-3.7153E+01	-6.9863E+00	4.5033E+01	4.7214E+01
	5.4332E-02	-2.5616E-01	-4.8169E-02	3.1049E-01	3.2553E-01
18	5.2382E-01	-2.0690E+02	-6.7730E+01	2.0743E+02	3.1976E+02
	3.6116E-03	-1.4265E+00	-4.6698E-01	1.4301E+00	2.2047E+00
19	2.5301E+01	-1.3617E+02	-6.8475E+01	1.6147E+02	2.4341E+02
	1.7444E-01	-9.3883E-01	-4.7212E-01	1.1133E+00	1.6783E+00
20	3.4974E+00	-1.0985E+02	-5.5129E+01	1.1334E+02	1.7983E+02
	2.4114E-02	-7.5736E-01	-3.8010E-01	7.8148E-01	1.2399E+00
21	9.4247E-01	-1.0787E+02	-5.2663E+01	1.0881E+02	1.7030E+02
	6.4981E-03	-7.4373E-01	-3.6310E-01	7.5022E-01	1.1742E+00
22	3.1953E+01	-1.4422E+02	-6.3079E+01	1.7618E+02	2.7847E+02
	2.2031E-01	-9.9438E-01	-4.3491E-01	1.2147E+00	1.9200E+00
23	2.7883E+01	-1.2116E+02	-4.7715E+01	1.4905E+02	2.8571E+02
	1.9225E-01	-8.3539E-01	-3.2898E-01	1.0276E+00	1.9699E+00
24	-2.2938E+00	-3.0948E+01	-3.0838E+00	2.8654E+01	2.7117E+01
	-1.5815E-02	-2.1338E-01	-2.1262E-02	1.9756E-01	1.8697E-01
25	4.5123E+01	-3.5490E+01	2.0310E+01	8.0613E+01	1.5502E+02
	3.1111E-01	-2.4470E-01	1.4004E-01	5.5581E-01	1.0688E+00

Table 2-304. Load Case 203, Maximum Increase External Pressure, 140 kPa (20 psia), Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.1381E+01	-2.1129E+01	-8.8609E+01	9.7478E+00	5.0466E+00
	-7.8471E-02	-1.4568E-01	-6.1094E-01	6.7209E-02	3.4795E-02
2	-1.3187E+00	-2.7054E+01	-2.3315E+00	2.5735E+01	7.2654E+00
	-9.0918E-03	-1.8653E-01	-1.6075E-02	1.7744E-01	5.0093E-02
3	-1.1690E+01	-2.0432E+01	-8.8022E+01	8.7414E+00	4.0129E-01
	-8.0603E-02	-1.4087E-01	-6.0689E-01	6.0270E-02	2.7668E-03
4	-6.2308E-01	-2.5640E+01	-4.2534E+00	2.5017E+01	5.3167E-01
	-4.2960E-03	-1.7678E-01	-2.9326E-02	1.7248E-01	3.6658E-03
5	-1.1336E+01	-2.1084E+01	-8.9113E+01	9.7475E+00	4.9140E+00
	-7.8161E-02	-1.4537E-01	-6.1441E-01	6.7206E-02	3.3881E-02
6	-1.7209E+00	-2.8609E+01	-1.5034E+00	2.6888E+01	9.4274E+00
	-1.1865E-02	-1.9725E-01	-1.0366E-02	1.8539E-01	6.4999E-02
7	1.3409E+02	-2.8320E+02	-2.0613E+00	4.1729E+02	8.1487E+02
	9.2451E-01	-1.9526E+00	-1.4212E-02	2.8771E+00	5.6183E+00
8	1.3065E+02	-3.3341E+02	1.5386E+01	4.6407E+02	6.9565E+02
	9.0082E-01	-2.2988E+00	1.0608E-01	3.1996E+00	4.7964E+00
9	6.3231E+00	-1.9083E+02	-2.5582E+01	1.9716E+02	3.0996E+02
	4.3596E-02	-1.3157E+00	-1.7638E-01	1.3593E+00	2.1371E+00
10	-6.4757E+00	-8.3548E+01	6.0146E+01	7.7072E+01	1.8475E+00
	-4.4648E-02	-5.7604E-01	4.1469E-01	5.3139E-01	1.2738E-02
11	-6.4768E+00	-8.3468E+01	5.7637E+01	7.6991E+01	2.5827E-02
	-4.4656E-02	-5.7549E-01	3.9739E-01	5.3083E-01	1.7807E-04
12	-6.4565E+00	-8.3448E+01	5.9128E+01	7.6992E+01	4.6131E-01
	-4.4516E-02	-5.7535E-01	4.0767E-01	5.3084E-01	3.1806E-03
13	-7.6750E-01	-8.4802E+01	3.4547E+00	8.4035E+01	9.3839E+00
	-5.2917E-03	-5.8469E-01	2.3819E-02	5.7940E-01	6.4700E-02
14	8.2037E+00	-2.3149E+01	-1.1802E+00	3.1353E+01	2.1625E+01
	5.6563E-02	-1.5961E-01	-8.1371E-03	2.1617E-01	1.4910E-01
15	-1.1034E+01	-1.4240E+02	-1.5206E+01	1.3137E+02	1.4111E+02
	-7.6077E-02	-9.8181E-01	-1.0484E-01	9.0573E-01	9.7290E-01

16	2.4641E+01	-9.4711E+01	-1.8555E+01	1.1935E+02	1.1670E+02
	1.6989E-01	-6.5301E-01	-1.2793E-01	8.2290E-01	8.0460E-01
17	1.9002E+01	-7.3626E+01	-1.5790E+01	9.2629E+01	7.8221E+01
	1.3102E-01	-5.0764E-01	-1.0887E-01	6.3865E-01	5.3932E-01
18	3.4702E-01	-2.0711E+02	-6.7769E+01	2.0746E+02	3.1971E+02
	2.3926E-03	-1.4280E+00	-4.6725E-01	1.4304E+00	2.2043E+00
19	2.5312E+01	-1.3620E+02	-6.8484E+01	1.6151E+02	2.4348E+02
	1.7452E-01	-9.3904E-01	-4.7218E-01	1.1136E+00	1.6787E+00
20	3.4989E+00	-1.0987E+02	-5.5126E+01	1.1337E+02	1.7988E+02
	2.4124E-02	-7.5755E-01	-3.8008E-01	7.8167E-01	1.2403E+00
21	9.5425E-01	-1.0792E+02	-5.2661E+01	1.0887E+02	1.7042E+02
	6.5793E-03	-7.4407E-01	-3.6309E-01	7.5065E-01	1.1750E+00
22	3.1981E+01	-1.4429E+02	-6.3103E+01	1.7627E+02	2.7861E+02
	2.2050E-01	-9.9482E-01	-4.3508E-01	1.2153E+00	1.9209E+00
23	2.7902E+01	-1.2118E+02	-4.7732E+01	1.4908E+02	2.8577E+02
	1.9238E-01	-8.3552E-01	-3.2910E-01	1.0279E+00	1.9703E+00
24	-1.3955E+01	-1.5473E+02	-1.5569E+01	1.4077E+02	7.4476E+01
	-9.6217E-02	-1.0668E+00	-1.0735E-01	9.7059E-01	5.1349E-01
25	1.2677E+01	-3.9179E+01	-6.3507E+00	5.1856E+01	1.0012E+02
	8.7404E-02	-2.7013E-01	-4.3787E-02	3.5754E-01	6.9031E-01

Table 2-305. Load Case 204, Additional Increased External Pressure, 2 MPa (290 psia), Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.6500E+02	-3.0674E+02	-1.2844E+03	1.4174E+02	7.4016E+01
	-1.1376E+00	-2.1149E+00	-8.8559E+00	9.7725E-01	5.1032E-01
2	-1.8220E+01	-4.1178E+02	-2.6926E+01	3.9356E+02	1.1062E+02
	-1.2562E-01	-2.8391E+00	-1.8565E-01	2.7135E+00	7.6266E-01
3	-1.6953E+02	-2.9649E+02	-1.2760E+03	1.2695E+02	5.9713E+00
	-1.1689E+00	-2.0442E+00	-8.7977E+00	8.7530E-01	4.1171E-02
4	-9.0482E+00	-3.9264E+02	-6.2188E+01	3.8360E+02	9.3317E+00
	-6.2385E-02	-2.7072E+00	-4.2877E-01	2.6448E+00	6.4340E-02
5	-1.6429E+02	-3.0614E+02	-1.2919E+03	1.4184E+02	7.2402E+01
	-1.1328E+00	-2.1108E+00	-8.9071E+00	9.7799E-01	4.9919E-01
6	-2.4788E+01	-4.3593E+02	-1.6060E+01	4.1114E+02	1.4766E+02
	-1.7091E-01	-3.0056E+00	-1.1073E-01	2.8347E+00	1.0181E+00
7	3.0545E+03	-6.6420E+03	-1.1746E+03	9.6966E+03	1.8338E+04
	2.1060E+01	-4.5795E+01	-8.0989E+00	6.6855E+01	1.2644E+02
8	2.8500E+03	-6.8330E+03	-9.1431E+02	9.6830E+03	1.5178E+04
	1.9650E+01	-4.7112E+01	-6.3040E+00	6.6762E+01	1.0465E+02
9	4.1766E+02	-3.6102E+03	-1.7876E+03	4.0279E+03	6.0118E+03
	2.8797E+00	-2.4892E+01	-1.2325E+01	2.7771E+01	4.1450E+01
10	-6.3936E+00	-1.2282E+03	1.0608E+02	1.2218E+03	3.2625E+01
	-4.4082E-02	-8.4683E+00	7.3140E-01	8.4243E+00	2.2494E-01
11	-6.4918E+00	-1.2268E+03	5.6796E+01	1.2203E+03	5.6956E-01
	-4.4759E-02	-8.4584E+00	3.9159E-01	8.4136E+00	3.9270E-03
12	-6.2503E+00	-1.2261E+03	5.5860E+01	1.2199E+03	1.6207E+01
	-4.3095E-02	-8.4537E+00	3.8514E-01	8.4106E+00	1.1175E-01
13	-1.3701E+02	-1.2659E+03	-1.9593E+01	1.1289E+03	6.1612E+02
	-9.4466E-01	-8.7280E+00	-1.3509E-01	7.7833E+00	4.2480E+00
14	1.6305E+02	-5.1160E+02	-8.5157E+01	6.7465E+02	4.7342E+02
	1.1242E+00	-3.5274E+00	-5.8714E-01	4.6516E+00	3.2641E+00
15	-1.0470E+02	-1.8535E+03	-2.1265E+02	1.7488E+03	2.4972E+03
	-7.2190E-01	-1.2780E+01	-1.4662E+00	1.2058E+01	1.7218E+01

16	2.9967E+02	-9.2126E+02	-2.1115E+02	1.2209E+03	1.2962E+03
	2.0662E+00	-6.3519E+00	-1.4558E+00	8.4180E+00	8.9372E+00
17	2.0386E+02	-6.6380E+02	-1.5901E+02	8.6765E+02	5.5118E+02
	1.4055E+00	-4.5767E+00	-1.0963E+00	5.9823E+00	3.8002E+00
18	-1.6766E+00	-2.0970E+02	-6.8190E+01	2.0803E+02	3.1939E+02
	-1.1560E-02	-1.4459E+00	-4.7015E-01	1.4343E+00	2.2021E+00
19	2.5339E+01	-1.3636E+02	-6.8524E+01	1.6169E+02	2.4376E+02
	1.7471E-01	-9.4014E-01	-4.7246E-01	1.1148E+00	1.6806E+00
20	3.4566E+00	-1.1000E+02	-5.5113E+01	1.1346E+02	1.8005E+02
	2.3832E-02	-7.5845E-01	-3.7999E-01	7.8228E-01	1.2414E+00
21	1.2255E+00	-1.0880E+02	-5.2526E+01	1.1002E+02	1.7249E+02
	8.4494E-03	-7.5014E-01	-3.6215E-01	7.5859E-01	1.1893E+00
22	3.2664E+01	-1.4560E+02	-6.3426E+01	1.7827E+02	2.8215E+02
	2.2521E-01	-1.0039E+00	-4.3731E-01	1.2291E+00	1.9453E+00
23	2.9118E+01	-1.2362E+02	-4.8130E+01	1.5274E+02	2.9277E+02
	2.0076E-01	-8.5231E-01	-3.3185E-01	1.0531E+00	2.0186E+00
24	-2.0330E+02	-2.1820E+03	-2.1989E+02	1.9787E+03	8.5491E+02
	-1.4017E+00	-1.5045E+01	-1.5161E+00	1.3643E+01	5.8944E+00
25	7.7981E+02	-1.3920E+03	-4.3726E+02	2.1718E+03	4.2414E+03
	5.3766E+00	-9.5973E+00	-3.0148E+00	1.4974E+01	2.9243E+01

Table 2-306. Load Case 211, Fabrication Stress, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.0156E+01	-5.5174E+02	4.2251E+03	6.2189E+02	4.0815E+02
	4.8371E-01	-3.8041E+00	2.9131E+01	4.2878E+00	2.8141E+00
2	7.0344E+02	-1.8052E+03	-3.2178E+03	2.5086E+03	1.5771E+02
	4.8500E+00	-1.2446E+01	-2.2186E+01	1.7296E+01	1.0874E+00
3	-4.2396E-01	-5.0653E+02	4.1407E+03	5.0610E+02	1.4773E+01
	-2.9231E-03	-3.4924E+00	2.8549E+01	3.4894E+00	1.0186E-01
4	-2.2905E+01	-6.6366E+02	-4.3361E+03	6.4076E+02	3.0941E+02
	-1.5792E-01	-4.5758E+00	-2.9896E+01	4.4179E+00	2.1333E+00
5	6.2751E+01	-5.5356E+02	4.2692E+03	6.1631E+02	3.8451E+02
	4.3265E-01	-3.8166E+00	2.9435E+01	4.2493E+00	2.6511E+00
6	3.9043E+02	-2.1740E+03	-3.1787E+03	2.5644E+03	8.5159E+02
	2.6919E+00	-1.4989E+01	-2.1916E+01	1.7681E+01	5.8715E+00
7	5.9816E+02	-2.5814E+03	-3.6018E+03	3.1796E+03	4.3410E+03
	4.1242E+00	-1.7798E+01	-2.4833E+01	2.1922E+01	2.9930E+01
8	5.5161E+02	-1.9550E+03	-4.0761E+03	2.5066E+03	1.8300E+03
	3.8032E+00	-1.3479E+01	-2.8104E+01	1.7282E+01	1.2617E+01
9	9.1632E+02	-5.1560E+02	-2.7665E+03	1.4319E+03	2.2392E+03
	6.3178E+00	-3.5549E+00	-1.9074E+01	9.8728E+00	1.5439E+01
10	3.6675E+02	5.5440E-01	-5.1040E+00	3.6620E+02	5.5226E+01
	2.5287E+00	3.8224E-03	-3.5191E-02	2.5249E+00	3.8077E-01
11	3.6424E+02	-1.6470E-02	8.7469E-01	3.6426E+02	1.6415E+00
	2.5114E+00	-1.1356E-04	6.0308E-03	2.5115E+00	1.1318E-02
12	3.6579E+02	2.5815E-01	-1.2043E+01	3.6553E+02	3.3387E+01
	2.5220E+00	1.7799E-03	-8.3030E-02	2.5202E+00	2.3019E-01
13	5.5838E+02	-4.0247E+02	1.8432E+02	9.6085E+02	1.4296E+03
	3.8499E+00	-2.7749E+00	1.2708E+00	6.6248E+00	9.8569E+00
14	-1.1358E+02	-1.3527E+03	-1.2966E+03	1.2391E+03	1.4778E+03
	-7.8313E-01	-9.3267E+00	-8.9396E+00	8.5436E+00	1.0189E+01
15	2.0064E+01	-1.2589E+03	-1.2397E+03	1.2789E+03	1.5090E+03
	1.3833E-01	-8.6795E+00	-8.5471E+00	8.8179E+00	1.0404E+01

16	2.0534E+02	-2.5290E+03	-2.2112E+03	2.7344E+03	3.2425E+02
	1.4158E+00	-1.7437E+01	-1.5245E+01	1.8853E+01	2.2356E+00
17	2.0538E+02	-2.4971E+03	-2.2394E+03	2.7024E+03	9.8229E+02
	1.4161E+00	-1.7217E+01	-1.5440E+01	1.8633E+01	6.7726E+00
18	1.7491E+02	-2.5801E+02	1.2046E+01	4.3292E+02	6.2216E+02
	1.2060E+00	-1.7789E+00	8.3052E-02	2.9849E+00	4.2896E+00
19	5.0427E+02	-2.5506E+02	8.5064E+01	7.5932E+02	1.1448E+03
	3.4768E+00	-1.7586E+00	5.8650E-01	5.2353E+00	7.8929E+00
20	4.4764E+02	-7.6933E+01	-1.5443E+02	5.2457E+02	9.5959E+02
	3.0864E+00	-5.3043E-01	-1.0648E+00	3.6168E+00	6.6161E+00
21	5.2293E+02	-1.0833E+02	-2.3767E+02	6.3126E+02	1.1394E+03
	3.6055E+00	-7.4692E-01	-1.6387E+00	4.3524E+00	7.8556E+00
22	6.4674E+02	-3.8457E+02	4.1893E+00	1.0313E+03	1.4987E+03
	4.4591E+00	-2.6515E+00	2.8884E-02	7.1106E+00	1.0333E+01
23	7.5376E+02	-5.2880E+02	-8.2026E+01	1.2826E+03	2.3873E+03
	5.1970E+00	-3.6459E+00	-5.6555E-01	8.8429E+00	1.6460E+01
24	8.3863E+00	-8.4569E+01	-7.6164E+01	9.2955E+01	1.4333E+02
	5.7821E-02	-5.8308E-01	-5.2513E-01	6.4090E-01	9.8823E-01
25	7.2312E+01	-6.8757E+02	-5.7236E+02	7.5988E+02	1.2687E+03
	4.9857E-01	-4.7406E+00	-3.9463E+00	5.2392E+00	8.7475E+00

Table 2-307. Load Case 215, Compression Load (5x weight), Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5028E+01	-8.9507E+01	2.0172E+01	1.0453E+02	1.4821E+02
	1.0361E-01	-6.1713E-01	1.3908E-01	7.2074E-01	1.0219E+00
2	1.0159E+01	-1.7879E+02	4.4443E+01	1.8895E+02	4.7156E+01
	7.0045E-02	-1.2327E+00	3.0643E-01	1.3028E+00	3.2513E-01
3	1.9927E-01	-1.0519E+02	1.0485E+01	1.0539E+02	1.0069E+01
	1.3739E-03	-7.2523E-01	7.2291E-02	7.2661E-01	6.9426E-02
4	1.9921E+00	-1.7524E+02	-8.9845E+00	1.7723E+02	1.3464E+01
	1.3735E-02	-1.2082E+00	-6.1946E-02	1.2220E+00	9.2829E-02
5	7.8531E-01	-1.2079E+02	2.0004E+01	1.2157E+02	3.6365E+01
	5.4145E-03	-8.3279E-01	1.3793E-01	8.3821E-01	2.5073E-01
6	9.4098E+00	-2.0156E+02	-1.3558E+01	2.1097E+02	7.2537E+00
	6.4879E-02	-1.3897E+00	-9.3482E-02	1.4546E+00	5.0013E-02
7	2.1681E+02	-2.5775E+02	5.8567E+01	4.7455E+02	5.5049E+02
	1.4948E+00	-1.7771E+00	4.0380E-01	3.2719E+00	3.7955E+00
8	1.6150E+02	-1.9197E+02	4.8710E+01	3.5346E+02	4.2544E+02
	1.1135E+00	-1.3236E+00	3.3584E-01	2.4370E+00	2.9333E+00
9	-4.7381E+01	-2.8676E+02	-4.4352E+01	2.3938E+02	1.5046E+01
	-3.2668E-01	-1.9771E+00	-3.0579E-01	1.6505E+00	1.0374E-01
10	-4.5627E-01	-1.4719E+02	-3.4287E+00	1.4673E+02	2.2917E+00
	-3.1459E-03	-1.0148E+00	-2.3640E-02	1.0117E+00	1.5800E-02
11	-5.3841E-01	-1.0827E+02	-3.2481E+00	1.0773E+02	6.5904E-02
	-3.7122E-03	-7.4649E-01	-2.2395E-02	7.4278E-01	4.5439E-04
12	-6.5604E-01	-1.1972E+02	-4.6330E+00	1.1907E+02	1.4366E+00
	-4.5232E-03	-8.2546E-01	-3.1943E-02	8.2094E-01	9.9048E-03
13	-1.8195E+01	-2.0035E+02	-2.7053E+01	1.8216E+02	6.9955E+01
	-1.2545E-01	-1.3814E+00	-1.8652E-01	1.2559E+00	4.8233E-01
14	2.2990E+01	-7.9310E+01	-1.5026E+01	1.0230E+02	7.8981E+01
	1.5851E-01	-5.4682E-01	-1.0360E-01	7.0534E-01	5.4455E-01
15	-3.4935E+00	-1.1756E+02	-1.1037E+01	1.1406E+02	1.9217E+02
	-2.4087E-02	-8.1052E-01	-7.6099E-02	7.8643E-01	1.3250E+00

16	6.1022E+01	-1.8608E+02	-2.9159E+01	2.4711E+02	2.4059E+02
	4.2073E-01	-1.2830E+00	-2.0105E-01	1.7037E+00	1.6588E+00
17	5.6825E+01	-1.6181E+02	-2.4194E+01	2.1864E+02	1.5100E+02
	3.9179E-01	-1.1156E+00	-1.6681E-01	1.5074E+00	1.0411E+00
18	-6.7809E+02	-2.3317E+03	-4.5740E+02	1.6536E+03	9.3635E+01
	-4.6752E+00	-1.6076E+01	-3.1536E+00	1.1401E+01	6.4559E-01
19	5.8068E+01	-2.6726E+02	-8.3882E+01	3.2532E+02	3.5776E+02
	4.0036E-01	-1.8427E+00	-5.7835E-01	2.2430E+00	2.4667E+00
20	-7.5039E+01	-3.4808E+02	-1.0509E+02	2.7304E+02	2.2321E+02
	-5.1737E-01	-2.3999E+00	-7.2455E-01	1.8826E+00	1.5390E+00
21	-2.7339E+01	-1.9886E+02	-2.8427E+01	1.7152E+02	5.6535E+01
	-1.8850E-01	-1.3711E+00	-1.9600E-01	1.1826E+00	3.8979E-01
22	1.1462E+02	-1.2742E+02	2.2366E+01	2.4205E+02	2.4969E+02
	7.9028E-01	-8.7856E-01	1.5421E-01	1.6688E+00	1.7216E+00
23	1.7272E+02	-1.5101E+02	-9.1638E+00	3.2373E+02	3.1388E+02
	1.1909E+00	-1.0412E+00	-6.3182E-02	2.2321E+00	2.1641E+00
24	-1.6984E+01	-2.3732E+02	-1.5846E+01	2.2033E+02	9.5342E+01
	-1.1710E-01	-1.6363E+00	-1.0926E-01	1.5192E+00	6.5736E-01
25	-4.1270E+02	-8.2705E+02	-5.1143E+02	4.1435E+02	2.7563E+02
	-2.8455E+00	-5.7023E+00	-3.5262E+00	2.8569E+00	1.9004E+00

Table 2-308. Load Case 216, Rod Drop onto Cask, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-4.0860E-02	-1.4431E+00	7.1755E-01	1.4022E+00	1.1703E+00
	-2.8172E-04	-9.9495E-03	4.9474E-03	9.6678E-03	8.0690E-03
2	1.5460E-01	-2.9751E+00	2.9991E+00	3.1297E+00	1.2856E+00
	1.0659E-03	-2.0513E-02	2.0678E-02	2.1578E-02	8.8639E-03
3	5.1134E-03	-2.9308E+00	2.9958E-01	2.9360E+00	1.8450E-01
	3.5255E-05	-2.0207E-02	2.0655E-03	2.0243E-02	1.2721E-03
4	6.0656E-02	-5.1823E+00	-2.1661E-01	5.2429E+00	4.9969E-01
	4.1821E-04	-3.5731E-02	-1.4935E-03	3.6149E-02	3.4452E-03
5	1.6186E-02	-3.6405E+00	7.0341E-01	3.6567E+00	1.1151E+00
	1.1160E-04	-2.5101E-02	4.8499E-03	2.5212E-02	7.6881E-03
6	3.1287E-01	-6.9029E+00	-4.4370E-01	7.2158E+00	4.8260E-01
	2.1572E-03	-4.7594E-02	-3.0592E-03	4.9751E-02	3.3274E-03
7	1.6746E+01	-5.3078E+00	1.0668E+01	2.2054E+01	4.8606E+00
	1.1546E-01	-3.6596E-02	7.3556E-02	1.5206E-01	3.3513E-02
8	1.3529E+01	-8.9764E+00	6.9427E+00	2.2505E+01	7.8686E+00
	9.3280E-02	-6.1890E-02	4.7868E-02	1.5517E-01	5.4252E-02
9	-1.1416E+00	-2.8803E+01	-9.9713E-01	2.7661E+01	1.6471E+01
	-7.8709E-03	-1.9859E-01	-6.8750E-03	1.9072E-01	1.1356E-01
10	-3.6108E-02	-1.2991E+01	-4.9448E-01	1.2955E+01	1.9747E-01
	-2.4896E-04	-8.9570E-02	-3.4093E-03	8.9321E-02	1.3615E-03
11	-3.3892E-02	-7.2119E+00	-2.3789E-01	7.1780E+00	6.2446E-03
	-2.3368E-04	-4.9724E-02	-1.6402E-03	4.9491E-02	4.3055E-05
12	-3.9951E-02	-6.0611E+00	-2.4149E-01	6.0212E+00	6.5364E-02
	-2.7545E-04	-4.1790E-02	-1.6650E-03	4.1515E-02	4.5067E-04
13	-7.5036E-01	-8.7038E+00	-1.2480E+00	7.9534E+00	2.8520E+00
	-5.1736E-03	-6.0010E-02	-8.6047E-03	5.4837E-02	1.9664E-02
14	8.9446E-01	-3.3387E+00	-7.3041E-01	4.2332E+00	3.2975E+00
	6.1671E-03	-2.3020E-02	-5.0360E-03	2.9187E-02	2.2736E-02
15	-2.3993E-01	-4.8953E+00	-5.6423E-01	4.6554E+00	7.9609E+00
	-1.6543E-03	-3.3752E-02	-3.8902E-03	3.2098E-02	5.4888E-02

16	2.5346E+00	-8.2426E+00	-1.4371E+00	1.0777E+01	1.0594E+01
	1.7476E-02	-5.6831E-02	-9.9087E-03	7.4306E-02	7.3045E-02
17	2.3185E+00	-7.1496E+00	-1.2448E+00	9.4681E+00	6.6117E+00
	1.5985E-02	-4.9295E-02	-8.5829E-03	6.5280E-02	4.5586E-02
18	-1.4675E+02	-9.9414E+02	-4.5586E+01	8.4739E+02	5.7805E+01
	-1.0118E+00	-6.8544E+00	-3.1430E-01	5.8425E+00	3.9855E-01
19	1.2742E+01	-3.6663E+01	3.2291E+00	4.9405E+01	6.1786E+01
	8.7854E-02	-2.5278E-01	2.2264E-02	3.4063E-01	4.2600E-01
20	3.0384E+00	-3.3551E+01	5.2330E+00	3.6590E+01	4.8375E+01
	2.0949E-02	-2.3133E-01	3.6080E-02	2.5228E-01	3.3353E-01
21	4.7144E+00	-2.1284E+01	-2.7607E+00	2.5999E+01	2.1364E+01
	3.2505E-02	-1.4675E-01	-1.9035E-02	1.7925E-01	1.4730E-01
22	1.3203E+01	-6.9706E+00	6.5815E+00	2.0174E+01	5.5078E+00
	9.1035E-02	-4.8060E-02	4.5378E-02	1.3910E-01	3.7975E-02
23	2.2075E+01	-1.3585E+01	1.5503E+00	3.5660E+01	9.5167E+00
	1.5220E-01	-9.3665E-02	1.0689E-02	2.4587E-01	6.5615E-02
24	-6.6667E-01	-9.4575E+00	-6.2107E-01	8.7908E+00	3.7971E+00
	-4.5965E-03	-6.5207E-02	-4.2821E-03	6.0611E-02	2.6180E-02
25	-4.8661E+01	-1.4977E+03	-2.4974E+02	1.4490E+03	7.5397E+02
	-3.3551E-01	-1.0326E+01	-1.7219E+00	9.9908E+00	5.1985E+00

Table 2-309. Load Case 221, Forward 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.0090E+02	3.5262E+00	-9.0867E+00	1.1473E+02	1.4330E+01
	6.9565E-01	2.4312E-02	-6.2650E-02	7.9104E-01	9.8800E-02
2	1.0319E+02	1.6746E+01	-1.3895E+00	1.3021E+02	1.6468E+01
	7.1145E-01	1.1546E-01	-9.5804E-03	8.9779E-01	1.1354E-01
3	1.0634E+03	5.9879E+01	-8.0455E+00	1.7955E+03	5.5779E+02
	7.3322E+00	4.1285E-01	-5.5472E-02	1.2379E+01	3.8459E+00
4	3.5869E+01	4.8667E+00	-1.2085E+01	6.6400E+01	1.7895E+01
	2.4731E-01	3.3555E-02	-8.3324E-02	4.5781E-01	1.2338E-01
5	3.3413E+01	-5.0604E+00	-2.1456E+01	1.2989E+02	1.4245E+01
	2.3037E-01	-3.4890E-02	-1.4793E-01	8.9555E-01	9.8214E-02
6	3.0557E+01	-1.1655E+01	-3.9363E+01	1.3729E+02	1.5580E+01
	2.1068E-01	-8.0358E-02	-2.7140E-01	9.4660E-01	1.0742E-01
7	1.9684E+02	1.1251E+01	-6.7098E+01	2.4933E+02	3.0442E+02
	1.3571E+00	7.7571E-02	-4.6262E-01	1.7191E+00	2.0989E+00
8	7.8280E+01	-1.8874E+02	-6.1814E+02	6.3359E+02	5.0710E+02
	5.3972E-01	-1.3013E+00	-4.2620E+00	4.3684E+00	3.4963E+00
9	-4.0875E+01	-1.8713E+02	-4.0797E+02	3.6709E+02	4.1186E+02
	-2.8182E-01	-1.2902E+00	-2.8128E+00	2.5310E+00	2.8397E+00
10	1.6277E+01	-2.0498E+01	-5.7274E+01	8.5151E+01	4.2173E+00
	1.1223E-01	-1.4133E-01	-3.9489E-01	5.8710E-01	2.9077E-02
11	3.2645E+01	4.2150E-01	-1.6866E+00	3.4415E+01	5.9762E-01
	2.2508E-01	2.9061E-03	-1.1629E-02	2.3728E-01	4.1205E-03
12	1.3046E+02	8.1325E-01	-5.3466E-01	1.3253E+02	6.0636E+00
	8.9946E-01	5.6072E-03	-3.6863E-03	9.1378E-01	4.1807E-02
13	2.2940E+02	1.4002E+02	-2.4844E+01	2.5563E+02	1.5844E+02
	1.5817E+00	9.6540E-01	-1.7129E-01	1.7625E+00	1.0924E+00
14	1.1805E+02	5.7433E+01	-6.7972E+01	1.8684E+02	1.2616E+02
	8.1391E-01	3.9599E-01	-4.6865E-01	1.2882E+00	8.6985E-01
15	9.7858E+01	4.6599E+01	-3.2622E+01	1.3050E+02	1.6607E+02
	6.7471E-01	3.2129E-01	-2.2492E-01	8.9979E-01	1.1450E+00

16	4.5831E+02	1.1730E+02	-7.4119E+01	5.3200E+02	4.5226E+02
	3.1599E+00	8.0879E-01	-5.1103E-01	3.6680E+00	3.1182E+00
17	4.4189E+02	1.1959E+02	-6.6743E+01	5.1088E+02	4.8176E+02
	3.0467E+00	8.2453E-01	-4.6018E-01	3.5224E+00	3.3216E+00
18	2.7609E+01	-1.3914E+01	-7.2232E+01	9.9618E+01	1.7590E+01
	1.9036E-01	-9.5932E-02	-4.9802E-01	6.8684E-01	1.2128E-01
19	1.7376E+02	2.5883E+01	-1.7110E+01	1.7670E+02	1.0976E+02
	1.1981E+00	1.7846E-01	-1.1797E-01	1.2183E+00	7.5678E-01
20	1.1407E+02	2.3382E+01	-1.2356E+00	1.5714E+02	7.5320E+01
	7.8651E-01	1.6122E-01	-8.5190E-03	1.0835E+00	5.1931E-01
21	-1.3261E+01	-6.2160E+01	-4.2426E+02	4.1100E+02	3.9548E+02
	-9.1433E-02	-4.2858E-01	-2.9252E+00	2.8337E+00	2.7267E+00
22	9.3554E+01	-1.0314E+02	-5.9014E+02	6.2189E+02	5.2457E+02
	6.4503E-01	-7.1109E-01	-4.0689E+00	4.2878E+00	3.6168E+00
23	2.2532E+02	1.0320E+02	-3.8478E+01	2.4196E+02	2.0920E+02
	1.5535E+00	7.1155E-01	-2.6529E-01	1.6682E+00	1.4424E+00
24	2.4549E+01	-5.3954E+00	-1.0901E+02	1.3356E+02	8.8020E+01
	1.6926E-01	-3.7200E-02	-7.5159E-01	9.2085E-01	6.0688E-01
25	1.1863E+02	1.1105E+01	-1.4988E+01	1.3354E+02	6.9101E+01
	8.1795E-01	7.6565E-02	-1.0334E-01	9.2071E-01	4.7643E-01

Table 2-310. Load Case 222, Lateral 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.0099E+01	1.1283E+01	-7.2002E+00	2.5224E+01	5.5432E+00
	1.3858E-01	7.7791E-02	-4.9644E-02	1.7391E-01	3.8219E-02
2	4.3692E+01	8.7657E+00	-5.7767E+00	5.3837E+01	5.0372E+00
	3.0125E-01	6.0437E-02	-3.9829E-02	3.7120E-01	3.4731E-02
3	3.8323E+01	1.4672E+01	-8.5831E+00	1.7410E+02	5.7199E+01
	2.6422E-01	1.0116E-01	-5.9179E-02	1.2004E+00	3.9437E-01
4	7.4513E+01	1.6930E+01	5.5913E+00	6.8714E+01	2.1692E+01
	5.1375E-01	1.1673E-01	3.8550E-02	4.7377E-01	1.4956E-01
5	1.9184E+01	1.0742E+01	-6.6199E+00	2.4655E+01	6.4651E+00
	1.3227E-01	7.4061E-02	-4.5643E-02	1.6999E-01	4.4575E-02
6	4.2556E+01	8.2436E+00	-5.9099E+00	5.2404E+01	5.4267E+00
	2.9342E-01	5.6838E-02	-4.0747E-02	3.6131E-01	3.7416E-02
7	1.0673E+02	4.4137E+00	-3.9036E+01	1.2751E+02	8.3916E+00
	7.3589E-01	3.0432E-02	-2.6914E-01	8.7916E-01	5.7858E-02
8	1.2556E+02	2.1437E+01	-2.2509E+01	1.6139E+02	3.4805E+01
	8.6571E-01	1.4780E-01	-1.5519E-01	1.1128E+00	2.3997E-01
9	9.0112E+01	3.7305E+01	-7.1314E-01	9.3226E+01	5.7908E+01
	6.2130E-01	2.5721E-01	-4.9170E-03	6.4277E-01	3.9926E-01
10	1.0648E+02	1.3404E+01	-2.2403E+01	1.2872E+02	6.0458E+01
	7.3416E-01	9.2417E-02	-1.5446E-01	8.8751E-01	4.1684E-01
11	1.2292E+02	1.6991E+01	-2.9002E+01	1.5192E+02	6.8676E+01
	8.4749E-01	1.1715E-01	-1.9996E-01	1.0475E+00	4.7350E-01
12	1.0475E+02	1.1530E+01	-2.1165E+01	1.2592E+02	5.9276E+01
	7.2226E-01	7.9496E-02	-1.4593E-01	8.6819E-01	4.0870E-01
13	6.8686E+01	3.8749E+01	-1.3463E+01	1.0665E+02	1.0477E+02
	4.7357E-01	2.6717E-01	-9.2825E-02	7.3536E-01	7.2238E-01
14	8.1504E+01	1.2726E+01	-2.7565E+01	1.0194E+02	1.1519E+01
	5.6195E-01	8.7740E-02	-1.9006E-01	7.0283E-01	7.9418E-02
15	9.2024E+01	3.2630E+00	-2.4102E+01	1.1615E+02	3.1983E+01
	6.3449E-01	2.2498E-02	-1.6618E-01	8.0080E-01	2.2052E-01

16	1.1736E+02	1.3045E+01	-3.6974E+01	1.5329E+02	3.7934E+01
	8.0914E-01	8.9945E-02	-2.5492E-01	1.0569E+00	2.6155E-01
17	1.0748E+02	6.2880E+00	-3.8256E+01	1.2860E+02	7.6202E+00
	7.4103E-01	4.3355E-02	-2.6376E-01	8.8670E-01	5.2540E-02
18	8.7783E+01	5.7321E+00	-8.7197E+00	9.6462E+01	7.5958E+00
	6.0524E-01	3.9521E-02	-6.0120E-02	6.6508E-01	5.2371E-02
19	5.4965E+01	4.9951E+00	-3.8330E+01	9.3697E+01	2.6635E+01
	3.7897E-01	3.4440E-02	-2.6428E-01	6.4602E-01	1.8364E-01
20	6.4185E+01	9.3191E+00	-2.2050E+01	8.8004E+01	1.7045E+01
	4.4254E-01	6.4253E-02	-1.5203E-01	6.0677E-01	1.1752E-01
21	9.7196E+01	2.0433E+01	-4.5157E+00	1.0167E+02	1.2132E+01
	6.7014E-01	1.4088E-01	-3.1135E-02	7.0096E-01	8.3645E-02
22	1.0077E+02	6.8215E+00	-4.2386E+01	1.3125E+02	1.6326E+01
	6.9479E-01	4.7033E-02	-2.9224E-01	9.0497E-01	1.1256E-01
23	1.1366E+02	8.4054E+00	-4.6116E+01	1.2653E+02	8.9129E+00
	7.8368E-01	5.7953E-02	-3.1796E-01	8.7238E-01	6.1452E-02
24	6.2115E+01	3.2178E+00	-2.1543E+01	8.3795E+01	2.8704E+01
	4.2827E-01	2.2186E-02	-1.4853E-01	5.7775E-01	1.9791E-01
25	5.6217E+01	2.8409E+00	-2.6634E+01	8.2873E+01	2.1215E+01
	3.8761E-01	1.9587E-02	-1.8363E-01	5.7139E-01	1.4627E-01

Table 2-311. Load Case 223, Vertical 10g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.8560E+02	3.3733E+01	-4.6136E+02	1.0470E+03	5.0768E+02
	4.0375E+00	2.3258E-01	-3.1810E+00	7.2185E+00	3.5004E+00
2	5.6006E+02	8.4931E+01	-1.5034E+02	2.4887E+03	1.0859E+03
	3.8615E+00	5.8558E-01	-1.0365E+00	1.7159E+01	7.4869E+00
3	3.3114E+03	4.5643E+02	-3.6079E+02	3.7628E+03	1.5822E+03
	2.2832E+01	3.1470E+00	-2.4875E+00	2.5943E+01	1.0909E+01
4	1.9041E+02	8.5183E+01	-1.0286E+02	2.7041E+02	1.5243E+02
	1.3128E+00	5.8731E-01	-7.0922E-01	1.8644E+00	1.0510E+00
5	4.7189E+02	3.2912E+01	-3.7265E+02	8.4454E+02	4.1586E+02
	3.2536E+00	2.2692E-01	-2.5694E+00	5.8229E+00	2.8672E+00
6	4.1898E+02	8.5611E+01	-3.7242E+01	1.7181E+03	7.8726E+02
	2.8888E+00	5.9027E-01	-2.5678E-01	1.1846E+01	5.4280E+00
7	1.1529E+03	8.2482E-01	-5.6258E+02	4.2715E+03	2.9654E+03
	7.9492E+00	5.6869E-03	-3.8789E+00	2.9451E+01	2.0446E+01
8	1.8186E+03	5.6081E+02	-4.2452E+02	5.5452E+03	3.4908E+03
	1.2539E+01	3.8667E+00	-2.9270E+00	3.8233E+01	2.4068E+01
9	8.8181E+02	1.9596E+02	-3.8264E+02	3.0433E+03	1.4739E+03
	6.0798E+00	1.3511E+00	-2.6382E+00	2.0983E+01	1.0162E+01
10	1.0540E+03	3.7027E+02	-9.8156E+02	1.0339E+03	2.2906E+02
	7.2669E+00	2.5529E+00	-6.7676E+00	7.1284E+00	1.5793E+00
11	1.2574E+03	2.7146E+02	-1.4223E+03	1.3860E+03	2.7663E+02
	8.6692E+00	1.8717E+00	-9.8066E+00	9.5562E+00	1.9073E+00
12	9.4085E+02	-2.9145E+02	-1.2291E+03	1.2070E+03	2.5213E+02
	6.4869E+00	-2.0095E+00	-8.4745E+00	8.3221E+00	1.7384E+00
13	5.0947E+02	-1.0999E+02	-5.6691E+02	1.3522E+03	5.8489E+02
	3.5127E+00	-7.5833E-01	-3.9087E+00	9.3234E+00	4.0327E+00
14	3.0677E+02	-1.1209E+02	-2.9362E+02	9.5936E+02	7.3250E+02
	2.1151E+00	-7.7283E-01	-2.0244E+00	6.6145E+00	5.0504E+00
15	1.5139E+02	1.0077E+01	-3.8297E+02	5.5010E+02	4.9211E+01
	1.0438E+00	6.9480E-02	-2.6405E+00	3.7928E+00	3.3930E-01

16	4.5631E+02	-3.8031E+01	-3.3391E+02	2.1218E+03	1.0910E+03
	3.1461E+00	-2.6222E-01	-2.3022E+00	1.4629E+01	7.5222E+00
17	3.2190E+02	-5.7277E+01	-2.8764E+02	2.3060E+03	7.6076E+02
	2.2195E+00	-3.9491E-01	-1.9832E+00	1.5900E+01	5.2453E+00
18	6.4086E+01	9.2798E+00	-5.0761E+01	1.1327E+02	9.1293E+01
	4.4186E-01	6.3982E-02	-3.4999E-01	7.8096E-01	6.2945E-01
19	2.5094E+02	5.4346E+01	-2.2520E+02	4.9758E+02	4.2757E+02
	1.7302E+00	3.7470E-01	-1.5527E+00	3.4307E+00	2.9480E+00
20	1.6388E+02	3.2949E+01	-1.5767E+02	2.9208E+02	4.9681E+02
	1.1299E+00	2.2717E-01	-1.0871E+00	2.0138E+00	3.4254E+00
21	2.9393E+02	1.3618E+02	-5.4979E+01	3.4891E+02	3.8294E+02
	2.0266E+00	9.3890E-01	-3.7907E-01	2.4056E+00	2.6402E+00
22	4.6239E+02	1.2726E+02	1.7778E+01	4.4461E+02	9.3698E+01
	3.1880E+00	8.7742E-01	1.2257E-01	3.0655E+00	6.4602E-01
23	3.0543E+02	1.6120E+02	-2.0073E+02	5.0616E+02	8.3755E+02
	2.1059E+00	1.1115E+00	-1.3840E+00	3.4898E+00	5.7747E+00
24	7.3142E+01	7.7595E+00	-4.3855E+01	1.1605E+02	4.3569E+01
	5.0430E-01	5.3500E-02	-3.0237E-01	8.0011E-01	3.0039E-01
25	1.1322E+02	-2.6758E+01	-2.4564E+02	3.6422E+02	1.5799E+02
	7.8063E-01	-1.8449E-01	-1.6936E+00	2.5112E+00	1.0893E+00

Table 2-312. Load Case 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.5328E+01	-1.0868E+03	-2.3483E+02	1.0715E+03	4.9814E+02
	-1.0568E-01	-7.4933E+00	-1.6191E+00	7.3876E+00	3.4345E+00
2	8.2807E+00	-1.3482E+03	-2.2751E+02	1.3565E+03	3.8644E+02
	5.7093E-02	-9.2956E+00	-1.5686E+00	9.3526E+00	2.6644E+00
3	3.0323E+00	-7.4505E+02	9.0550E+00	7.4809E+02	1.0471E+01
	2.0907E-02	-5.1370E+00	6.2432E-02	5.1579E+00	7.2193E-02
4	1.5077E+01	-7.1984E+02	-3.7860E+01	7.3492E+02	2.2457E+01
	1.0395E-01	-4.9631E+00	-2.6104E-01	5.0671E+00	1.5484E-01
5	5.0628E+00	-4.6099E+02	2.3131E+01	4.6605E+02	6.5042E+01
	3.4906E-02	-3.1784E+00	1.5948E-01	3.2133E+00	4.4845E-01
6	1.7575E+01	-3.4348E+02	-9.7695E+00	3.6105E+02	4.5218E+01
	1.2118E-01	-2.3682E+00	-6.7358E-02	2.4894E+00	3.1177E-01
7	7.5783E+02	-2.1408E+03	-5.6935E+02	2.8986E+03	3.5335E+03
	5.2251E+00	-1.4760E+01	-3.9255E+00	1.9985E+01	2.4362E+01
8	3.9041E+02	-1.1608E+03	-3.5609E+02	1.5512E+03	2.4142E+03
	2.6918E+00	-8.0034E+00	-2.4551E+00	1.0695E+01	1.6646E+01
9	-1.1259E+02	-5.9744E+02	-4.0824E+02	4.8484E+02	6.2774E+02
	-7.7631E-01	-4.1192E+00	-2.8147E+00	3.3429E+00	4.3281E+00
10	-9.0520E-01	-2.3253E+02	-2.7838E+00	2.3162E+02	7.7207E+00
	-6.2411E-03	-1.6032E+00	-1.9194E-02	1.5970E+00	5.3232E-02
11	-3.6913E-01	-1.7800E+02	-4.1633E+00	1.7763E+02	1.4685E-01
	-2.5451E-03	-1.2272E+00	-2.8705E-02	1.2247E+00	1.0125E-03
12	-7.7966E-02	-1.4440E+02	-4.0315E+00	1.4433E+02	4.3446E-01
	-5.3756E-04	-9.9563E-01	-2.7796E-02	9.9510E-01	2.9955E-03
13	-2.3378E+01	-1.5833E+02	3.0080E+01	1.3495E+02	1.3592E+02
	-1.6118E-01	-1.0917E+00	2.0739E-01	9.3047E-01	9.3713E-01
14	7.9203E+01	-9.7469E+01	3.9341E+01	1.7667E+02	6.2064E+01
	5.4609E-01	-6.7203E-01	2.7125E-01	1.2181E+00	4.2791E-01
15	6.5552E+01	-5.5839E+01	5.7533E+01	1.2139E+02	2.1207E+02
	4.5196E-01	-3.8500E-01	3.9668E-01	8.3696E-01	1.4622E+00

16	1.6287E+02	-1.9780E+01	8.2716E+01	1.8265E+02	1.1651E+02
	1.1229E+00	-1.3638E-01	5.7031E-01	1.2593E+00	8.0329E-01
17	1.7424E+02	-8.8778E+00	1.0097E+02	1.8312E+02	3.6121E+01
	1.2013E+00	-6.1210E-02	6.9617E-01	1.2625E+00	2.4904E-01
18	4.4649E+02	1.3743E+01	-3.2288E+01	4.3274E+02	3.1231E+01
	3.0784E+00	9.4753E-02	-2.2261E-01	2.9837E+00	2.1533E-01
19	2.1475E+02	-2.2437E+02	-5.6798E+01	4.3912E+02	3.9960E+02
	1.4807E+00	-1.5470E+00	-3.9161E-01	3.0276E+00	2.7551E+00
20	2.6921E+02	-2.0613E+02	-1.2898E+02	4.7534E+02	6.0046E+02
	1.8561E+00	-1.4212E+00	-8.8928E-01	3.2773E+00	4.1400E+00
21	3.1076E+02	-5.3394E+02	3.3272E+00	8.4470E+02	1.1958E+03
	2.1426E+00	-3.6814E+00	2.2940E-02	5.8240E+00	8.2448E+00
22	2.1530E+02	-5.9964E+02	-2.2115E+02	8.1494E+02	8.9116E+02
	1.4844E+00	-4.1343E+00	-1.5248E+00	5.6188E+00	6.1443E+00
23	1.7131E+02	-4.9552E+02	-1.9918E+02	6.6684E+02	1.2345E+03
	1.1812E+00	-3.4165E+00	-1.3733E+00	4.5977E+00	8.5113E+00
24	5.8769E+02	5.0974E+01	4.8152E+01	5.3672E+02	2.1873E+02
	4.0520E+00	3.5145E-01	3.3200E-01	3.7005E+00	1.5081E+00
25	3.6483E+02	5.9496E+00	2.3039E+02	3.5888E+02	4.5912E+02
	2.5154E+00	4.1021E-02	1.5885E+00	2.4744E+00	3.1655E+00

Table 2-313. Load Case 232, Impact Test, Normal Condition, Normal Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-5.3589E+01	-3.8128E+03	-8.1400E+02	3.7592E+03	1.7416E+03
	-3.6948E-01	-2.6289E+01	-5.6123E+00	2.5919E+01	1.2008E+01
2	2.9106E+01	-4.7125E+03	-7.8313E+02	4.7416E+03	1.3332E+03
	2.0068E-01	-3.2492E+01	-5.3995E+00	3.2692E+01	9.1924E+00
3	1.0558E+01	-2.6737E+03	3.1340E+01	2.6842E+03	4.0202E+01
	7.2798E-02	-1.8434E+01	2.1608E-01	1.8507E+01	2.7718E-01
4	5.1548E+01	-2.5964E+03	-1.3754E+02	2.6479E+03	8.1897E+01
	3.5541E-01	-1.7901E+01	-9.4833E-01	1.8257E+01	5.6466E-01
5	1.9029E+01	-1.7292E+03	1.0463E+02	1.7482E+03	2.4464E+02
	1.3120E-01	-1.1922E+01	7.2137E-01	1.2054E+01	1.6867E+00
6	6.8413E+01	-1.3872E+03	-4.7712E+01	1.4556E+03	1.3845E+02
	4.7169E-01	-9.5646E+00	-3.2896E-01	1.0036E+01	9.5458E-01
7	2.6399E+03	-7.3981E+03	-1.9457E+03	1.0038E+04	1.2241E+04
	1.8201E+01	-5.1008E+01	-1.3415E+01	6.9209E+01	8.4396E+01
8	1.3652E+03	-4.0179E+03	-1.2151E+03	5.3830E+03	8.3717E+03
	9.4124E+00	-2.7702E+01	-8.3782E+00	3.7115E+01	5.7721E+01
9	-4.1650E+02	-2.0893E+03	-1.4120E+03	1.6728E+03	2.1514E+03
	-2.8716E+00	-1.4405E+01	-9.7357E+00	1.1534E+01	1.4833E+01
10	-3.3457E+00	-8.4685E+02	-1.0799E+01	8.4351E+02	2.7021E+01
	-2.3068E-02	-5.8388E+00	-7.4456E-02	5.8158E+00	1.8630E-01
11	-1.5832E+00	-6.7331E+02	-1.6293E+01	6.7172E+02	5.0604E-01
	-1.0916E-02	-4.6423E+00	-1.1234E-01	4.6314E+00	3.4890E-03
12	-7.5818E-01	-5.9588E+02	-1.7722E+01	5.9512E+02	2.8948E+00
	-5.2275E-03	-4.1084E+00	-1.2219E-01	4.1032E+00	1.9959E-02
13	-1.0546E+02	-7.3327E+02	7.0266E+01	6.2781E+02	5.2596E+02
	-7.2710E-01	-5.0557E+00	4.8446E-01	4.3286E+00	3.6264E+00
14	2.8147E+02	-4.0222E+02	1.1507E+02	6.8369E+02	2.9360E+02
	1.9407E+00	-2.7732E+00	7.9339E-01	4.7139E+00	2.0243E+00
15	2.1218E+02	-3.1219E+02	1.7945E+02	5.2436E+02	9.1244E+02
	1.4629E+00	-2.1525E+00	1.2373E+00	3.6154E+00	6.2910E+00

16	4.9562E+02	-1.5442E+02	2.4478E+02	6.5005E+02	1.2749E+02
	3.4172E+00	-1.0647E+00	1.6877E+00	4.4819E+00	8.7902E-01
17	5.0220E+02	-6.6834E+01	3.1051E+02	5.6904E+02	5.4739E+01
	3.4626E+00	-4.6081E-01	2.1409E+00	3.9234E+00	3.7741E-01
18	1.5163E+03	3.6960E+01	-1.1951E+02	1.4793E+03	1.0619E+02
	1.0454E+01	2.5483E-01	-8.2398E-01	1.0199E+01	7.3214E-01
19	7.2047E+02	-7.6998E+02	-2.0752E+02	1.4905E+03	1.3510E+03
	4.9675E+00	-5.3088E+00	-1.4308E+00	1.0276E+01	9.3146E+00
20	9.0643E+02	-7.0345E+02	-4.5076E+02	1.6099E+03	2.0358E+03
	6.2496E+00	-4.8501E+00	-3.1079E+00	1.1100E+01	1.4036E+01
21	1.0504E+03	-1.8428E+03	8.0577E+00	2.8932E+03	4.1098E+03
	7.2422E+00	-1.2706E+01	5.5556E-02	1.9948E+01	2.8336E+01
22	7.5281E+02	-2.0716E+03	-7.5505E+02	2.8244E+03	3.0969E+03
	5.1904E+00	-1.4283E+01	-5.2059E+00	1.9474E+01	2.1353E+01
23	6.0898E+02	-1.7165E+03	-6.8700E+02	2.3255E+03	4.2889E+03
	4.1988E+00	-1.1835E+01	-4.7367E+00	1.6034E+01	2.9571E+01
24	1.6846E+03	1.4540E+02	1.3718E+02	1.5392E+03	6.1954E+02
	1.1615E+01	1.0025E+00	9.4585E-01	1.0612E+01	4.2716E+00
25	1.2277E+03	1.3746E+01	7.6424E+02	1.2140E+03	1.5514E+03
	8.4650E+00	9.4776E-02	5.2692E+00	8.3702E+00	1.0696E+01

Table 2-314. Load Combination 101, Hot Environment, Normal Conditions of Transport – Model AOS-165B

Load Cases: 101, 201, 211
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.46	1.04	1.50	20.00	66.30	>10
	4.33	2.83	3.20	7.17	10.37	137.90	457.12	
2	2.52	0.16	0.70	2.68	3.38	20.00	66.30	6.94
	17.36	1.10	4.81	18.47	23.28	137.90	457.12	
3	0.51	0.01	0.52	0.53	1.04	20.00	66.30	>10
	3.53	0.10	3.55	3.64	7.19	137.90	457.12	
4	0.65	0.31	1.01	0.96	1.97	20.00	66.30	>10
	4.48	2.15	6.95	6.62	13.57	137.90	457.12	
5	0.62	0.39	0.46	1.01	1.47	20.00	66.30	>10
	4.30	2.67	3.17	6.96	10.13	137.90	457.12	
6	2.57	0.86	0.68	3.43	4.11	20.00	66.30	6.77
	17.75	5.92	4.66	23.67	28.33	137.90	457.12	
7	7.24	11.62	7.23	18.86	26.09	20.00	61.80	0.59
	49.94	80.11	49.82	130.04	179.87	137.90	426.10	
8	5.94	7.51	7.76	13.45	21.20	20.00	61.80	1.23
	40.92	51.79	53.47	92.71	146.18	137.90	426.10	
9	2.77	3.94	3.42	6.70	10.12	20.00	61.80	3.47
	19.08	27.14	23.56	46.23	69.79	137.90	426.10	
10	0.49	0.06	1.05	0.55	1.60	20.00	61.80	>10
	3.34	0.43	7.23	3.77	11.00	137.90	426.10	
11	0.48	0.00	1.04	0.48	1.52	20.00	61.80	>10
	3.33	0.01	7.15	3.34	10.49	137.90	426.10	
12	0.48	0.04	1.04	0.53	1.56	20.00	61.80	>10
	3.34	0.29	7.14	3.63	10.77	137.90	426.10	
13	1.61	2.20	1.73	3.81	5.53	20.00	61.80	6.88
	11.10	15.14	11.91	26.24	38.15	137.90	426.10	

14	1.65	1.66	1.79	3.31	5.10	20.00	61.80	8.05
	11.41	11.44	12.32	22.85	35.17	137.90	426.10	
15	1.65	1.85	2.70	3.50	6.20	20.00	61.80	7.57
	11.37	12.78	18.61	24.15	42.75	137.90	426.10	
16	3.29	0.76	3.14	4.05	7.19	20.00	61.80	5.08
	22.69	5.27	21.65	27.95	49.60	137.90	426.10	
17	3.22	1.55	2.71	4.76	7.47	20.00	61.80	5.21
	22.19	10.66	18.68	32.85	51.53	137.90	426.10	
18	3.54	5.41	0.42	8.94	9.36	20.00	61.80	2.35
	24.39	37.28	2.87	61.67	64.54	137.90	426.10	
19	3.18	4.79	0.18	7.96	8.15	20.00	61.80	2.77
	21.90	33.01	1.25	54.91	56.16	137.90	426.10	
20	2.22	3.65	0.13	5.87	6.00	20.00	61.80	4.11
	15.31	25.17	0.91	40.49	41.39	137.90	426.10	
21	2.26	3.69	0.44	5.95	6.39	20.00	61.80	4.04
	15.58	25.43	3.02	41.01	44.02	137.90	426.10	
22	3.67	5.67	0.57	9.33	9.90	20.00	61.80	2.21
	25.29	39.07	3.91	64.36	68.27	137.90	426.10	

Min MS: 0.591, Location: 7, Combination: Pm+Pb

Table 2-315. Load Combination 102, Cold Environment, Normal Conditions of Transport – Model AOS-165B

Load Cases: 104, 201, 211
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.00	1.04	1.04	20.00	70.00	>10
	4.33	2.83	0.02	7.17	7.18	137.90	482.63	
2	2.52	0.16	0.09	2.68	2.77	20.00	70.00	6.94
	17.36	1.10	0.61	18.47	19.07	137.90	482.63	
3	0.51	0.01	0.00	0.53	0.53	20.00	70.00	>10
	3.53	0.10	0.00	3.64	3.64	137.90	482.63	
4	0.65	0.31	0.09	0.96	1.05	20.00	70.00	>10
	4.48	2.15	0.60	6.62	7.23	137.90	482.63	
5	0.62	0.39	0.00	1.01	1.01	20.00	70.00	>10
	4.30	2.67	0.02	6.96	6.98	137.90	482.63	
6	2.57	0.86	0.09	3.43	3.53	20.00	70.00	6.77
	17.75	5.92	0.64	23.67	24.31	137.90	482.63	
7	7.24	11.62	5.42	18.86	24.29	20.00	70.00	0.59
	49.94	80.11	37.40	130.04	167.44	137.90	482.63	
8	5.94	7.51	7.18	13.45	20.62	20.00	70.00	1.23
	40.92	51.79	49.49	92.71	142.20	137.90	482.63	
9	2.77	3.94	3.31	6.70	10.01	20.00	70.00	3.47
	19.08	27.14	22.79	46.23	69.02	137.90	482.63	
10	0.49	0.06	1.40	0.55	1.95	20.00	70.00	>10
	3.34	0.43	9.67	3.77	13.44	137.90	482.63	
11	0.48	0.00	1.40	0.48	1.89	20.00	70.00	>10
	3.33	0.01	9.66	3.34	13.00	137.90	482.63	
12	0.48	0.04	1.40	0.53	1.93	20.00	70.00	>10
	3.34	0.29	9.66	3.63	13.29	137.90	482.63	
13	1.61	2.20	1.66	3.81	5.46	20.00	70.00	6.88
	11.10	15.14	11.42	26.24	37.66	137.90	482.63	

14	1.65	1.66	0.91	3.31	4.22	20.00	70.00	8.05
	11.41	11.44	6.25	22.85	29.10	137.90	482.63	
15	1.65	1.85	0.75	3.50	4.26	20.00	70.00	7.57
	11.37	12.78	5.19	24.15	29.34	137.90	482.63	
16	3.29	0.76	2.98	4.05	7.03	20.00	70.00	5.08
	22.69	5.27	20.53	27.95	48.48	137.90	482.63	
17	3.22	1.55	2.46	4.76	7.23	20.00	70.00	5.21
	22.19	10.66	16.99	32.85	49.84	137.90	482.63	
18	3.54	5.41	0.84	8.94	9.78	20.00	70.00	2.35
	24.39	37.28	5.77	61.67	67.44	137.90	482.63	
19	3.18	4.79	1.39	7.96	9.36	20.00	70.00	2.77
	21.90	33.01	9.61	54.91	64.52	137.90	482.63	
20	2.22	3.65	1.05	5.87	6.93	20.00	70.00	4.11
	15.31	25.17	7.26	40.49	47.75	137.90	482.63	
21	2.26	3.69	0.99	5.95	6.94	20.00	70.00	4.04
	15.58	25.43	6.81	41.01	47.82	137.90	482.63	
22	3.67	5.67	1.49	9.33	10.82	20.00	70.00	2.21
	25.29	39.07	10.28	64.36	74.63	137.90	482.63	

Min MS: 0.591, Location: 7, Combination: Pm+Pb

Table 2-316. Load Combination 103, Increased External Pressure, Normal Conditions of Transport – Model AOS-165B

Load Cases: 103, 201, 211
-20°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.00	1.04	1.04	20.00	70.00	>10
	4.33	2.83	0.01	7.17	7.18	137.90	482.63	
2	2.52	0.16	0.07	2.68	2.75	20.00	70.00	6.94
	17.36	1.10	0.50	18.47	18.96	137.90	482.63	
3	0.51	0.01	0.00	0.53	0.53	20.00	70.00	>10
	3.53	0.10	0.00	3.64	3.64	137.90	482.63	
4	0.65	0.31	0.07	0.96	1.03	20.00	70.00	>10
	4.48	2.15	0.49	6.62	7.12	137.90	482.63	
5	0.62	0.39	0.00	1.01	1.01	20.00	70.00	>10
	4.30	2.67	0.01	6.96	6.98	137.90	482.63	
6	2.57	0.86	0.08	3.43	3.51	20.00	70.00	6.77
	17.75	5.92	0.52	23.67	24.19	137.90	482.63	
7	7.24	11.62	4.44	18.86	23.30	20.00	70.00	0.59
	49.94	80.11	30.60	130.04	160.64	137.90	482.63	
8	5.94	7.51	5.87	13.45	19.32	20.00	70.00	1.23
	40.92	51.79	40.49	92.71	133.20	137.90	482.63	
9	2.77	3.94	2.70	6.70	9.41	20.00	70.00	3.47
	19.08	27.14	18.65	46.23	64.88	137.90	482.63	
10	0.49	0.06	1.15	0.55	1.69	20.00	70.00	>10
	3.34	0.43	7.91	3.77	11.68	137.90	482.63	
11	0.48	0.00	1.15	0.48	1.63	20.00	70.00	>10
	3.33	0.01	7.90	3.34	11.24	137.90	482.63	
12	0.48	0.04	1.15	0.53	1.67	20.00	70.00	>10
	3.34	0.29	7.91	3.63	11.54	137.90	482.63	
13	1.61	2.20	1.36	3.81	5.16	20.00	70.00	6.88
	11.10	15.14	9.34	26.24	35.59	137.90	482.63	

14	1.65	1.66	0.74	3.31	4.06	20.00	70.00	8.05
	11.41	11.44	5.11	22.85	27.96	137.90	482.63	
15	1.65	1.85	0.62	3.50	4.12	20.00	70.00	7.57
	11.37	12.78	4.25	24.15	28.39	137.90	482.63	
16	3.29	0.76	2.44	4.05	6.49	20.00	70.00	5.08
	22.69	5.27	16.80	27.95	44.75	137.90	482.63	
17	3.22	1.55	2.02	4.76	6.78	20.00	70.00	5.21
	22.19	10.66	13.90	32.85	46.75	137.90	482.63	
18	3.54	5.41	0.68	8.94	9.63	20.00	70.00	2.35
	24.39	37.28	4.72	61.67	66.39	137.90	482.63	
19	3.18	4.79	1.14	7.96	9.10	20.00	70.00	2.77
	21.90	33.01	7.86	54.91	62.77	137.90	482.63	
20	2.22	3.65	0.86	5.87	6.73	20.00	70.00	4.11
	15.31	25.17	5.94	40.49	46.43	137.90	482.63	
21	2.26	3.69	0.81	5.95	6.76	20.00	70.00	4.04
	15.58	25.43	5.58	41.01	46.58	137.90	482.63	
22	3.67	5.67	1.22	9.33	10.55	20.00	70.00	2.21
	25.29	39.07	8.41	64.36	72.77	137.90	482.63	

Min MS: 0.591, Location: 7, Combination: Pm+Pb

Table 2-317. Load Combination 104, Minimum External Pressure, Normal Conditions of Transport – Model AOS-165B

Load Cases: 101, 201, 202, 211
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.46	1.04	1.51	20.00	66.30	>10
	4.35	2.84	3.20	7.18	10.39	137.90	457.12	
2	2.52	0.16	0.70	2.68	3.38	20.00	66.30	6.93
	17.39	1.11	4.81	18.49	23.31	137.90	457.12	
3	0.51	0.01	0.52	0.53	1.04	20.00	66.30	>10
	3.54	0.10	3.55	3.65	7.20	137.90	457.12	
4	0.65	0.31	1.01	0.96	1.97	20.00	66.30	>10
	4.50	2.15	6.95	6.65	13.59	137.90	457.12	
5	0.62	0.39	0.46	1.01	1.47	20.00	66.30	>10
	4.31	2.67	3.17	6.98	10.15	137.90	457.12	
6	2.58	0.86	0.68	3.44	4.11	20.00	66.30	6.76
	17.77	5.93	4.66	23.70	28.36	137.90	457.12	
7	7.40	11.89	7.23	19.29	26.52	20.00	61.80	0.55
	51.05	81.97	49.82	133.03	182.85	137.90	426.10	
8	6.05	7.71	7.76	13.77	21.52	20.00	61.80	1.18
	41.74	53.17	53.47	94.91	148.38	137.90	426.10	
9	2.81	3.98	3.42	6.79	10.21	20.00	61.80	3.42
	19.39	27.44	23.56	46.83	70.39	137.90	426.10	
10	0.49	0.06	1.05	0.55	1.60	20.00	61.80	>10
	3.38	0.43	7.23	3.81	11.04	137.90	426.10	
11	0.49	0.00	1.04	0.49	1.53	20.00	61.80	>10
	3.37	0.01	7.15	3.38	10.53	137.90	426.10	
12	0.49	0.04	1.04	0.53	1.57	20.00	61.80	>10
	3.38	0.30	7.14	3.68	10.81	137.90	426.10	
13	1.66	2.24	1.73	3.90	5.63	20.00	61.80	6.69
	11.42	15.47	11.91	26.88	38.79	137.90	426.10	

14	1.68	1.67	1.79	3.35	5.13	20.00	61.80	7.96
	11.59	11.49	12.32	23.08	35.40	137.90	426.10	
15	1.68	1.86	2.70	3.54	6.24	20.00	61.80	7.48
	11.61	12.79	18.61	24.41	43.01	137.90	426.10	
16	3.34	0.81	3.14	4.15	7.29	20.00	61.80	4.98
	23.04	5.57	21.65	28.61	50.26	137.90	426.10	
17	3.26	1.59	2.71	4.86	7.57	20.00	61.80	5.13
	22.50	10.98	18.68	33.49	52.17	137.90	426.10	
18	3.74	5.73	0.42	9.47	9.89	20.00	61.80	2.17
	25.82	39.49	2.87	65.31	68.17	137.90	426.10	
19	3.34	5.03	0.18	8.37	8.55	20.00	61.80	2.58
	23.01	34.69	1.25	57.70	58.95	137.90	426.10	
20	2.33	3.83	0.13	6.17	6.30	20.00	61.80	3.87
	16.09	26.41	0.91	42.51	43.42	137.90	426.10	
21	2.37	3.86	0.44	6.23	6.66	20.00	61.80	3.82
	16.33	26.60	3.02	42.93	45.95	137.90	426.10	
22	3.84	5.94	0.57	9.79	10.36	20.00	61.80	2.06
	26.50	40.99	3.91	67.49	71.41	137.90	426.10	

Min MS: 0.555, Location: 7, Combination: Pm+Pb

Table 2-318. Load Combination 105, Cold Environment with Maximum Decay Heat, Normal Conditions of Transport – Model AOS-165B

Load Cases: 105, 201, 202, 211
-40°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.52	1.04	1.57	20.00	70.00	>10
	4.35	2.84	3.62	7.18	10.80	137.90	482.63	
2	2.52	0.16	0.76	2.68	3.44	20.00	70.00	6.93
	17.39	1.11	5.26	18.49	23.75	137.90	482.63	
3	0.51	0.01	0.54	0.53	1.07	20.00	70.00	>10
	3.54	0.10	3.72	3.65	7.37	137.90	482.63	
4	0.65	0.31	1.09	0.96	2.05	20.00	70.00	>10
	4.50	2.15	7.52	6.65	14.16	137.90	482.63	
5	0.62	0.39	0.52	1.01	1.53	20.00	70.00	>10
	4.31	2.67	3.58	6.98	10.56	137.90	482.63	
6	2.58	0.86	0.73	3.44	4.17	20.00	70.00	6.76
	17.77	5.93	5.06	23.70	28.76	137.90	482.63	
7	7.40	11.89	7.73	19.29	27.02	20.00	70.00	0.55
	51.05	81.97	53.28	133.03	186.30	137.90	482.63	
8	6.05	7.71	8.51	13.77	22.28	20.00	70.00	1.18
	41.74	53.17	58.68	94.91	153.59	137.90	482.63	
9	2.81	3.98	3.71	6.79	10.50	20.00	70.00	3.42
	19.39	27.44	25.56	46.83	72.39	137.90	482.63	
10	0.49	0.06	1.16	0.55	1.71	20.00	70.00	>10
	3.38	0.43	7.96	3.81	11.78	137.90	482.63	
11	0.49	0.00	1.14	0.49	1.63	20.00	70.00	>10
	3.37	0.01	7.87	3.38	11.25	137.90	482.63	
12	0.49	0.04	1.14	0.53	1.67	20.00	70.00	>10
	3.38	0.30	7.86	3.68	11.54	137.90	482.63	
13	1.66	2.24	1.65	3.90	5.55	20.00	70.00	6.69
	11.42	15.47	11.36	26.88	38.24	137.90	482.63	

14	1.68	1.67	1.73	3.35	5.08	20.00	70.00	7.96
	11.59	11.49	11.93	23.08	35.00	137.90	482.63	
15	1.68	1.86	2.63	3.54	6.17	20.00	70.00	7.48
	11.61	12.79	18.14	24.41	42.54	137.90	482.63	
16	3.34	0.81	3.31	4.15	7.46	20.00	70.00	4.98
	23.04	5.57	22.84	28.61	51.45	137.90	482.63	
17	3.26	1.59	2.90	4.86	7.76	20.00	70.00	5.13
	22.50	10.98	20.00	33.49	53.49	137.90	482.63	
18	3.74	5.73	0.13	9.47	9.60	20.00	70.00	2.17
	25.82	39.49	0.88	65.31	66.18	137.90	482.63	
19	3.34	5.03	0.07	8.37	8.44	20.00	70.00	2.58
	23.01	34.69	0.47	57.70	58.17	137.90	482.63	
20	2.33	3.83	0.08	6.17	6.24	20.00	70.00	3.87
	16.09	26.41	0.52	42.51	43.03	137.90	482.63	
21	2.37	3.86	0.47	6.23	6.69	20.00	70.00	3.82
	16.33	26.60	3.23	42.93	46.16	137.90	482.63	
22	3.84	5.94	0.61	9.79	10.40	20.00	70.00	2.06
	26.50	40.99	4.20	67.49	71.69	137.90	482.63	

Min MS: 0.555, Location: 7, Combination: Pm+Pb

Table 2-319. Load Combination 106, Maximum Pressure, Hot Environment, *Normal Conditions of Transport* – Model AOS-165B

Load Cases: 101, 201, 203, 211
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Maximum Increase External Pressure, 140 kPa (20 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.64	0.42	0.46	1.05	1.52	20.00	66.30	>10
	4.40	2.87	3.20	7.27	10.47	137.90	457.12	
2	2.54	0.17	0.70	2.71	3.41	20.00	66.30	6.86
	17.54	1.15	4.81	18.69	23.51	137.90	457.12	
3	0.52	0.02	0.52	0.54	1.05	20.00	66.30	>10
	3.59	0.11	3.55	3.70	7.25	137.90	457.12	
4	0.67	0.31	1.01	0.99	1.99	20.00	66.30	>10
	4.65	2.15	6.95	6.80	13.75	137.90	457.12	
5	0.63	0.39	0.46	1.02	1.48	20.00	66.30	>10
	4.36	2.70	3.17	7.06	10.23	137.90	457.12	
6	2.60	0.87	0.68	3.47	4.15	20.00	66.30	6.69
	17.93	5.98	4.66	23.92	28.58	137.90	457.12	
7	7.66	12.43	7.23	20.09	27.32	20.00	61.80	0.49
	52.81	85.73	49.82	138.54	188.36	137.90	426.10	
8	6.40	8.21	7.76	14.61	22.36	20.00	61.80	1.05
	44.12	56.59	53.47	100.71	154.18	137.90	426.10	
9	2.97	4.25	3.42	7.21	10.63	20.00	61.80	3.16
	20.44	29.28	23.56	49.72	73.28	137.90	426.10	
10	0.56	0.06	1.05	0.63	1.67	20.00	61.80	>10
	3.88	0.44	7.23	4.32	11.55	137.90	426.10	
11	0.56	0.00	1.04	0.56	1.60	20.00	61.80	>10
	3.86	0.01	7.15	3.87	11.02	137.90	426.10	
12	0.56	0.04	1.04	0.60	1.64	20.00	61.80	>10
	3.87	0.30	7.14	4.17	11.30	137.90	426.10	
13	1.69	2.21	1.73	3.90	5.63	20.00	61.80	6.69
	11.68	15.21	11.91	26.89	38.80	137.90	426.10	

14	1.69	1.68	1.79	3.37	5.15	20.00	61.80	7.91
	11.62	11.59	12.32	23.21	35.53	137.90	426.10	
15	1.78	1.99	2.70	3.77	6.47	20.00	61.80	6.95
	12.28	13.75	18.61	26.03	44.63	137.90	426.10	
16	3.41	0.88	3.14	4.29	7.43	20.00	61.80	4.87
	23.51	6.07	21.65	29.58	51.23	137.90	426.10	
17	3.31	1.62	2.71	4.94	7.64	20.00	61.80	5.04
	22.83	11.20	18.68	34.03	52.71	137.90	426.10	
18	3.74	5.73	0.42	9.47	9.89	20.00	61.80	2.17
	25.82	39.49	2.87	65.31	68.17	137.90	426.10	
19	3.34	5.03	0.18	8.37	8.55	20.00	61.80	2.58
	23.01	34.69	1.25	57.70	58.95	137.90	426.10	
20	2.33	3.83	0.13	6.17	6.30	20.00	61.80	3.87
	16.09	26.41	0.91	42.51	43.42	137.90	426.10	
21	2.37	3.86	0.44	6.23	6.66	20.00	61.80	3.82
	16.33	26.60	3.02	42.93	45.95	137.90	426.10	
22	3.84	5.94	0.57	9.79	10.36	20.00	61.80	2.06
	26.50	40.99	3.91	67.49	71.41	137.90	426.10	

Min MS: 0.493, Location: 7, Combination: Pm+Pb

Table 2-320. Load Combination 107, Maximum Pressure, Cold Environment, Normal Conditions of Transport – Model AOS-165B

Load Cases: 105, 201, 203, 211
-40°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Maximum Increase External Pressure, 140 kPa (20 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.64	0.42	0.52	1.05	1.58	20.00	70.00	>10
	4.40	2.87	3.62	7.27	10.89	137.90	482.63	
2	2.54	0.17	0.76	2.71	3.47	20.00	70.00	6.86
	17.54	1.15	5.26	18.69	23.95	137.90	482.63	
3	0.52	0.02	0.54	0.54	1.08	20.00	70.00	>10
	3.59	0.11	3.72	3.70	7.42	137.90	482.63	
4	0.67	0.31	1.09	0.99	2.08	20.00	70.00	>10
	4.65	2.15	7.52	6.80	14.32	137.90	482.63	
5	0.63	0.39	0.52	1.02	1.54	20.00	70.00	>10
	4.36	2.70	3.58	7.06	10.64	137.90	482.63	
6	2.60	0.87	0.73	3.47	4.20	20.00	70.00	6.69
	17.93	5.98	5.06	23.92	28.98	137.90	482.63	
7	7.66	12.43	7.73	20.09	27.82	20.00	70.00	0.49
	52.81	85.73	53.28	138.54	191.82	137.90	482.63	
8	6.40	8.21	8.51	14.61	23.12	20.00	70.00	1.05
	44.12	56.59	58.68	100.71	159.39	137.90	482.63	
9	2.97	4.25	3.71	7.21	10.92	20.00	70.00	3.16
	20.44	29.28	25.56	49.72	75.28	137.90	482.63	
10	0.56	0.06	1.16	0.63	1.78	20.00	70.00	>10
	3.88	0.44	7.96	4.32	12.28	137.90	482.63	
11	0.56	0.00	1.14	0.56	1.70	20.00	70.00	>10
	3.86	0.01	7.87	3.87	11.74	137.90	482.63	
12	0.56	0.04	1.14	0.60	1.74	20.00	70.00	>10
	3.87	0.30	7.86	4.17	12.03	137.90	482.63	
13	1.69	2.21	1.65	3.90	5.55	20.00	70.00	6.69
	11.68	15.21	11.36	26.89	38.24	137.90	482.63	

14	1.69	1.68	1.73	3.37	5.10	20.00	70.00	7.91
	11.62	11.59	11.93	23.21	35.14	137.90	482.63	
15	1.78	1.99	2.63	3.77	6.41	20.00	70.00	6.95
	12.28	13.75	18.14	26.03	44.16	137.90	482.63	
16	3.41	0.88	3.31	4.29	7.60	20.00	70.00	4.87
	23.51	6.07	22.84	29.58	52.42	137.90	482.63	
17	3.31	1.62	2.90	4.94	7.84	20.00	70.00	5.04
	22.83	11.20	20.00	34.03	54.03	137.90	482.63	
18	3.74	5.73	0.13	9.47	9.60	20.00	70.00	2.17
	25.82	39.49	0.88	65.31	66.18	137.90	482.63	
19	3.34	5.03	0.07	8.37	8.44	20.00	70.00	2.58
	23.01	34.69	0.47	57.70	58.17	137.90	482.63	
20	2.33	3.83	0.08	6.17	6.24	20.00	70.00	3.87
	16.09	26.41	0.52	42.51	43.03	137.90	482.63	
21	2.37	3.86	0.47	6.23	6.70	20.00	70.00	3.82
	16.33	26.60	3.23	42.93	46.16	137.90	482.63	
22	3.84	5.94	0.61	9.79	10.40	20.00	70.00	2.06
	26.50	40.99	4.20	67.49	71.69	137.90	482.63	

Min MS: 0.493, Location: 7, Combination: Pm+Pb

Table 2-321. Load Combination 215, Compression Load, Normal Conditions of Transport – Model AOS-165B

Load Cases: 215, 101, 201, 211
Compression Load (5x weight)
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.73	0.56	0.46	1.29	1.76	20.00	66.30	>10
	5.06	3.85	3.20	8.91	12.11	137.90	457.12	
2	2.71	0.21	0.70	2.91	3.61	20.00	66.30	6.39
	18.67	1.43	4.81	20.09	24.91	137.90	457.12	
3	0.62	0.02	0.52	0.64	1.16	20.00	66.30	>10
	4.26	0.17	3.55	4.43	7.99	137.90	457.12	
4	0.83	0.32	1.01	1.15	2.16	20.00	66.30	>10
	5.70	2.24	6.95	7.94	14.89	137.90	457.12	
5	0.74	0.42	0.46	1.17	1.63	20.00	66.30	>10
	5.13	2.92	3.17	8.05	11.22	137.90	457.12	
6	2.79	0.87	0.68	3.65	4.33	20.00	66.30	6.18
	19.20	5.97	4.66	25.17	29.84	137.90	457.12	
7	7.72	12.17	7.23	19.89	27.11	20.00	61.80	0.51
	53.21	83.90	49.82	137.11	186.94	137.90	426.10	
8	6.29	7.94	7.76	14.23	21.98	20.00	61.80	1.11
	43.36	54.72	53.47	98.08	151.55	137.90	426.10	
9	3.01	3.95	3.42	6.96	10.38	20.00	61.80	3.31
	20.73	27.25	23.56	47.98	71.54	137.90	426.10	
10	0.63	0.06	1.05	0.70	1.75	20.00	61.80	>10
	4.36	0.44	7.23	4.80	12.03	137.90	426.10	
11	0.59	0.00	1.04	0.59	1.63	20.00	61.80	>10
	4.07	0.01	7.15	4.08	11.23	137.90	426.10	
12	0.60	0.04	1.04	0.65	1.68	20.00	61.80	>10
	4.16	0.30	7.14	4.46	11.60	137.90	426.10	
13	1.79	2.27	1.73	4.06	5.79	20.00	61.80	6.39
	12.36	15.63	11.91	27.98	39.89	137.90	426.10	

14	1.76	1.74	1.79	3.50	5.28	20.00	61.80	7.58
	12.11	11.99	12.32	24.10	36.42	137.90	426.10	
15	1.76	2.05	2.70	3.81	6.51	20.00	61.80	6.88
	12.16	14.10	18.61	26.26	44.86	137.90	426.10	
16	3.54	1.00	3.14	4.54	7.68	20.00	61.80	4.65
	24.39	6.93	21.65	31.32	52.97	137.90	426.10	
17	3.44	1.70	2.71	5.13	7.84	20.00	61.80	4.82
	23.70	11.70	18.68	35.40	54.08	137.90	426.10	
18	5.19	5.50	0.42	10.69	11.11	20.00	61.80	1.81
	35.79	37.93	2.87	73.72	76.58	137.90	426.10	
19	3.50	5.15	0.18	8.65	8.83	20.00	61.80	2.47
	24.14	35.48	1.25	59.62	60.87	137.90	426.10	
20	2.49	3.87	0.13	6.37	6.50	20.00	61.80	3.71
	17.19	26.71	0.91	43.91	44.82	137.90	426.10	
21	2.43	3.74	0.44	6.18	6.61	20.00	61.80	3.86
	16.76	25.82	3.02	42.58	45.60	137.90	426.10	
22	3.91	5.92	0.57	9.83	10.39	20.00	61.80	2.05
	26.96	40.79	3.91	67.75	71.66	137.90	426.10	

Min MS: 0.509, Location: 7, Combination: Pm+Pb

Table 2-322. Load Combination 216, Rod Drop, Normal Conditions of Transport – Model AOS-165B

Load Cases: 216, 101, 201, 211
Rod Drop onto Cask
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.46	1.04	1.51	20.00	66.30	>10
	4.34	2.84	3.20	7.18	10.39	137.90	457.12	
2	2.52	0.16	0.70	2.68	3.38	20.00	66.30	6.93
	17.39	1.11	4.81	18.50	23.31	137.90	457.12	
3	0.52	0.02	0.52	0.53	1.05	20.00	66.30	>10
	3.55	0.10	3.55	3.66	7.21	137.90	457.12	
4	0.65	0.31	1.01	0.97	1.97	20.00	66.30	>10
	4.52	2.15	6.95	6.66	13.61	137.90	457.12	
5	0.63	0.39	0.46	1.01	1.47	20.00	66.30	>10
	4.32	2.67	3.17	6.99	10.17	137.90	457.12	
6	2.58	0.86	0.68	3.44	4.12	20.00	66.30	6.75
	17.80	5.92	4.66	23.72	28.38	137.90	457.12	
7	7.26	11.62	7.23	18.89	26.11	20.00	61.80	0.59
	50.09	80.14	49.82	130.23	180.05	137.90	426.10	
8	5.96	7.52	7.76	13.48	21.23	20.00	61.80	1.23
	41.08	51.84	53.47	92.92	146.39	137.90	426.10	
9	2.80	3.95	3.42	6.75	10.17	20.00	61.80	3.45
	19.27	27.26	23.56	46.53	70.09	137.90	426.10	
10	0.50	0.06	1.05	0.56	1.61	20.00	61.80	>10
	3.43	0.43	7.23	3.86	11.10	137.90	426.10	
11	0.49	0.00	1.04	0.49	1.53	20.00	61.80	>10
	3.38	0.01	7.15	3.39	10.54	137.90	426.10	
12	0.49	0.04	1.04	0.53	1.57	20.00	61.80	>10
	3.38	0.29	7.14	3.67	10.81	137.90	426.10	
13	1.62	2.20	1.73	3.82	5.54	20.00	61.80	6.86
	11.15	15.16	11.91	26.32	38.23	137.90	426.10	

14	1.66	1.66	1.79	3.32	5.11	20.00	61.80	8.03
	11.44	11.47	12.32	22.90	35.22	137.90	426.10	
15	1.65	1.86	2.70	3.51	6.21	20.00	61.80	7.54
	11.40	12.83	18.61	24.23	42.84	137.90	426.10	
16	3.30	0.77	3.14	4.08	7.22	20.00	61.80	5.06
	22.76	5.34	21.65	28.10	49.75	137.90	426.10	
17	3.23	1.55	2.71	4.78	7.49	20.00	61.80	5.19
	22.26	10.70	18.68	32.96	51.64	137.90	426.10	
18	4.38	5.47	0.42	9.85	10.27	20.00	61.80	2.05
	30.23	37.68	2.87	67.91	70.78	137.90	426.10	
19	3.23	4.85	0.18	8.07	8.26	20.00	61.80	2.72
	22.24	33.44	1.25	55.67	56.93	137.90	426.10	
20	2.26	3.70	0.13	5.96	6.09	20.00	61.80	4.04
	15.56	25.51	0.91	41.07	41.98	137.90	426.10	
21	2.29	3.71	0.44	6.00	6.43	20.00	61.80	4.00
	15.76	25.58	3.02	41.33	44.35	137.90	426.10	
22	3.69	5.67	0.57	9.36	9.93	20.00	61.80	2.21
	25.43	39.11	3.91	64.53	68.45	137.90	426.10	

Min MS: 0.588, Location: 7, Combination: Pm+Pb

Table 2-323. Load Combination 217, Rod Drop, Cold Environment, Normal Conditions of Transport – Model AOS-165B

Load Cases: 216, 104, 201, 211
Rod Drop onto Cask
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.63	0.41	0.00	1.04	1.04	20.00	70.00	>10
	4.34	2.84	0.02	7.18	7.20	137.90	482.63	
2	2.52	0.16	0.09	2.68	2.77	20.00	70.00	6.93
	17.39	1.11	0.61	18.50	19.10	137.90	482.63	
3	0.52	0.02	0.00	0.53	0.53	20.00	70.00	>10
	3.55	0.10	0.00	3.66	3.66	137.90	482.63	
4	0.65	0.31	0.09	0.97	1.05	20.00	70.00	>10
	4.52	2.15	0.60	6.66	7.27	137.90	482.63	
5	0.63	0.39	0.00	1.01	1.02	20.00	70.00	>10
	4.32	2.67	0.02	6.99	7.01	137.90	482.63	
6	2.58	0.86	0.09	3.44	3.53	20.00	70.00	6.75
	17.80	5.92	0.64	23.72	24.36	137.90	482.63	
7	7.26	11.62	5.42	18.89	24.31	20.00	70.00	0.59
	50.09	80.14	37.40	130.23	167.63	137.90	482.63	
8	5.96	7.52	7.18	13.48	20.65	20.00	70.00	1.23
	41.08	51.84	49.49	92.92	142.41	137.90	482.63	
9	2.80	3.95	3.31	6.75	10.05	20.00	70.00	3.45
	19.27	27.26	22.79	46.53	69.32	137.90	482.63	
10	0.50	0.06	1.40	0.56	1.96	20.00	70.00	>10
	3.43	0.43	9.67	3.86	13.53	137.90	482.63	
11	0.49	0.00	1.40	0.49	1.89	20.00	70.00	>10
	3.38	0.01	9.66	3.39	13.05	137.90	482.63	
12	0.49	0.04	1.40	0.53	1.93	20.00	70.00	>10
	3.38	0.29	9.66	3.67	13.34	137.90	482.63	
13	1.62	2.20	1.66	3.82	5.47	20.00	70.00	6.86
	11.15	15.16	11.42	26.32	37.74	137.90	482.63	

14	1.66	1.66	0.91	3.32	4.23	20.00	70.00	8.03
	11.44	11.47	6.25	22.90	29.15	137.90	482.63	
15	1.65	1.86	0.75	3.51	4.27	20.00	70.00	7.54
	11.40	12.83	5.19	24.23	29.42	137.90	482.63	
16	3.30	0.77	2.98	4.08	7.05	20.00	70.00	5.06
	22.76	5.34	20.53	28.10	48.63	137.90	482.63	
17	3.23	1.55	2.46	4.78	7.25	20.00	70.00	5.19
	22.26	10.70	16.99	32.96	49.95	137.90	482.63	
18	4.38	5.47	0.84	9.85	10.69	20.00	70.00	2.05
	30.23	37.68	5.77	67.91	73.68	137.90	482.63	
19	3.23	4.85	1.39	8.07	9.47	20.00	70.00	2.72
	22.24	33.44	9.61	55.67	65.29	137.90	482.63	
20	2.26	3.70	1.05	5.96	7.01	20.00	70.00	4.04
	15.56	25.51	7.26	41.07	48.33	137.90	482.63	
21	2.29	3.71	0.99	6.00	6.98	20.00	70.00	4.00
	15.76	25.58	6.81	41.33	48.15	137.90	482.63	
22	3.69	5.67	1.49	9.36	10.85	20.00	70.00	2.21
	25.43	39.11	10.28	64.53	74.81	137.90	482.63	

Min MS: 0.588, Location: 7, Combination: Pm+Pb

Table 2-324. Load Combination 221, Forward Vibration, Normal Conditions of Transport – Model AOS-165B

Load Cases: 221, 101, 201, 211
Forward 5g Vibration Inertia Load
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.74	0.43	0.46	1.17	1.63	20.00	66.30	>10
	5.13	2.93	3.20	8.06	11.26	137.90	457.12	
2	2.65	0.18	0.70	2.82	3.52	20.00	66.30	6.55
	18.26	1.22	4.81	19.48	24.29	137.90	457.12	
3	2.31	0.57	0.52	2.88	3.40	20.00	66.30	7.67
	15.91	3.95	3.55	19.86	23.42	137.90	457.12	
4	0.72	0.33	1.01	1.05	2.05	20.00	66.30	>10
	4.94	2.27	6.95	7.21	14.15	137.90	457.12	
5	0.75	0.40	0.46	1.15	1.61	20.00	66.30	>10
	5.19	2.76	3.17	7.96	11.13	137.90	457.12	
6	2.71	0.87	0.68	3.59	4.26	20.00	66.30	6.38
	18.70	6.03	4.66	24.72	29.39	137.90	457.12	
7	7.49	11.92	7.23	19.42	26.64	20.00	61.80	0.55
	51.65	82.21	49.82	133.86	183.69	137.90	426.10	
8	6.57	8.02	7.76	14.59	22.34	20.00	61.80	1.06
	45.29	55.29	53.47	100.58	154.04	137.90	426.10	
9	3.13	4.35	3.42	7.48	10.90	20.00	61.80	3.01
	21.61	29.98	23.56	51.60	75.16	137.90	426.10	
10	0.57	0.07	1.05	0.64	1.69	20.00	61.80	>10
	3.93	0.46	7.23	4.39	11.62	137.90	426.10	
11	0.52	0.00	1.04	0.52	1.56	20.00	61.80	>10
	3.56	0.02	7.15	3.58	10.73	137.90	426.10	
12	0.62	0.05	1.04	0.67	1.70	20.00	61.80	>10
	4.25	0.34	7.14	4.59	11.72	137.90	426.10	
13	1.87	2.35	1.73	4.22	5.95	20.00	61.80	6.11
	12.86	16.24	11.91	29.10	41.01	137.90	426.10	

14	1.84	1.79	1.79	3.63	5.41	20.00	61.80	7.27
	12.69	12.31	12.32	25.01	37.33	137.90	426.10	
15	1.78	2.02	2.70	3.80	6.50	20.00	61.80	6.90
	12.27	13.92	18.61	26.19	44.80	137.90	426.10	
16	3.82	1.22	3.14	5.04	8.18	20.00	61.80	4.23
	26.35	8.39	21.65	34.74	56.39	137.90	426.10	
17	3.73	2.03	2.71	5.76	8.47	20.00	61.80	4.21
	25.72	13.98	18.68	39.70	58.37	137.90	426.10	
18	3.64	5.43	0.42	9.06	9.48	20.00	61.80	2.31
	25.08	37.40	2.87	62.48	65.35	137.90	426.10	
19	3.35	4.90	0.18	8.25	8.43	20.00	61.80	2.64
	23.12	33.77	1.25	56.88	58.14	137.90	426.10	
20	2.38	3.73	0.13	6.10	6.24	20.00	61.80	3.91
	16.40	25.69	0.91	42.09	43.00	137.90	426.10	
21	2.67	4.08	0.44	6.75	7.19	20.00	61.80	3.44
	18.41	28.16	3.02	46.57	49.59	137.90	426.10	
22	4.29	6.19	0.57	10.48	11.05	20.00	61.80	1.86
	29.58	42.68	3.91	72.26	76.18	137.90	426.10	

Min MS: 0.545, Location: 7, Combination: Pm+Pb

Table 2-325. Load Combination 222, Lateral Vibration, Normal Conditions of Transport – Model AOS-165B

Load Cases: 222, 101, 201, 211
Lateral 5g Vibration Inertia Load
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
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1	0.65	0.42	0.46	1.07	1.53	20.00	66.30	>10
	4.51	2.87	3.20	7.38	10.58	137.90	457.12	
2	2.57	0.16	0.70	2.74	3.44	20.00	66.30	6.78
	17.74	1.14	4.81	18.87	23.68	137.90	457.12	
3	0.69	0.07	0.52	0.76	1.27	20.00	66.30	>10
	4.73	0.50	3.55	5.23	8.78	137.90	457.12	
4	0.72	0.33	1.01	1.05	2.06	20.00	66.30	>10
	4.95	2.29	6.95	7.25	14.19	137.90	457.12	
5	0.65	0.39	0.46	1.04	1.50	20.00	66.30	>10
	4.47	2.71	3.17	7.18	10.35	137.90	457.12	
6	2.63	0.86	0.68	3.49	4.17	20.00	66.30	6.61
	18.11	5.96	4.66	24.07	28.73	137.90	457.12	
7	7.37	11.63	7.23	19.00	26.22	20.00	61.80	0.58
	50.81	80.17	49.82	130.98	180.80	137.90	426.10	
8	6.10	7.55	7.76	13.64	21.40	20.00	61.80	1.20
	42.03	52.03	53.47	94.06	147.53	137.90	426.10	
9	2.86	3.99	3.42	6.86	10.27	20.00	61.80	3.38
	19.73	27.54	23.56	47.27	70.83	137.90	426.10	
10	0.61	0.12	1.05	0.74	1.79	20.00	61.80	>10
	4.23	0.84	7.23	5.08	12.31	137.90	426.10	
11	0.63	0.07	1.04	0.71	1.74	20.00	61.80	>10
	4.37	0.49	7.15	4.86	12.01	137.90	426.10	
12	0.61	0.10	1.04	0.71	1.75	20.00	61.80	>10
	4.21	0.70	7.14	4.91	12.04	137.90	426.10	
13	1.72	2.30	1.73	4.02	5.75	20.00	61.80	6.47
	11.83	15.87	11.91	27.70	39.61	137.90	426.10	

14	1.76	1.67	1.79	3.43	5.21	20.00	61.80	7.75
	12.11	11.52	12.32	23.63	35.95	137.90	426.10	
15	1.77	1.88	2.70	3.65	6.35	20.00	61.80	7.22
	12.17	13.00	18.61	25.17	43.77	137.90	426.10	
16	3.44	0.80	3.14	4.25	7.39	20.00	61.80	4.81
	23.74	5.53	21.65	29.27	50.92	137.90	426.10	
17	3.35	1.55	2.71	4.90	7.61	20.00	61.80	4.97
	23.08	10.71	18.68	33.79	52.47	137.90	426.10	
18	3.63	5.42	0.42	9.05	9.46	20.00	61.80	2.32
	25.05	37.34	2.87	62.39	65.25	137.90	426.10	
19	3.27	4.81	0.18	8.08	8.27	20.00	61.80	2.71
	22.54	33.19	1.25	55.74	56.99	137.90	426.10	
20	2.31	3.67	0.13	5.98	6.11	20.00	61.80	4.02
	15.92	25.29	0.91	41.21	42.12	137.90	426.10	
21	2.36	3.70	0.44	6.06	6.50	20.00	61.80	3.95
	16.28	25.51	3.02	41.79	44.81	137.90	426.10	
22	3.80	5.68	0.57	9.48	10.05	20.00	61.80	2.16
	26.19	39.18	3.91	65.37	69.29	137.90	426.10	

Min MS: 0.579, Location: 7, Combination: Pm+Pb

Table 2-326. Load Combination 223, Vertical Vibration, Normal Conditions of Transport – Model AOS-165B

Load Cases: 223, 101, 201, 211
Lateral 5g Vibration Inertia Load
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.68	0.92	0.46	2.59	3.06	20.00	66.30	>10
	11.55	6.33	3.20	17.89	21.09	137.90	457.12	
2	5.01	1.25	0.70	6.25	6.95	20.00	66.30	2.99
	34.52	8.59	4.81	43.11	47.92	137.90	457.12	
3	4.28	1.60	0.52	5.87	6.39	20.00	66.30	3.68
	29.48	11.01	3.55	40.49	44.04	137.90	457.12	
4	0.92	0.46	1.01	1.38	2.39	20.00	66.30	>10
	6.34	3.20	6.95	9.54	16.49	137.90	457.12	
5	1.47	0.80	0.46	2.27	2.73	20.00	66.30	>10
	10.12	5.53	3.17	15.65	18.82	137.90	457.12	
6	4.29	1.65	0.68	5.94	6.61	20.00	66.30	3.66
	29.59	11.35	4.66	40.94	45.61	137.90	457.12	
7	11.51	14.58	7.23	26.10	33.32	20.00	61.80	0.15
	79.39	100.55	49.82	179.94	229.76	137.90	426.10	
8	11.48	11.00	7.76	22.48	30.24	20.00	61.80	0.33
	79.15	75.86	53.47	155.01	208.48	137.90	426.10	
9	5.81	5.41	3.42	11.22	14.64	20.00	61.80	1.67
	40.07	37.31	23.56	77.37	100.93	137.90	426.10	
10	1.52	0.29	1.05	1.81	2.86	20.00	61.80	>10
	10.47	2.01	7.23	12.48	19.71	137.90	426.10	
11	1.87	0.28	1.04	2.15	3.18	20.00	61.80	9.70
	12.88	1.92	7.15	14.80	21.95	137.90	426.10	
12	1.69	0.29	1.04	1.99	3.02	20.00	61.80	>10
	11.66	2.03	7.14	13.69	20.83	137.90	426.10	
13	2.96	2.78	1.73	5.74	7.47	20.00	61.80	4.22
	20.42	19.18	11.91	39.60	51.51	137.90	426.10	

14	2.61	2.39	1.79	5.01	6.79	20.00	61.80	4.99
	18.02	16.49	12.32	34.51	46.83	137.90	426.10	
15	2.20	1.90	2.70	4.10	6.80	20.00	61.80	6.31
	15.16	13.11	18.61	28.28	46.88	137.90	426.10	
16	5.41	1.86	3.14	7.27	10.41	20.00	61.80	2.70
	37.31	12.79	21.65	50.11	71.76	137.90	426.10	
17	5.53	2.31	2.71	7.83	10.54	20.00	61.80	2.62
	38.09	15.90	18.68	54.00	72.67	137.90	426.10	
18	3.65	5.50	0.42	9.15	9.56	20.00	61.80	2.28
	25.17	37.91	2.87	63.08	65.95	137.90	426.10	
19	3.67	5.22	0.18	8.89	9.07	20.00	61.80	2.38
	25.33	35.96	1.25	61.29	62.54	137.90	426.10	
20	2.51	4.15	0.13	6.66	6.79	20.00	61.80	3.50
	17.33	28.60	0.91	45.92	46.83	137.90	426.10	
21	2.61	4.07	0.44	6.68	7.12	20.00	61.80	3.49
	17.99	28.07	3.02	46.05	49.07	137.90	426.10	
22	4.11	5.76	0.57	9.87	10.44	20.00	61.80	2.04
	28.35	39.71	3.91	68.07	71.98	137.90	426.10	

Min MS: 0.150, Location: 7, Combination: Pm+Pb

Table 2-327. Load Combination 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-165B

Load Cases: 231, 102, 201, 211
4-ft. Head-On Drop
100°F Ambient, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.70	0.91	0.44	2.61	3.04	20.00	61.80	>10
	11.72	6.27	3.00	17.99	20.99	137.90	426.10	
2	3.87	0.55	0.67	4.42	5.10	20.00	61.80	4.16
	26.72	3.77	4.65	30.48	35.14	137.90	426.10	
3	1.26	0.03	0.52	1.29	1.80	20.00	61.80	>10
	8.69	0.17	3.58	8.87	12.44	137.90	426.10	
4	1.38	0.33	0.98	1.72	2.70	20.00	61.80	>10
	9.55	2.30	6.77	11.85	18.62	137.90	426.10	
5	1.09	0.45	0.43	1.54	1.97	20.00	61.80	>10
	7.51	3.12	2.97	10.62	13.60	137.90	426.10	
6	2.94	0.90	0.65	3.84	4.49	20.00	61.80	5.81
	20.24	6.23	4.51	26.47	30.98	137.90	426.10	
7	10.14	15.15	7.09	25.29	32.38	20.00	61.80	0.19
	69.92	104.47	48.85	174.39	223.25	137.90	426.10	
8	7.49	9.93	7.51	17.41	24.92	20.00	61.80	0.72
	51.62	68.44	51.79	120.05	171.84	137.90	426.10	
9	3.25	4.56	3.33	7.82	11.15	20.00	61.80	2.84
	22.43	31.47	22.99	53.90	76.89	137.90	426.10	
10	0.72	0.07	1.01	0.79	1.80	20.00	61.80	>10
	4.94	0.48	6.99	5.42	12.42	137.90	426.10	
11	0.66	0.00	1.00	0.66	1.66	20.00	61.80	>10
	4.55	0.01	6.90	4.57	11.47	137.90	426.10	
12	0.63	0.04	1.00	0.67	1.67	20.00	61.80	>10
	4.33	0.30	6.89	4.63	11.52	137.90	426.10	
13	1.74	2.33	1.78	4.08	5.86	20.00	61.80	6.36
	12.03	16.08	12.29	28.11	40.40	137.90	426.10	

14	1.83	1.72	1.82	3.55	5.38	20.00	61.80	7.44
	12.62	11.87	12.57	24.50	37.07	137.90	426.10	
15	1.77	2.07	2.74	3.84	6.57	20.00	61.80	6.82
	12.21	14.24	18.89	26.45	45.33	137.90	426.10	
16	3.47	0.88	3.09	4.35	7.44	20.00	61.80	4.76
	23.94	6.07	21.29	30.02	51.31	137.90	426.10	
17	3.40	1.58	2.65	4.98	7.63	20.00	61.80	4.88
	23.46	10.91	18.26	34.36	52.62	137.90	426.10	
18	3.97	5.44	0.53	9.41	9.94	20.00	61.80	2.19
	27.37	37.50	3.64	64.87	68.51	137.90	426.10	
19	3.62	5.19	0.23	8.80	9.03	20.00	61.80	2.41
	24.92	35.77	1.56	60.69	62.25	137.90	426.10	
20	2.70	4.25	0.16	6.95	7.10	20.00	61.80	3.32
	18.59	29.31	1.07	47.90	48.97	137.90	426.10	
21	3.10	4.88	0.43	7.99	8.42	20.00	61.80	2.76
	21.40	33.67	2.95	55.08	58.03	137.90	426.10	
22	4.48	6.56	0.56	11.04	11.60	20.00	61.80	1.72
	30.91	45.21	3.83	76.12	79.95	137.90	426.10	

Min MS: 0.186, Location: 7, Combination: Pm+Pb

2.10.4.2 Hypothetical Accident Conditions of Transport Summary of Damages (Stresses) – Model AOS-165B

Table 2-328 and Table 2-329 present Model AOS-165B transport package Load Cases and Load Combinations, respectively, under Hypothetical Accident conditions of transport:

- Table 2-330 through Table 2-342 present Load Case test case output data. Comparisons with allowable stress limits are included for Load Cases 111, 112, 113, 114, 115, and 116.
- Table 2-342 through Table 2-357 present Load Combination test case output data.

Table 2-328. Load Cases Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Case	Description	Data
111	Fire at 30 Minutes, 1,475°F Ambient, 2.5 kW Decay Heat	Table 2-330
112	Fire at 60 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation	Table 2-331
113	Fire at 90 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation	Table 2-332
114	Fire at 120 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation	Table 2-333
115	Fire at 150 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation	Table 2-334
116	Fire at 180 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation	Table 2-335
301	30-ft. Head-On Drop	Table 2-336
302	30-ft. Side Drop	Table 2-337
303	30-ft. Cg/Corner Drop	Table 2-338
304	30-ft. Head-On Drop at -40°F	Table 2-339
305	30-ft. Side Drop at -40°F	Table 2-340
306	30-ft. Cg/Corner Drop at -40°F	Table 2-341
311	4-ft. Drop onto Rod	Table 2-342

Table 2-329. Load Combinations Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Combination	Load Cases	Description	Data
301	301, 102, 201, 211	Head-On Orientation	Table 2-343
302	302, 102, 201, 211	Side Drop Orientation	Table 2-344
303	303, 102, 201, 211	Cg/Corner Orientation	Table 2-345
304	304, 105, 202, 211	Head-On Orientation at -40°F	Table 2-346
305	305, 105, 202, 211	Side Drop Orientation at -40°F	Table 2-347
306	306, 105, 202, 211	Cg/Corner Orientation at -40°F	Table 2-348
310	204, 101, 201, 211	Additional Increase Evaluation Pressure	Table 2-349
311	311, 101, 201, 211	4-ft. Drop onto Rod	Table 2-350
312	311, 104, 201, 211	4-ft. Drop onto Rod at -40°F	Table 2-351
350	111, 201, 211	Fire at 30 Minutes	Table 2-352
351	112, 201, 211	Fire at 60 Minutes	Table 2-353
352	113, 201, 211	Fire at 90 Minutes	Table 2-354
353	114, 201, 211	Fire at 120 Minutes	Table 2-355
354	115, 201, 211	Fire at 150 Minutes	Table 2-356
355	116, 201, 211	Fire at 180 Minutes	Table 2-357

Table 2-330. Load Case 111, Fire at 30 Minutes, 1,475°F Ambient, 2.5 kW Decay Heat, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.2736E+03	-6.1491E+03	7.6427E+03	1.3423E+04	2.4486E+04
	5.0150E+01	-4.2397E+01	5.2695E+01	9.2546E+01	1.6882E+02
2	1.7980E+03	-8.0462E+02	3.1091E+02	2.6026E+03	4.6348E+03
	1.2397E+01	-5.5477E+00	2.1436E+00	1.7944E+01	3.1956E+01
3	1.1783E+04	-8.1487E+03	5.6033E+03	1.9932E+04	3.9508E+04
	8.1240E+01	-5.6183E+01	3.8633E+01	1.3742E+02	2.7240E+02
4	3.9670E+03	-2.1411E+03	1.3236E+03	6.1080E+03	1.1668E+04
	2.7351E+01	-1.4762E+01	9.1259E+00	4.2113E+01	8.0446E+01
5	7.2590E+03	-6.1402E+03	7.5384E+03	1.3399E+04	2.4345E+04
	5.0049E+01	-4.2335E+01	5.1975E+01	9.2384E+01	1.6786E+02
6	1.8244E+03	-8.3436E+02	3.3383E+02	2.6588E+03	4.7038E+03
	1.2579E+01	-5.7527E+00	2.3017E+00	1.8332E+01	3.2432E+01
7	-1.2200E+02	-1.6390E+03	-4.7957E+02	1.5170E+03	2.1784E+03
	-8.4113E-01	-1.1301E+01	-3.3065E+00	1.0460E+01	1.5019E+01
8	-9.9949E+01	-1.7992E+03	-2.3042E+03	1.6992E+03	1.9901E+03
	-6.8912E-01	-1.2405E+01	-1.5887E+01	1.1716E+01	1.3721E+01
9	1.2510E+02	-9.2181E+02	-3.0012E+03	1.0469E+03	7.0033E+01
	8.6252E-01	-6.3556E+00	-2.0692E+01	7.2182E+00	4.8286E-01
10	1.8383E+02	-6.3479E+02	-1.4677E+03	8.1863E+02	1.4042E+03
	1.2675E+00	-4.3767E+00	-1.0119E+01	5.6442E+00	9.6819E+00
11	1.7797E+02	-6.2771E+02	-1.4976E+03	8.0568E+02	1.3816E+03
	1.2271E+00	-4.3279E+00	-1.0325E+01	5.5550E+00	9.5258E+00
12	1.7895E+02	-6.2934E+02	-1.5355E+03	8.0830E+02	1.3874E+03
	1.2338E+00	-4.3392E+00	-1.0587E+01	5.5730E+00	9.5657E+00
13	4.9819E+02	-1.7384E+03	-3.2789E+01	2.2366E+03	3.6862E+03
	3.4349E+00	-1.1986E+01	-2.2607E-01	1.5421E+01	2.5415E+01
14	-4.7261E+02	-2.1171E+03	-9.9123E+02	1.6445E+03	6.3205E+02
	-3.2585E+00	-1.4597E+01	-6.8343E+00	1.1338E+01	4.3579E+00
15	7.0921E+00	-2.4890E+03	-2.4685E+03	2.4961E+03	7.7021E+02
	4.8898E-02	-1.7161E+01	-1.7020E+01	1.7210E+01	5.3104E+00

16	-3.7113E+01	-2.2849E+03	1.8533E+02	2.2478E+03	1.9339E+02
	-2.5589E-01	-1.5754E+01	1.2778E+00	1.5498E+01	1.3334E+00
17	-1.0857E+02	-1.9382E+03	6.7016E+02	1.8296E+03	4.0989E+02
	-7.4855E-01	-1.3363E+01	4.6206E+00	1.2615E+01	2.8261E+00
18	3.8032E+02	-4.9616E+02	-1.1805E+02	8.7647E+02	1.4593E+03
	2.6222E+00	-3.4209E+00	-8.1390E-01	6.0431E+00	1.0061E+01
19	9.8675E+01	-2.2053E+02	2.2781E+01	3.1921E+02	5.5548E+02
	6.8034E-01	-1.5205E+00	1.5707E-01	2.2008E+00	3.8299E+00
20	5.3964E+01	-1.5203E+02	2.0718E+01	2.0599E+02	3.5816E+02
	3.7207E-01	-1.0482E+00	1.4284E-01	1.4203E+00	2.4694E+00
21	1.8321E+02	-2.5643E+02	1.5765E+03	4.3964E+02	4.2036E+02
	1.2632E+00	-1.7680E+00	1.0869E+01	3.0312E+00	2.8983E+00
22	-8.6962E+00	-5.7092E+02	2.0534E+03	5.6222E+02	1.8115E+02
	-5.9958E-02	-3.9364E+00	1.4157E+01	3.8764E+00	1.2490E+00
23	-5.3892E+01	-1.5305E+03	5.3918E+02	1.4766E+03	2.7392E+02
	-3.7157E-01	-1.0552E+01	3.7175E+00	1.0181E+01	1.8886E+00
24	3.5213E-01	-4.5630E+02	-4.5481E+02	4.5665E+02	1.8803E+02
	2.4279E-03	-3.1461E+00	-3.1358E+00	3.1485E+00	1.2964E+00
25	-4.4902E+01	-5.5333E+02	-5.4498E+02	5.0843E+02	5.8886E+02
	-3.0959E-01	-3.8151E+00	-3.7575E+00	3.5055E+00	4.0600E+00

Allowable Stress for Load Case 111

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	374.00	363.53	20.00	22.40	61.80
2	354.62	349.96	20.00	22.40	61.80
3	845.68	637.44	16.40	18.40	59.20
4	458.65	397.46	20.00	22.40	61.80
5	375.68	364.32	20.00	22.40	61.80
6	355.72	350.86	20.00	22.40	61.80
7	356.76	356.10	20.00	22.40	61.80
8	366.16	364.42	20.00	22.40	61.80
9	371.44	369.52	20.00	22.40	61.80
10	383.34	378.60	20.00	22.40	61.80
11	383.77	379.08	20.00	22.40	61.80
12	383.47	378.73	20.00	22.40	61.80
13	378.52	373.57	20.00	22.40	61.80
14	380.86	372.03	20.00	22.40	61.80
15	392.38	381.82	20.00	22.40	61.80
16	363.85	361.01	20.00	22.40	61.80
17	358.25	357.24	20.00	22.40	61.80
18	360.54	360.19	20.00	22.40	61.80
19	359.77	359.19	20.00	22.40	61.80
20	360.35	359.63	20.00	22.40	61.80
21	361.94	361.50	20.00	22.40	61.80
22	362.82	362.26	20.00	22.40	61.80
23	376.03	372.95	20.00	22.40	61.80
24	353.00	352.38	20.00	22.40	61.80
25	353.51	352.94	20.00	22.40	61.80

Table 2-331. Load Case 112, Fire at 60 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.3075E+03	-1.0127E+03	3.6982E+03	2.3202E+03	4.3791E+03
	9.0150E+00	-6.9823E+00	2.5498E+01	1.5997E+01	3.0193E+01
2	2.4981E+03	-8.4827E+02	8.7429E+02	3.3464E+03	7.5740E+03
	1.7224E+01	-5.8486E+00	6.0280E+00	2.3073E+01	5.2221E+01
3	1.8413E+03	-2.1241E+03	-1.4075E+03	3.9654E+03	7.0258E+03
	1.2695E+01	-1.4645E+01	-9.7045E+00	2.7340E+01	4.8441E+01
4	2.1600E+03	-1.8063E+03	7.0632E+02	3.9663E+03	7.7124E+03
	1.4893E+01	-1.2454E+01	4.8699E+00	2.7347E+01	5.3175E+01
5	1.3180E+03	-1.0142E+03	3.7085E+03	2.3321E+03	4.4154E+03
	9.0870E+00	-6.9924E+00	2.5569E+01	1.6079E+01	3.0443E+01
6	3.3825E+03	-5.6602E+02	7.7899E+02	3.9485E+03	9.1415E+03
	2.3321E+01	-3.9026E+00	5.3709E+00	2.7224E+01	6.3028E+01
7	3.8709E+04	-1.8821E+04	7.2549E+03	5.7530E+04	1.1177E+05
	2.6689E+02	-1.2976E+02	5.0021E+01	3.9666E+02	7.7060E+02
8	4.1978E+04	-1.8005E+04	4.3484E+03	5.9984E+04	9.3456E+04
	2.8943E+02	-1.2414E+02	2.9981E+01	4.1357E+02	6.4436E+02
9	2.2204E+04	-2.7305E+03	9.2643E+03	2.4935E+04	3.7843E+04
	1.5309E+02	-1.8826E+01	6.3875E+01	1.7192E+02	2.6092E+02
10	7.6046E+03	-2.1802E+02	-1.7342E+03	7.8226E+03	9.8188E+02
	5.2432E+01	-1.5032E+00	-1.1957E+01	5.3935E+01	6.7698E+00
11	7.5983E+03	-2.1937E+02	-1.4937E+03	7.8177E+03	1.1230E+03
	5.2388E+01	-1.5125E+00	-1.0299E+01	5.3901E+01	7.7428E+00
12	7.5978E+03	-2.1931E+02	-1.5916E+03	7.8172E+03	1.1337E+03
	5.2385E+01	-1.5121E+00	-1.0973E+01	5.3897E+01	7.8166E+00
13	7.7713E+03	-1.4207E+03	3.3060E+03	9.1920E+03	5.6444E+03
	5.3581E+01	-9.7951E+00	2.2794E+01	6.3376E+01	3.8917E+01
14	2.3535E+03	-2.4188E+03	1.4961E+03	4.7723E+03	1.9996E+03
	1.6226E+01	-1.6677E+01	1.0315E+01	3.2904E+01	1.3787E+01
15	8.7818E+02	-2.9612E+02	5.8265E+02	1.1743E+03	1.9513E+03
	6.0549E+00	-2.0416E+00	4.0173E+00	8.0965E+00	1.3454E+01

16	1.3175E+04	-2.9513E+03	4.4992E+03	1.6126E+04	1.5227E+04
	9.0838E+01	-2.0348E+01	3.1021E+01	1.1119E+02	1.0499E+02
17	1.1527E+04	-2.4594E+03	5.0964E+03	1.3987E+04	1.3191E+04
	7.9479E+01	-1.6957E+01	3.5138E+01	9.6435E+01	9.0949E+01
18	4.9897E+01	-1.9122E+02	-9.8556E+01	2.4112E+02	3.7877E+02
	3.4403E-01	-1.3184E+00	-6.7952E-01	1.6625E+00	2.6116E+00
19	2.9523E+01	-9.1571E+01	4.6099E+01	1.2109E+02	2.3133E+02
	2.0355E-01	-6.3136E-01	3.1784E-01	8.3491E-01	1.5950E+00
20	2.5064E+01	-7.5196E+01	-3.9206E+00	1.0026E+02	1.6422E+02
	1.7281E-01	-5.1846E-01	-2.7032E-02	6.9127E-01	1.1322E+00
21	2.2049E+02	-2.6036E+02	1.4915E+03	4.8085E+02	5.6623E+02
	1.5203E+00	-1.7951E+00	1.0284E+01	3.3154E+00	3.9040E+00
22	1.5338E+01	-5.3136E+02	1.8585E+03	5.4670E+02	3.3194E+01
	1.0575E-01	-3.6636E+00	1.2814E+01	3.7693E+00	2.2886E-01
23	-2.7066E+01	-1.3840E+03	4.0316E+02	1.3570E+03	3.5130E+01
	-1.8662E-01	-9.5426E+00	2.7797E+00	9.3560E+00	2.4221E-01
24	4.2273E+02	-8.3511E+02	-4.0704E+02	1.2578E+03	2.4052E+03
	2.9147E+00	-5.7579E+00	-2.8064E+00	8.6726E+00	1.6583E+01
25	1.0448E+02	-8.6627E+02	-7.3630E+02	9.7075E+02	1.5546E+03
	7.2040E-01	-5.9727E+00	-5.0766E+00	6.6931E+00	1.0719E+01

Allowable Stress for Load Case 112

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	399.92	392.39	20.00	22.40	61.80
2	384.65	375.13	20.00	22.40	61.80
3	555.95	544.42	17.40	19.40	59.20
4	510.88	466.27	18.70	20.70	59.70
5	401.08	392.92	20.00	22.40	61.80
6	385.64	375.56	20.00	22.40	61.80
7	366.72	364.87	20.00	22.40	61.80
8	374.78	372.88	20.00	22.40	61.80
9	378.97	377.30	20.00	22.40	61.80
10	401.20	397.06	20.00	22.40	61.80
11	404.67	400.88	18.70	20.70	59.70
12	401.27	397.12	20.00	22.40	61.80
13	387.28	382.47	20.00	22.40	61.80
14	385.32	376.25	20.00	22.40	61.80
15	393.67	383.08	20.00	22.40	61.80
16	370.31	366.52	20.00	22.40	61.80
17	365.46	363.11	20.00	22.40	61.80
18	360.74	360.37	20.00	22.40	61.80
19	360.05	359.43	20.00	22.40	61.80
20	360.67	359.92	20.00	22.40	61.80
21	364.37	363.81	20.00	22.40	61.80
22	366.20	365.37	20.00	22.40	61.80
23	378.44	375.33	20.00	22.40	61.80
24	353.27	352.51	20.00	22.40	61.80
25	353.54	352.96	20.00	22.40	61.80

Table 2-332. Load Case 113, Fire at 90 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.0803E+02	-3.9938E+02	1.7669E+03	9.0742E+02	1.0829E+03
	3.5028E+00	-2.7536E+00	1.2182E+01	6.2564E+00	7.4661E+00
2	1.0004E+03	-3.9965E+02	4.4413E+02	1.4000E+03	2.9925E+03
	6.8975E+00	-2.7555E+00	3.0622E+00	9.6530E+00	2.0633E+01
3	1.8521E+03	-2.2693E+03	-1.6251E+03	4.1213E+03	7.9745E+03
	1.2770E+01	-1.5646E+01	-1.1205E+01	2.8416E+01	5.4982E+01
4	5.4734E+02	-2.7952E+02	-6.8948E+01	8.2686E+02	1.2022E+03
	3.7738E+00	-1.9272E+00	-4.7538E-01	5.7010E+00	8.2890E+00
5	5.1469E+02	-3.9754E+02	1.7827E+03	9.1222E+02	1.1247E+03
	3.5486E+00	-2.7409E+00	1.2291E+01	6.2896E+00	7.7547E+00
6	7.6580E+02	-5.3210E+02	5.2193E+02	1.2979E+03	2.6786E+03
	5.2800E+00	-3.6687E+00	3.5986E+00	8.9487E+00	1.8468E+01
7	2.5443E+03	-2.5460E+03	-2.8395E+02	5.0903E+03	9.2302E+03
	1.7542E+01	-1.7554E+01	-1.9578E+00	3.5096E+01	6.3640E+01
8	2.4879E+03	-2.1655E+03	-2.5477E+03	4.6534E+03	6.5900E+03
	1.7154E+01	-1.4930E+01	-1.7566E+01	3.2084E+01	4.5436E+01
9	1.5030E+03	-4.4309E+02	-2.1516E+03	1.9461E+03	3.5148E+03
	1.0363E+01	-3.0550E+00	-1.4835E+01	1.3418E+01	2.4234E+01
10	6.3340E+02	-3.5909E+02	-1.8232E+03	9.9249E+02	1.2169E+03
	4.3671E+00	-2.4759E+00	-1.2571E+01	6.8430E+00	8.3902E+00
11	6.4457E+02	-3.7906E+02	-1.9007E+03	1.0236E+03	1.2835E+03
	4.4441E+00	-2.6135E+00	-1.3105E+01	7.0576E+00	8.8494E+00
12	6.4323E+02	-3.7203E+02	-1.8265E+03	1.0153E+03	1.2753E+03
	4.4349E+00	-2.5651E+00	-1.2593E+01	7.0000E+00	8.7932E+00
13	7.6485E+02	-7.6903E+02	-8.0964E+02	1.5339E+03	2.0495E+03
	5.2734E+00	-5.3023E+00	-5.5823E+00	1.0576E+01	1.4131E+01
14	-1.2937E+02	-9.7560E+02	-6.8887E+02	8.4623E+02	2.3265E+02
	-8.9198E-01	-6.7266E+00	-4.7496E+00	5.8346E+00	1.6040E+00
15	1.5127E+01	-1.0202E+03	-9.9732E+02	1.0353E+03	2.3256E+02
	1.0430E-01	-7.0341E+00	-6.8763E+00	7.1383E+00	1.6035E+00

16	4.7359E+02	-1.1964E+03	4.6439E+01	1.6700E+03	1.4958E+02
	3.2653E+00	-8.2488E+00	3.2018E-01	1.1514E+01	1.0313E+00
17	7.0271E+02	-1.1536E+03	6.9688E+02	1.8563E+03	2.2240E+03
	4.8450E+00	-7.9535E+00	4.8048E+00	1.2799E+01	1.5334E+01
18	3.8149E+02	-4.7425E+02	-9.3715E+01	8.5574E+02	1.4217E+03
	2.6303E+00	-3.2698E+00	-6.4614E-01	5.9001E+00	9.8023E+00
19	9.2660E+01	-2.0249E+02	-3.0333E+01	2.9515E+02	5.2207E+02
	6.3887E-01	-1.3961E+00	-2.0914E-01	2.0350E+00	3.5996E+00
20	5.0327E+01	-1.4393E+02	-4.2692E+01	1.9426E+02	3.2635E+02
	3.4699E-01	-9.9237E-01	-2.9435E-01	1.3394E+00	2.2501E+00
21	2.2662E+02	-2.8236E+02	1.4628E+03	5.0898E+02	5.1601E+02
	1.5625E+00	-1.9468E+00	1.0086E+01	3.5093E+00	3.5577E+00
22	-9.3017E+00	-5.4179E+02	1.5969E+03	5.3249E+02	1.6958E+02
	-6.4133E-02	-3.7355E+00	1.1010E+01	3.6714E+00	1.1692E+00
23	-4.0282E+01	-1.2359E+03	9.0918E+01	1.1956E+03	1.9779E+02
	-2.7773E-01	-8.5211E+00	6.2685E-01	8.2434E+00	1.3637E+00
24	1.4836E+00	-3.1764E+02	-3.1494E+02	3.1913E+02	1.5532E+02
	1.0229E-02	-2.1901E+00	-2.1714E+00	2.2003E+00	1.0709E+00
25	-4.3215E+01	-3.8903E+02	-3.8071E+02	3.4581E+02	4.4874E+02
	-2.9796E-01	-2.6823E+00	-2.6249E+00	2.3843E+00	3.0939E+00

Allowable Stress for Load Case 113

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	398.22	395.17	20.00	22.40	61.80
2	393.07	388.37	20.00	22.40	61.80
3	498.91	495.76	18.70	20.70	59.70
4	487.01	466.98	18.70	20.70	59.70
5	399.31	395.78	20.00	22.40	61.80
6	393.94	388.59	20.00	22.40	61.80
7	383.28	380.17	20.00	22.40	61.80
8	391.66	389.16	20.00	22.40	61.80
9	395.72	394.01	20.00	22.40	61.80
10	431.16	426.77	18.70	20.70	59.70
11	437.59	433.65	18.70	20.70	59.70
12	430.98	426.58	18.70	20.70	59.70
13	405.49	400.31	18.70	20.70	59.70
14	399.13	388.14	20.00	22.40	61.80
15	401.11	390.36	20.00	22.40	61.80
16	384.06	378.88	20.00	22.40	61.80
17	379.18	375.34	20.00	22.40	61.80
18	362.47	361.99	20.00	22.40	61.80
19	362.20	361.41	20.00	22.40	61.80
20	362.99	362.12	20.00	22.40	61.80
21	371.17	370.19	20.00	22.40	61.80
22	374.48	373.14	20.00	22.40	61.80
23	386.04	382.74	20.00	22.40	61.80
24	355.37	353.89	20.00	22.40	61.80
25	353.92	353.25	20.00	22.40	61.80

Table 2-333. Load Case 114, Fire at 120 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.2184E+02	-2.8444E+02	9.9106E+02	6.0628E+02	1.4044E+02
	2.2190E+00	-1.9612E+00	6.8331E+00	4.1802E+00	9.6832E-01
2	2.9843E+02	-2.7927E+02	2.4822E+02	5.7771E+02	5.1619E+02
	2.0576E+00	-1.9255E+00	1.7114E+00	3.9831E+00	3.5590E+00
3	1.6076E+03	-1.9978E+03	-1.3005E+03	3.6054E+03	7.0990E+03
	1.1084E+01	-1.3775E+01	-8.9668E+00	2.4859E+01	4.8946E+01
4	4.4902E+02	-4.1615E+02	-1.5481E+02	8.6516E+02	1.4786E+03
	3.0959E+00	-2.8692E+00	-1.0674E+00	5.9651E+00	1.0195E+01
5	3.1924E+02	-2.7294E+02	1.0102E+03	5.9218E+02	7.7266E+01
	2.2011E+00	-1.8819E+00	6.9648E+00	4.0829E+00	5.3273E-01
6	3.4033E+02	-2.8321E+02	2.9940E+02	6.2354E+02	7.1245E+02
	2.3465E+00	-1.9526E+00	2.0643E+00	4.2991E+00	4.9121E+00
7	5.3217E+02	-4.1178E+03	-1.5852E+03	4.6500E+03	8.8655E+03
	3.6692E+00	-2.8391E+01	-1.0929E+01	3.2060E+01	6.1125E+01
8	7.8280E+02	-4.7236E+03	-3.8782E+03	5.5064E+03	8.7946E+03
	5.3972E+00	-3.2568E+01	-2.6739E+01	3.7965E+01	6.0636E+01
9	1.5544E+02	-2.3854E+03	-4.3231E+03	2.5408E+03	2.4932E+03
	1.0717E+00	-1.6447E+01	-2.9806E+01	1.7518E+01	1.7190E+01
10	-8.5017E+01	-9.3074E+02	-1.9587E+03	8.4572E+02	1.3900E+03
	-5.8617E-01	-6.4172E+00	-1.3505E+01	5.8311E+00	9.5838E+00
11	-7.8783E+01	-9.4614E+02	-2.0945E+03	8.6736E+02	1.4378E+03
	-5.4319E-01	-6.5234E+00	-1.4441E+01	5.9803E+00	9.9136E+00
12	-7.4575E+01	-9.4335E+02	-1.9870E+03	8.6878E+02	1.4361E+03
	-5.1417E-01	-6.5042E+00	-1.3700E+01	5.9900E+00	9.9014E+00
13	-1.2628E+02	-1.0156E+03	-1.6335E+03	8.8928E+02	1.4582E+03
	-8.7070E-01	-7.0021E+00	-1.1262E+01	6.1314E+00	1.0054E+01
14	-7.2692E+01	-1.2012E+03	-1.1071E+03	1.1285E+03	6.3177E+01
	-5.0119E-01	-8.2819E+00	-7.6330E+00	7.7807E+00	4.3559E-01
15	8.8924E+00	-1.2318E+03	-1.2158E+03	1.2407E+03	4.0581E+01
	6.1311E-02	-8.4927E+00	-8.3830E+00	8.5540E+00	2.7980E-01

16	-2.8192E+02	-2.3248E+03	-6.4936E+02	2.0429E+03	2.7288E+03
	-1.9438E+00	-1.6029E+01	-4.4772E+00	1.4085E+01	1.8814E+01
17	-4.4252E+01	-2.0400E+03	8.9270E+01	1.9957E+03	1.2934E+02
	-3.0510E-01	-1.4065E+01	6.1549E-01	1.3760E+01	8.9177E-01
18	4.7489E+02	-5.7714E+02	-6.5255E+01	1.0520E+03	1.7521E+03
	3.2742E+00	-3.9793E+00	-4.4992E-01	7.2535E+00	1.2080E+01
19	1.2287E+02	-2.4385E+02	-1.0406E+02	3.6672E+02	6.4166E+02
	8.4713E-01	-1.6813E+00	-7.1747E-01	2.5284E+00	4.4241E+00
20	6.2651E+01	-1.8246E+02	-1.0427E+02	2.4511E+02	4.1774E+02
	4.3196E-01	-1.2580E+00	-7.1889E-01	1.6900E+00	2.8802E+00
21	2.3364E+02	-3.1337E+02	1.5116E+03	5.4700E+02	4.9118E+02
	1.6109E+00	-2.1606E+00	1.0422E+01	3.7715E+00	3.3866E+00
22	-2.0436E+01	-5.7880E+02	1.5423E+03	5.5836E+02	3.0931E+02
	-1.4090E-01	-3.9907E+00	1.0634E+01	3.8498E+00	2.1326E+00
23	-5.4432E+01	-1.2149E+03	-7.6953E+01	1.1605E+03	3.3757E+02
	-3.7530E-01	-8.3764E+00	-5.3058E-01	8.0011E+00	2.3275E+00
24	3.8257E-01	-1.9938E+02	-1.9539E+02	1.9976E+02	3.4621E+01
	2.6377E-03	-1.3747E+00	-1.3472E+00	1.3773E+00	2.3870E-01
25	-3.8423E+01	-9.5780E+01	-6.5683E+01	5.7357E+01	5.3499E+01
	-2.6492E-01	-6.6038E-01	-4.5287E-01	3.9546E-01	3.6886E-01

Allowable Stress for Load Case 114

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	396.38	395.03	20.00	22.40	61.80
2	397.69	394.46	20.00	22.40	61.80
3	468.02	465.73	18.70	20.70	59.70
4	465.67	457.47	18.70	20.70	59.70
5	397.35	395.66	20.00	22.40	61.80
6	397.57	394.57	20.00	22.40	61.80
7	395.58	392.11	20.00	22.40	61.80
8	404.89	401.96	18.70	20.70	59.70
9	409.41	407.51	18.70	20.70	59.70
10	449.54	444.83	18.70	20.70	59.70
11	456.20	451.90	18.70	20.70	59.70
12	449.09	444.35	18.70	20.70	59.70
13	420.03	414.56	18.70	20.70	59.70
14	412.77	400.44	18.70	20.70	59.70
15	412.23	401.25	18.70	20.70	59.70
16	396.40	390.50	20.00	22.40	61.80
17	390.91	386.52	20.00	22.40	61.80
18	366.50	365.86	20.00	22.40	61.80
19	366.84	365.85	20.00	22.40	61.80
20	367.82	366.82	20.00	22.40	61.80
21	379.25	377.71	20.00	22.40	61.80
22	383.09	381.44	20.00	22.40	61.80
23	394.93	391.39	20.00	22.40	61.80
24	360.09	357.70	20.00	22.40	61.80
25	355.47	354.61	20.00	22.40	61.80

Table 2-334. Load Case 115, Fire at 150 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.6125E+02	-3.5973E+02	5.9503E+02	7.2098E+02	7.0776E+02
	2.4907E+00	-2.4803E+00	4.1026E+00	4.9710E+00	4.8798E+00
2	2.9121E+02	-4.0740E+02	1.2340E+02	6.9861E+02	5.8520E+02
	2.0078E+00	-2.8089E+00	8.5079E-01	4.8168E+00	4.0348E+00
3	1.3773E+03	-1.7334E+03	-9.3388E+02	3.1107E+03	6.1761E+03
	9.4961E+00	-1.1952E+01	-6.4389E+00	2.1448E+01	4.2583E+01
4	6.1758E+02	-7.3610E+02	-1.8192E+02	1.3537E+03	2.6103E+03
	4.2581E+00	-5.0753E+00	-1.2543E+00	9.3334E+00	1.7998E+01
5	3.4627E+02	-3.3576E+02	6.1311E+02	6.8203E+02	6.3412E+02
	2.3874E+00	-2.3150E+00	4.2273E+00	4.7024E+00	4.3721E+00
6	2.7797E+02	-3.5062E+02	1.7471E+02	6.2859E+02	3.8572E+02
	1.9165E+00	-2.4174E+00	1.2045E+00	4.3339E+00	2.6594E+00
7	1.1819E+03	-5.4804E+03	-1.7129E+03	6.6623E+03	1.3036E+04
	8.1489E+00	-3.7786E+01	-1.1810E+01	4.5935E+01	8.9877E+01
8	1.3714E+03	-6.1861E+03	-4.0078E+03	7.5575E+03	1.2117E+04
	9.4553E+00	-4.2652E+01	-2.7633E+01	5.2107E+01	8.3543E+01
9	2.1913E+02	-3.1738E+03	-4.7471E+03	3.3929E+03	3.8362E+03
	1.5109E+00	-2.1882E+01	-3.2730E+01	2.3393E+01	2.6450E+01
10	-1.5846E+02	-1.1551E+03	-2.0294E+03	9.9667E+02	1.4772E+03
	-1.0925E+00	-7.9644E+00	-1.3993E+01	6.8718E+00	1.0185E+01
11	-1.5885E+02	-1.1623E+03	-2.1691E+03	1.0035E+03	1.5022E+03
	-1.0953E+00	-8.0139E+00	-1.4956E+01	6.9186E+00	1.0357E+01
12	-1.5308E+02	-1.1617E+03	-2.0688E+03	1.0086E+03	1.5084E+03
	-1.0554E+00	-8.0097E+00	-1.4264E+01	6.9543E+00	1.0400E+01
13	-2.4288E+02	-1.2359E+03	-1.7298E+03	9.9305E+02	1.6131E+03
	-1.6746E+00	-8.5215E+00	-1.1926E+01	6.8469E+00	1.1122E+01
14	-1.0729E+02	-1.4186E+03	-1.2618E+03	1.3113E+03	1.7829E+02
	-7.3972E-01	-9.7806E+00	-8.6997E+00	9.0409E+00	1.2292E+00
15	7.5322E+00	-1.4709E+03	-1.4572E+03	1.4784E+03	1.6393E+02
	5.1933E-02	-1.0141E+01	-1.0047E+01	1.0193E+01	1.1302E+00

16	-2.8015E+02	-2.8694E+03	-7.5840E+02	2.5893E+03	3.1102E+03
	-1.9315E+00	-1.9784E+01	-5.2290E+00	1.7852E+01	2.1444E+01
17	-6.9257E+01	-2.5138E+03	1.5082E+01	2.4446E+03	5.2394E+02
	-4.7751E-01	-1.7332E+01	1.0399E-01	1.6855E+01	3.6124E+00
18	3.6311E+02	-4.3285E+02	-1.9663E+01	7.9595E+02	1.3116E+03
	2.5035E+00	-2.9844E+00	-1.3557E-01	5.4879E+00	9.0430E+00
19	1.0129E+02	-1.8378E+02	-1.3437E+02	2.8507E+02	5.0752E+02
	6.9837E-01	-1.2671E+00	-9.2647E-01	1.9655E+00	3.4993E+00
20	5.5342E+01	-1.5591E+02	-1.5760E+02	2.1125E+02	3.6026E+02
	3.8157E-01	-1.0749E+00	-1.0866E+00	1.4565E+00	2.4839E+00
21	2.4171E+02	-3.2404E+02	1.5652E+03	5.6575E+02	5.0102E+02
	1.6665E+00	-2.2342E+00	1.0791E+01	3.9007E+00	3.4544E+00
22	-2.1801E+01	-6.0020E+02	1.5925E+03	5.7840E+02	3.4383E+02
	-1.5031E-01	-4.1382E+00	1.0980E+01	3.9879E+00	2.3706E+00
23	-5.7816E+01	-1.2509E+03	-1.0081E+02	1.1931E+03	3.5427E+02
	-3.9863E-01	-8.6245E+00	-6.9509E-01	8.2259E+00	2.4426E+00
24	1.5386E+00	-1.5040E+02	-1.4486E+02	1.5194E+02	1.8141E+02
	1.0608E-02	-1.0370E+00	-9.9880E-01	1.0476E+00	1.2507E+00
25	2.0906E+02	-6.1453E+01	2.0185E+02	2.7051E+02	2.5573E+02
	1.4414E+00	-4.2370E-01	1.3917E+00	1.8651E+00	1.7632E+00

Allowable Stress for Load Case 115

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	396.75	394.74	20.00	22.40	61.80
2	402.53	397.62	20.00	22.40	61.80
3	449.73	445.77	18.70	20.70	59.70
4	449.82	447.92	18.70	20.70	59.70
5	397.45	395.35	20.00	22.40	61.80
6	402.34	397.69	20.00	22.40	61.80
7	403.24	399.87	20.00	22.40	61.80
8	413.10	410.04	18.70	20.70	59.70
9	417.95	415.95	18.70	20.70	59.70
10	457.55	452.68	18.70	20.70	59.70
11	463.47	458.95	18.70	20.70	59.70
12	456.94	452.05	18.70	20.70	59.70
13	428.98	423.43	18.70	20.70	59.70
14	421.97	409.78	18.70	20.70	59.70
15	422.24	411.15	18.70	20.70	59.70
16	405.14	399.14	20.00	22.40	61.80
17	399.18	394.83	20.00	22.40	61.80
18	372.00	371.24	20.00	22.40	61.80
19	372.83	371.69	20.00	22.40	61.80
20	373.94	372.86	20.00	22.40	61.80
21	386.43	384.77	20.00	22.40	61.80
22	390.40	388.68	20.00	22.40	61.80
23	402.69	399.03	20.00	22.40	61.80
24	366.45	363.50	20.00	22.40	61.80
25	358.65	357.60	20.00	22.40	61.80

Table 2-335. Load Case 116, Fire at 180 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.8540E+02	-4.0831E+02	3.6386E+02	7.9370E+02	1.0052E+03
	2.6572E+00	-2.8152E+00	2.5087E+00	5.4724E+00	6.9303E+00
2	3.6072E+02	-5.4660E+02	3.3719E+01	9.0732E+02	1.1527E+03
	2.4871E+00	-3.7687E+00	2.3248E-01	6.2558E+00	7.9474E+00
3	1.1861E+03	-1.5086E+03	-6.6264E+02	2.6947E+03	5.3693E+03
	8.1779E+00	-1.0401E+01	-4.5688E+00	1.8579E+01	3.7020E+01
4	6.8413E+02	-8.7496E+02	-1.8533E+02	1.5591E+03	3.0626E+03
	4.7169E+00	-6.0327E+00	-1.2778E+00	1.0750E+01	2.1116E+01
5	3.6845E+02	-3.8187E+02	3.7991E+02	7.5033E+02	9.2443E+02
	2.5404E+00	-2.6329E+00	2.6194E+00	5.1733E+00	6.3737E+00
6	3.4065E+02	-4.8306E+02	8.4127E+01	8.2371E+02	9.6589E+02
	2.3487E+00	-3.3306E+00	5.8004E-01	5.6793E+00	6.6596E+00
7	1.5563E+03	-6.1513E+03	-1.7179E+03	7.7076E+03	1.5149E+04
	1.0730E+01	-4.2412E+01	-1.1844E+01	5.3142E+01	1.0445E+02
8	1.6818E+03	-6.8729E+03	-3.9650E+03	8.5547E+03	1.3669E+04
	1.1596E+01	-4.7387E+01	-2.7337E+01	5.8982E+01	9.4247E+01
9	2.5337E+02	-3.5508E+03	-4.9090E+03	3.8042E+03	4.5066E+03
	1.7469E+00	-2.4482E+01	-3.3846E+01	2.6229E+01	3.1072E+01
10	-1.8795E+02	-1.2687E+03	-2.0538E+03	1.0808E+03	1.5141E+03
	-1.2959E+00	-8.7476E+00	-1.4161E+01	7.4517E+00	1.0439E+01
11	-1.9117E+02	-1.2713E+03	-2.1879E+03	1.0801E+03	1.5199E+03
	-1.3181E+00	-8.7653E+00	-1.5085E+01	7.4473E+00	1.0480E+01
12	-1.8561E+02	-1.2714E+03	-2.1039E+03	1.0858E+03	1.5295E+03
	-1.2797E+00	-8.7660E+00	-1.4506E+01	7.4863E+00	1.0546E+01
13	-3.1266E+02	-1.3914E+03	-1.6672E+03	1.0787E+03	1.8785E+03
	-2.1557E+00	-9.5932E+00	-1.1495E+01	7.4375E+00	1.2952E+01
14	-1.6993E+02	-1.6232E+03	-1.3458E+03	1.4533E+03	3.1041E+02
	-1.1716E+00	-1.1192E+01	-9.2791E+00	1.0020E+01	2.1402E+00
15	6.3360E+00	-1.7307E+03	-1.7177E+03	1.7371E+03	3.1567E+02
	4.3685E-02	-1.1933E+01	-1.1843E+01	1.1977E+01	2.1765E+00

16	-2.7991E+02	-3.1789E+03	-7.5974E+02	2.8990E+03	3.1340E+03
	-1.9299E+00	-2.1918E+01	-5.2382E+00	1.9988E+01	2.1608E+01
17	-9.8407E+01	-2.7903E+03	7.6768E+00	2.6919E+03	9.9105E+02
	-6.7849E-01	-1.9239E+01	5.2930E-02	1.8560E+01	6.8331E+00
18	3.6090E+02	-4.0678E+02	4.2305E+00	7.6768E+02	1.2589E+03
	2.4883E+00	-2.8047E+00	2.9168E-02	5.2930E+00	8.6800E+00
19	1.0140E+02	-1.7157E+02	-1.5226E+02	2.7297E+02	4.8620E+02
	6.9913E-01	-1.1829E+00	-1.0498E+00	1.8820E+00	3.3522E+00
20	5.7330E+01	-1.5443E+02	-1.8067E+02	2.1176E+02	3.6238E+02
	3.9528E-01	-1.0648E+00	-1.2457E+00	1.4601E+00	2.4985E+00
21	2.4034E+02	-3.2440E+02	1.6011E+03	5.6474E+02	5.0029E+02
	1.6571E+00	-2.2367E+00	1.1039E+01	3.8938E+00	3.4494E+00
22	-2.3046E+01	-6.1024E+02	1.6645E+03	5.8719E+02	3.5136E+02
	-1.5890E-01	-4.2075E+00	1.1476E+01	4.0486E+00	2.4226E+00
23	-5.9472E+01	-1.2995E+03	-5.6933E+01	1.2400E+03	3.5522E+02
	-4.1005E-01	-8.9598E+00	-3.9254E-01	8.5498E+00	2.4492E+00
24	3.5598E+00	-1.5597E+02	-1.4834E+02	1.5953E+02	2.5861E+02
	2.4544E-02	-1.0754E+00	-1.0228E+00	1.0999E+00	1.7831E+00
25	3.5667E+02	-5.7470E+01	3.5131E+02	4.1414E+02	4.0113E+02
	2.4592E+00	-3.9624E-01	2.4222E+00	2.8554E+00	2.7657E+00

Allowable Stress for Load Case 116

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	397.17	394.58	20.00	22.40	61.80
2	404.97	399.32	20.00	22.40	61.80
3	437.44	431.79	18.70	20.70	59.70
4	440.29	439.63	18.70	20.70	59.70
5	397.79	395.17	20.00	22.40	61.80
6	404.83	399.43	20.00	22.40	61.80
7	407.78	404.71	18.70	20.70	59.70
8	417.89	414.87	18.70	20.70	59.70
9	422.91	420.90	18.70	20.70	59.70
10	459.85	454.93	18.70	20.70	59.70
11	464.89	460.26	18.70	20.70	59.70
12	459.22	454.27	18.70	20.70	59.70
13	434.00	428.47	18.70	20.70	59.70
14	427.65	416.23	18.70	20.70	59.70
15	429.85	418.74	18.70	20.70	59.70
16	410.92	405.15	18.70	20.70	59.70
17	404.72	400.69	18.70	20.70	59.70
18	377.97	377.14	20.00	22.40	61.80
19	379.05	377.84	20.00	22.40	61.80
20	380.22	379.10	20.00	22.40	61.80
21	392.41	390.86	20.00	22.40	61.80
22	396.29	394.62	20.00	22.40	61.80
23	408.94	405.24	18.70	20.70	59.70
24	373.20	370.11	20.00	22.40	61.80
25	363.18	362.01	20.00	22.40	61.80

Table 2-336. Load Case 301, 30-ft. Head-On Drop, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-5.3589E+01	-3.8128E+03	-8.1400E+02	3.7592E+03	1.7416E+03
	-3.6948E-01	-2.6289E+01	-5.6123E+00	2.5919E+01	1.2008E+01
2	2.9106E+01	-4.7125E+03	-7.8313E+02	4.7416E+03	1.3332E+03
	2.0068E-01	-3.2492E+01	-5.3995E+00	3.2692E+01	9.1924E+00
3	1.0558E+01	-2.6737E+03	3.1340E+01	2.6842E+03	4.0202E+01
	7.2798E-02	-1.8434E+01	2.1608E-01	1.8507E+01	2.7718E-01
4	5.1548E+01	-2.5964E+03	-1.3754E+02	2.6479E+03	8.1897E+01
	3.5541E-01	-1.7901E+01	-9.4833E-01	1.8257E+01	5.6466E-01
5	1.9029E+01	-1.7292E+03	1.0463E+02	1.7482E+03	2.4464E+02
	1.3120E-01	-1.1922E+01	7.2137E-01	1.2054E+01	1.6867E+00
6	6.8413E+01	-1.3872E+03	-4.7712E+01	1.4556E+03	1.3845E+02
	4.7169E-01	-9.5646E+00	-3.2896E-01	1.0036E+01	9.5458E-01
7	2.6399E+03	-7.3981E+03	-1.9457E+03	1.0038E+04	1.2241E+04
	1.8201E+01	-5.1008E+01	-1.3415E+01	6.9209E+01	8.4396E+01
8	1.3652E+03	-4.0179E+03	-1.2151E+03	5.3830E+03	8.3717E+03
	9.4124E+00	-2.7702E+01	-8.3782E+00	3.7115E+01	5.7721E+01
9	-4.1650E+02	-2.0893E+03	-1.4120E+03	1.6728E+03	2.1514E+03
	-2.8716E+00	-1.4405E+01	-9.7357E+00	1.1534E+01	1.4833E+01
10	-3.3457E+00	-8.4685E+02	-1.0799E+01	8.4351E+02	2.7021E+01
	-2.3068E-02	-5.8388E+00	-7.4456E-02	5.8158E+00	1.8630E-01
11	-1.5832E+00	-6.7331E+02	-1.6293E+01	6.7172E+02	5.0604E-01
	-1.0916E-02	-4.6423E+00	-1.1234E-01	4.6314E+00	3.4890E-03
12	-7.5818E-01	-5.9588E+02	-1.7722E+01	5.9512E+02	2.8948E+00
	-5.2275E-03	-4.1084E+00	-1.2219E-01	4.1032E+00	1.9959E-02
13	-1.0546E+02	-7.3327E+02	7.0266E+01	6.2781E+02	5.2596E+02
	-7.2710E-01	-5.0557E+00	4.8446E-01	4.3286E+00	3.6264E+00
14	2.8147E+02	-4.0222E+02	1.1507E+02	6.8369E+02	2.9360E+02
	1.9407E+00	-2.7732E+00	7.9339E-01	4.7139E+00	2.0243E+00
15	2.1218E+02	-3.1219E+02	1.7945E+02	5.2436E+02	9.1244E+02
	1.4629E+00	-2.1525E+00	1.2373E+00	3.6154E+00	6.2910E+00

16	4.9562E+02	-1.5442E+02	2.4478E+02	6.5005E+02	1.2749E+02
	3.4172E+00	-1.0647E+00	1.6877E+00	4.4819E+00	8.7902E-01
17	5.0220E+02	-6.6834E+01	3.1051E+02	5.6904E+02	5.4739E+01
	3.4626E+00	-4.6081E-01	2.1409E+00	3.9234E+00	3.7741E-01
18	1.5163E+03	3.6960E+01	-1.1951E+02	1.4793E+03	1.0619E+02
	1.0454E+01	2.5483E-01	-8.2398E-01	1.0199E+01	7.3214E-01
19	7.2047E+02	-7.6998E+02	-2.0752E+02	1.4905E+03	1.3510E+03
	4.9675E+00	-5.3088E+00	-1.4308E+00	1.0276E+01	9.3146E+00
20	9.0643E+02	-7.0345E+02	-4.5076E+02	1.6099E+03	2.0358E+03
	6.2496E+00	-4.8501E+00	-3.1079E+00	1.1100E+01	1.4036E+01
21	1.0504E+03	-1.8428E+03	8.0577E+00	2.8932E+03	4.1098E+03
	7.2422E+00	-1.2706E+01	5.5556E-02	1.9948E+01	2.8336E+01
22	7.5281E+02	-2.0716E+03	-7.5505E+02	2.8244E+03	3.0969E+03
	5.1904E+00	-1.4283E+01	-5.2059E+00	1.9474E+01	2.1353E+01
23	6.0898E+02	-1.7165E+03	-6.8700E+02	2.3255E+03	4.2889E+03
	4.1988E+00	-1.1835E+01	-4.7367E+00	1.6034E+01	2.9571E+01
24	1.6846E+03	1.4540E+02	1.3718E+02	1.5392E+03	6.1954E+02
	1.1615E+01	1.0025E+00	9.4585E-01	1.0612E+01	4.2716E+00
25	1.2277E+03	1.3746E+01	7.6424E+02	1.2140E+03	1.5514E+03
	8.4650E+00	9.4776E-02	5.2692E+00	8.3702E+00	1.0696E+01

Table 2-337. Load Case 302, 30-ft. Side Drop, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.7249E+03	-4.5683E+03	-1.7807E+04	1.6300E+04	4.0006E+03
	1.1892E+01	-3.1498E+01	-1.2278E+02	1.1238E+02	2.7583E+01
2	1.2218E+03	-7.0847E+02	-1.1213E+04	1.1744E+04	1.4567E+03
	8.4243E+00	-4.8847E+00	-7.7312E+01	8.0970E+01	1.0044E+01
3	1.8760E+03	-5.2057E+03	-1.6194E+04	1.4823E+04	4.4313E+03
	1.2934E+01	-3.5892E+01	-1.1166E+02	1.0220E+02	3.0553E+01
4	1.2544E+03	-2.3954E+03	-9.0881E+03	9.3944E+03	1.1178E+03
	8.6487E+00	-1.6516E+01	-6.2660E+01	6.4772E+01	7.7070E+00
5	1.6917E+03	-4.4663E+03	-1.7542E+04	1.6174E+04	4.1658E+03
	1.1664E+01	-3.0794E+01	-1.2095E+02	1.1152E+02	2.8722E+01
6	1.3303E+03	-5.8495E+02	-1.0967E+04	1.1538E+04	1.4739E+03
	9.1723E+00	-4.0331E+00	-7.5612E+01	7.9554E+01	1.0162E+01
7	2.2732E+03	4.7640E+02	-7.5012E+03	9.4973E+03	2.6841E+03
	1.5673E+01	3.2847E+00	-5.1719E+01	6.5482E+01	1.8506E+01
8	2.0667E+03	5.8112E+02	-8.4279E+03	9.8992E+03	4.6049E+02
	1.4249E+01	4.0067E+00	-5.8108E+01	6.8253E+01	3.1750E+00
9	2.4731E+03	5.8733E+02	-7.0342E+03	8.7283E+03	6.5257E+02
	1.7052E+01	4.0495E+00	-4.8499E+01	6.0180E+01	4.4993E+00
10	4.6542E+03	2.5444E+03	7.6036E+01	8.3720E+03	9.0583E+02
	3.2089E+01	1.7543E+01	5.2425E-01	5.7723E+01	6.2455E+00
11	4.8551E+03	2.5699E+03	1.1910E+02	7.9732E+03	9.1356E+02
	3.3475E+01	1.7719E+01	8.2118E-01	5.4974E+01	6.2988E+00
12	4.6022E+03	2.5557E+03	7.0326E+01	8.2807E+03	9.1493E+02
	3.1731E+01	1.7621E+01	4.8488E-01	5.7093E+01	6.3083E+00
13	2.9041E+03	1.5997E+03	-5.9040E+03	8.5643E+03	1.2137E+03
	2.0023E+01	1.1029E+01	-4.0707E+01	5.9049E+01	8.3681E+00
14	1.7176E+03	-5.4970E+02	-7.8780E+03	8.7961E+03	2.9025E+03
	1.1843E+01	-3.7900E+00	-5.4317E+01	6.0647E+01	2.0012E+01
15	6.4662E+02	-1.4733E+02	-5.8589E+03	6.5055E+03	7.5293E+02
	4.4583E+00	-1.0158E+00	-4.0396E+01	4.4854E+01	5.1913E+00

16	2.0681E+03	3.2886E+02	-7.7682E+03	9.1745E+03	3.4983E+02
	1.4259E+01	2.2674E+00	-5.3560E+01	6.3256E+01	2.4120E+00
17	1.7125E+03	1.6679E+02	-7.7458E+03	8.9595E+03	1.8386E+03
	1.1807E+01	1.1500E+00	-5.3406E+01	6.1773E+01	1.2676E+01
18	4.3477E+02	-3.4990E+02	-4.5081E+03	4.9428E+03	1.8063E+02
	2.9977E+00	-2.4125E+00	-3.1082E+01	3.4080E+01	1.2454E+00
19	1.5186E+03	-1.6891E+02	-8.1050E+03	8.5048E+03	9.9258E+02
	1.0471E+01	-1.1646E+00	-5.5882E+01	5.8638E+01	6.8436E+00
20	1.5308E+03	6.8242E+02	-6.7316E+03	7.9376E+03	9.2619E+02
	1.0554E+01	4.7051E+00	-4.6413E+01	5.4728E+01	6.3859E+00
21	2.2478E+03	7.1034E+02	-6.5348E+03	8.4239E+03	5.0359E+02
	1.5498E+01	4.8977E+00	-4.5056E+01	5.8081E+01	3.4721E+00
22	1.6263E+03	-2.4449E+02	-9.2421E+03	1.0214E+04	4.8162E+02
	1.1213E+01	-1.6857E+00	-6.3722E+01	7.0424E+01	3.3207E+00
23	1.4189E+03	-1.1005E+01	-6.9570E+03	7.8525E+03	1.0302E+03
	9.7827E+00	-7.5876E-02	-4.7967E+01	5.4141E+01	7.1027E+00
24	3.6153E+02	-1.0719E+02	-4.9286E+03	5.2914E+03	5.3725E+02
	2.4926E+00	-7.3905E-01	-3.3982E+01	3.6483E+01	3.7042E+00
25	3.1647E+02	-9.2843E+01	-5.2663E+03	5.5852E+03	4.9776E+02
	2.1820E+00	-6.4013E-01	-3.6310E+01	3.8508E+01	3.4319E+00

Table 2-338. Load Case 303, 30-ft. Cg/Corner Drop, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.8132E+02	-1.8769E+02	-2.0324E+03	2.2179E+03	1.7482E+03
	3.3186E+00	-1.2941E+00	-1.4013E+01	1.5292E+01	1.2054E+01
2	3.9749E+02	1.0773E+02	-1.3510E+03	2.9202E+03	3.1184E+02
	2.7406E+00	7.4278E-01	-9.3151E+00	2.0134E+01	2.1500E+00
3	5.2015E+02	-1.4902E+02	-1.6943E+03	2.2144E+03	2.5893E+02
	3.5863E+00	-1.0275E+00	-1.1682E+01	1.5268E+01	1.7853E+00
4	2.9965E+02	-8.7296E+01	-9.2038E+02	1.7570E+03	4.6581E+01
	2.0660E+00	-6.0188E-01	-6.3458E+00	1.2114E+01	3.2116E-01
5	9.2333E+02	-6.7235E+01	-8.8086E+02	1.8042E+03	7.8475E+01
	6.3661E+00	-4.6357E-01	-6.0733E+00	1.2439E+01	5.4107E-01
6	3.4522E+02	-1.6482E+02	-4.8650E+02	8.3172E+02	1.0880E+02
	2.3802E+00	-1.1364E+00	-3.3543E+00	5.7345E+00	7.5016E-01
7	3.0818E+02	1.2932E+02	-1.4423E+03	4.4854E+03	8.0345E+02
	2.1248E+00	8.9166E-01	-9.9444E+00	3.0926E+01	5.5396E+00
8	3.8147E+02	-2.2525E+02	-2.0200E+03	2.1707E+03	4.6393E+02
	2.6301E+00	-1.5531E+00	-1.3928E+01	1.4966E+01	3.1987E+00
9	4.1723E+02	-4.7409E+02	-2.0221E+03	2.4824E+03	5.3446E+02
	2.8767E+00	-3.2687E+00	-1.3942E+01	1.7116E+01	3.6849E+00
10	4.8333E+02	1.0433E+02	-1.9151E+02	2.5926E+03	1.1843E+02
	3.3325E+00	7.1936E-01	-1.3204E+00	1.7875E+01	8.1655E-01
11	3.4024E+02	6.1857E+01	-2.3804E+02	2.1706E+03	5.2429E+01
	2.3458E+00	4.2649E-01	-1.6412E+00	1.4966E+01	3.6148E-01
12	3.4347E+02	2.3629E+01	-2.3887E+02	1.5370E+03	3.5996E+01
	2.3681E+00	1.6292E-01	-1.6470E+00	1.0597E+01	2.4818E-01
13	3.7700E+02	-7.4360E+01	-2.0896E+02	1.3427E+03	7.3672E+02
	2.5993E+00	-5.1270E-01	-1.4407E+00	9.2573E+00	5.0795E+00
14	4.2379E+02	8.1476E+01	-7.2541E+01	9.7591E+02	3.4486E+02
	2.9219E+00	5.6176E-01	-5.0015E-01	6.7287E+00	2.3777E+00
15	2.5701E+02	1.2432E+02	-2.8684E+01	2.8569E+02	1.5188E+02
	1.7720E+00	8.5714E-01	-1.9777E-01	1.9698E+00	1.0472E+00

16	3.4447E+02	-1.0722E+02	-2.3123E+02	8.2678E+02	1.1652E+02
	2.3750E+00	-7.3928E-01	-1.5943E+00	5.7005E+00	8.0338E-01
17	3.2677E+02	-1.3809E+02	-2.6731E+02	7.5174E+02	3.7808E+01
	2.2530E+00	-9.5209E-01	-1.8430E+00	5.1831E+00	2.6068E-01
18	5.4436E+02	1.0117E+02	-7.8578E+02	1.3674E+03	4.2326E+01
	3.7532E+00	6.9751E-01	-5.4178E+00	9.4276E+00	2.9183E-01
19	5.8322E+02	3.6595E+01	-1.1119E+03	2.7637E+03	3.3265E+02
	4.0212E+00	2.5231E-01	-7.6664E+00	1.9055E+01	2.2935E+00
20	4.8382E+02	1.4851E+02	-9.3228E+02	2.4984E+03	6.0299E+02
	3.3358E+00	1.0239E+00	-6.4279E+00	1.7226E+01	4.1574E+00
21	4.4984E+02	-1.5370E+01	-1.3407E+03	2.3167E+03	6.8542E+02
	3.1015E+00	-1.0597E-01	-9.2439E+00	1.5973E+01	4.7258E+00
22	4.4408E+02	-1.8003E+02	-2.0069E+03	2.1700E+03	5.8271E+02
	3.0618E+00	-1.2413E+00	-1.3837E+01	1.4962E+01	4.0176E+00
23	2.7327E+02	-3.4550E+02	-1.7975E+03	1.9596E+03	3.2505E+02
	1.8841E+00	-2.3821E+00	-1.2393E+01	1.3511E+01	2.2411E+00
24	1.8168E+02	-3.2454E+01	-1.7914E+02	3.5376E+02	3.6308E+01
	1.2527E+00	-2.2377E-01	-1.2351E+00	2.4391E+00	2.5033E-01
25	7.5926E+02	4.3072E+01	-7.7829E+02	1.5673E+03	1.6046E+02
	5.2349E+00	2.9697E-01	-5.3661E+00	1.0806E+01	1.1063E+00

Table 2-339. Load Case 304, 30-ft. Head-On Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-7.5024E+01	-5.3380E+03	-1.1396E+03	5.2629E+03	2.4383E+03
	-5.1727E-01	-3.6804E+01	-7.8572E+00	3.6287E+01	1.6811E+01
2	4.0749E+01	-6.5976E+03	-1.0964E+03	6.6383E+03	1.8665E+03
	2.8095E-01	-4.5489E+01	-7.5593E+00	4.5769E+01	1.2869E+01
3	1.4782E+01	-3.7431E+03	4.3876E+01	3.7579E+03	5.6283E+01
	1.0192E-01	-2.5808E+01	3.0252E-01	2.5910E+01	3.8806E-01
4	7.2167E+01	-3.6349E+03	-1.9256E+02	3.7071E+03	1.1466E+02
	4.9757E-01	-2.5062E+01	-1.3277E+00	2.5559E+01	7.9053E-01
5	2.6641E+01	-2.4209E+03	1.4648E+02	2.4475E+03	3.4250E+02
	1.8368E-01	-1.6691E+01	1.0099E+00	1.6875E+01	2.3614E+00
6	9.5779E+01	-1.9421E+03	-6.6797E+01	2.0379E+03	1.9383E+02
	6.6037E-01	-1.3390E+01	-4.6055E-01	1.4051E+01	1.3364E+00
7	3.6958E+03	-1.0357E+04	-2.7239E+03	1.4053E+04	1.7137E+04
	2.5482E+01	-7.1411E+01	-1.8781E+01	9.6893E+01	1.1815E+02
8	1.9112E+03	-5.6250E+03	-1.7012E+03	7.5363E+03	1.1720E+04
	1.3177E+01	-3.8783E+01	-1.1729E+01	5.1961E+01	8.0810E+01
9	-5.8310E+02	-2.9250E+03	-1.9769E+03	2.3419E+03	3.0120E+03
	-4.0203E+00	-2.0167E+01	-1.3630E+01	1.6147E+01	2.0767E+01
10	-4.6840E+00	-1.1856E+03	-1.5118E+01	1.1809E+03	3.7829E+01
	-3.2295E-02	-8.1744E+00	-1.0424E-01	8.1421E+00	2.6082E-01
11	-2.2165E+00	-9.4263E+02	-2.2810E+01	9.4041E+02	7.0846E-01
	-1.5282E-02	-6.4992E+00	-1.5727E-01	6.4839E+00	4.8847E-03
12	-1.0615E+00	-8.3423E+02	-2.4810E+01	8.3317E+02	4.0527E+00
	-7.3185E-03	-5.7518E+00	-1.7106E-01	5.7445E+00	2.7942E-02
13	-1.4764E+02	-1.0266E+03	9.8372E+01	8.7893E+02	7.3634E+02
	-1.0179E+00	-7.0780E+00	6.7825E-01	6.0600E+00	5.0769E+00
14	3.9406E+02	-5.6310E+02	1.6110E+02	9.5717E+02	4.1104E+02
	2.7170E+00	-3.8825E+00	1.1108E+00	6.5994E+00	2.8340E+00
15	2.9705E+02	-4.3707E+02	2.5123E+02	7.3411E+02	1.2774E+03
	2.0481E+00	-3.0135E+00	1.7322E+00	5.0615E+00	8.8074E+00

16	6.9387E+02	-2.1619E+02	3.4269E+02	9.1007E+02	1.7849E+02
	4.7841E+00	-1.4906E+00	2.3628E+00	6.2747E+00	1.2306E+00
17	7.0308E+02	-9.3568E+01	4.3471E+02	7.9665E+02	7.6634E+01
	4.8476E+00	-6.4513E-01	2.9972E+00	5.4927E+00	5.2837E-01
18	2.1228E+03	5.1745E+01	-1.6731E+02	2.0710E+03	1.4866E+02
	1.4636E+01	3.5677E-01	-1.1536E+00	1.4279E+01	1.0250E+00
19	1.0087E+03	-1.0780E+03	-2.9053E+02	2.0866E+03	1.8914E+03
	6.9544E+00	-7.4324E+00	-2.0031E+00	1.4387E+01	1.3040E+01
20	1.2690E+03	-9.8483E+02	-6.3107E+02	2.2538E+03	2.8501E+03
	8.7495E+00	-6.7901E+00	-4.3510E+00	1.5540E+01	1.9651E+01
21	1.4705E+03	-2.5800E+03	1.1281E+01	4.0505E+03	5.7537E+03
	1.0139E+01	-1.7788E+01	7.7778E-02	2.7927E+01	3.9671E+01
22	1.0539E+03	-2.9003E+03	-1.0571E+03	3.9542E+03	4.3357E+03
	7.2666E+00	-1.9997E+01	-7.2882E+00	2.7263E+01	2.9894E+01
23	8.5257E+02	-2.4031E+03	-9.6180E+02	3.2557E+03	6.0045E+03
	5.8783E+00	-1.6569E+01	-6.6314E+00	2.2447E+01	4.1399E+01
24	2.3584E+03	2.0356E+02	1.9206E+02	2.1549E+03	8.6736E+02
	1.6261E+01	1.4035E+00	1.3242E+00	1.4857E+01	5.9802E+00
25	1.7188E+03	1.9245E+01	1.0699E+03	1.6996E+03	2.1719E+03
	1.1851E+01	1.3269E-01	7.3769E+00	1.1718E+01	1.4975E+01

Table 2-340. Load Case 305, 30-ft. Side Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.9735E+03	-7.6581E+03	-3.0033E+04	2.7574E+04	6.7582E+03
	2.0501E+01	-5.2801E+01	-2.0707E+02	1.9011E+02	4.6596E+01
2	1.7253E+03	-1.1794E+03	-1.8748E+04	1.9707E+04	2.3989E+03
	1.1896E+01	-8.1315E+00	-1.2926E+02	1.3587E+02	1.6540E+01
3	2.7953E+03	-8.7158E+03	-2.7692E+04	2.5479E+04	6.1428E+03
	1.9273E+01	-6.0093E+01	-1.9093E+02	1.7567E+02	4.2353E+01
4	2.1675E+03	-3.9049E+03	-1.5483E+04	1.6145E+04	1.8665E+03
	1.4944E+01	-2.6923E+01	-1.0675E+02	1.1131E+02	1.2869E+01
5	2.9171E+03	-7.4918E+03	-2.9601E+04	2.7374E+04	7.0338E+03
	2.0113E+01	-5.1654E+01	-2.0409E+02	1.8874E+02	4.8496E+01
6	1.8367E+03	-9.7788E+02	-1.8336E+04	1.9362E+04	2.4115E+03
	1.2664E+01	-6.7423E+00	-1.2642E+02	1.3349E+02	1.6626E+01
7	3.2821E+03	7.6638E+02	-1.2166E+04	1.4385E+04	4.3223E+03
	2.2629E+01	5.2840E+00	-8.3879E+01	9.9178E+01	2.9801E+01
8	2.9415E+03	7.0888E+02	-1.3359E+04	1.5317E+04	7.3455E+02
	2.0281E+01	4.8875E+00	-9.2106E+01	1.0560E+02	5.0646E+00
9	3.5691E+03	8.4417E+02	-1.1117E+04	1.4083E+04	1.0257E+03
	2.4608E+01	5.8204E+00	-7.6647E+01	9.7100E+01	7.0722E+00
10	7.7199E+03	4.1099E+03	1.2320E+02	1.3094E+04	1.4597E+03
	5.3227E+01	2.8337E+01	8.4944E-01	9.0280E+01	1.0064E+01
11	8.0572E+03	4.1728E+03	1.8708E+02	1.2604E+04	1.4741E+03
	5.5553E+01	2.8771E+01	1.2899E+00	8.6905E+01	1.0163E+01
12	7.6333E+03	4.1311E+03	1.1197E+02	1.2949E+04	1.4732E+03
	5.2630E+01	2.8483E+01	7.7202E-01	8.9277E+01	1.0158E+01
13	4.2326E+03	2.7148E+03	-9.3204E+03	1.3357E+04	1.8656E+03
	2.9183E+01	1.8718E+01	-6.4262E+01	9.2094E+01	1.2863E+01
14	2.8671E+03	-8.1624E+02	-1.2411E+04	1.4053E+04	4.5677E+03
	1.9768E+01	-5.6278E+00	-8.5569E+01	9.6892E+01	3.1493E+01
15	1.2413E+03	-2.1471E+02	-8.9976E+03	1.0239E+04	1.1421E+03
	8.5582E+00	-1.4804E+00	-6.2037E+01	7.0595E+01	7.8742E+00

16	2.9371E+03	4.7607E+02	-1.2333E+04	1.4073E+04	5.4265E+02
	2.0250E+01	3.2824E+00	-8.5030E+01	9.7033E+01	3.7414E+00
17	2.4433E+03	5.6009E+02	-1.2489E+04	1.3964E+04	2.7753E+03
	1.6846E+01	3.8617E+00	-8.6105E+01	9.6281E+01	1.9135E+01
18	7.9986E+02	-5.2711E+02	-6.8534E+03	7.6532E+03	2.4989E+02
	5.5148E+00	-3.6343E+00	-4.7252E+01	5.2767E+01	1.7229E+00
19	2.5130E+03	-2.4977E+02	-1.2957E+04	1.3671E+04	1.5820E+03
	1.7327E+01	-1.7221E+00	-8.9334E+01	9.4262E+01	1.0908E+01
20	2.5244E+03	1.1230E+03	-1.0800E+04	1.2808E+04	1.3357E+03
	1.7405E+01	7.7427E+00	-7.4465E+01	8.8310E+01	9.2094E+00
21	3.1985E+03	1.2011E+03	-1.0575E+04	1.2579E+04	7.2058E+02
	2.2053E+01	8.2814E+00	-7.2911E+01	8.6732E+01	4.9682E+00
22	2.7080E+03	-2.8079E+02	-1.4852E+04	1.5567E+04	6.7688E+02
	1.8671E+01	-1.9359E+00	-1.0240E+02	1.0733E+02	4.6669E+00
23	2.2657E+03	6.4494E+01	-1.1019E+04	1.2508E+04	1.6185E+03
	1.5621E+01	4.4467E-01	-7.5974E+01	8.6240E+01	1.1159E+01
24	7.1547E+02	-1.5787E+02	-7.4932E+03	8.2087E+03	8.0159E+02
	4.9330E+00	-1.0885E+00	-5.1664E+01	5.6597E+01	5.5268E+00
25	6.4518E+02	-1.3598E+02	-8.0034E+03	8.6513E+03	7.5766E+02
	4.4483E+00	-9.3758E-01	-5.5182E+01	5.9648E+01	5.2239E+00

Table 2-341. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.7350E+02	-2.6496E+02	-2.8582E+03	3.1114E+03	2.4513E+03
	4.6436E+00	-1.8269E+00	-1.9707E+01	2.1453E+01	1.6901E+01
2	5.5579E+02	1.5158E+02	-1.8990E+03	4.0865E+03	4.3450E+02
	3.8320E+00	1.0451E+00	-1.3093E+01	2.8176E+01	2.9957E+00
3	7.2220E+02	-2.0934E+02	-2.3754E+03	3.0976E+03	3.6317E+02
	4.9794E+00	-1.4433E+00	-1.6378E+01	2.1357E+01	2.5040E+00
4	4.1896E+02	-1.2215E+02	-1.2902E+03	2.4599E+03	6.5283E+01
	2.8886E+00	-8.4217E-01	-8.8954E+00	1.6961E+01	4.5011E-01
5	1.2907E+03	-9.4079E+01	-1.2311E+03	2.5219E+03	1.1003E+02
	8.8993E+00	-6.4865E-01	-8.4885E+00	1.7388E+01	7.5861E-01
6	4.8243E+02	-2.3065E+02	-6.8027E+02	1.1627E+03	1.5243E+02
	3.3263E+00	-1.5902E+00	-4.6903E+00	8.0166E+00	1.0509E+00
7	4.3073E+02	1.8139E+02	-2.0258E+03	6.2808E+03	1.1266E+03
	2.9698E+00	1.2506E+00	-1.3967E+01	4.3305E+01	7.7679E+00
8	5.3449E+02	-3.1456E+02	-2.8346E+03	3.0418E+03	6.4948E+02
	3.6852E+00	-2.1688E+00	-1.9544E+01	2.0973E+01	4.4780E+00
9	5.8474E+02	-6.6297E+02	-2.8354E+03	3.4786E+03	7.4799E+02
	4.0316E+00	-4.5710E+00	-1.9549E+01	2.3984E+01	5.1572E+00
10	6.7939E+02	1.4656E+02	-2.6685E+02	3.6309E+03	1.6606E+02
	4.6842E+00	1.0105E+00	-1.8399E+00	2.5034E+01	1.1449E+00
11	4.7583E+02	8.6803E+01	-3.3200E+02	3.0386E+03	7.3778E+01
	3.2808E+00	5.9849E-01	-2.2890E+00	2.0950E+01	5.0868E-01
12	4.7890E+02	3.3465E+01	-3.3344E+02	2.1505E+03	5.0596E+01
	3.3019E+00	2.3073E-01	-2.2990E+00	1.4827E+01	3.4885E-01
13	5.2554E+02	-1.0373E+02	-2.9236E+02	1.8796E+03	1.0309E+03
	3.6235E+00	-7.1518E-01	-2.0157E+00	1.2959E+01	7.1078E+00
14	5.9152E+02	1.1423E+02	-1.0132E+02	1.3656E+03	4.8226E+02
	4.0784E+00	7.8762E-01	-6.9858E-01	9.4152E+00	3.3250E+00
15	3.5917E+02	1.7458E+02	-3.9994E+01	3.9917E+02	2.1275E+02
	2.4764E+00	1.2037E+00	-2.7575E-01	2.7522E+00	1.4669E+00

16	4.8112E+02	-1.4984E+02	-3.2355E+02	1.1561E+03	1.6326E+02
	3.3172E+00	-1.0331E+00	-2.2308E+00	7.9710E+00	1.1256E+00
17	4.5645E+02	-1.9282E+02	-3.7391E+02	1.0512E+03	5.3010E+01
	3.1471E+00	-1.3294E+00	-2.5781E+00	7.2475E+00	3.6549E-01
18	7.6232E+02	1.4125E+02	-1.1035E+03	1.9179E+03	5.9145E+01
	5.2560E+00	9.7389E-01	-7.6083E+00	1.3223E+01	4.0779E-01
19	8.1786E+02	5.1354E+01	-1.5645E+03	3.8737E+03	4.6634E+02
	5.6389E+00	3.5407E-01	-1.0787E+01	2.6708E+01	3.2153E+00
20	6.7855E+02	2.0841E+02	-1.3118E+03	3.5008E+03	8.4372E+02
	4.6784E+00	1.4369E+00	-9.0444E+00	2.4137E+01	5.8173E+00
21	6.3032E+02	-2.0927E+01	-1.8826E+03	3.2450E+03	9.5987E+02
	4.3459E+00	-1.4428E-01	-1.2980E+01	2.2374E+01	6.6181E+00
22	6.2248E+02	-2.5209E+02	-2.8173E+03	3.0406E+03	8.1619E+02
	4.2918E+00	-1.7381E+00	-1.9425E+01	2.0964E+01	5.6274E+00
23	3.8311E+02	-4.8378E+02	-2.5214E+03	2.7461E+03	4.5560E+02
	2.6415E+00	-3.3356E+00	-1.7384E+01	1.8934E+01	3.1413E+00
24	2.5388E+02	-4.5344E+01	-2.5085E+02	4.9493E+02	5.0719E+01
	1.7504E+00	-3.1264E-01	-1.7296E+00	3.4124E+00	3.4970E-01
25	1.0630E+03	6.0175E+01	-1.0936E+03	2.1983E+03	2.2462E+02
	7.3293E+00	4.1489E-01	-7.5403E+00	1.5157E+01	1.5487E+00

Table 2-342. Load Case 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-165B

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2284E-01	-1.0728E+02	9.3151E+01	1.0741E+02	1.0334E+02
	8.4693E-04	-7.3970E-01	6.4225E-01	7.4054E-01	7.1253E-01
2	7.4606E+01	-2.6287E+02	3.0234E+02	3.3747E+02	1.7564E+02
	5.1439E-01	-1.8124E+00	2.0845E+00	2.3268E+00	1.2110E+00
3	1.8012E-01	-9.6583E+01	2.0205E+01	9.6763E+01	1.1236E+01
	1.2419E-03	-6.6592E-01	1.3931E-01	6.6716E-01	7.7468E-02
4	1.5509E+00	-2.4426E+02	-1.1744E+01	2.4581E+02	3.8207E+01
	1.0693E-02	-1.6841E+00	-8.0973E-02	1.6948E+00	2.6342E-01
5	-5.8095E-01	-3.7114E+01	4.8995E+00	3.6533E+01	2.0775E+00
	-4.0055E-03	-2.5589E-01	3.3781E-02	2.5188E-01	1.4324E-02
6	-1.6304E+00	-9.9380E+01	2.9778E+00	9.7749E+01	1.2227E+00
	-1.1241E-02	-6.8520E-01	2.0532E-02	6.7396E-01	8.4304E-03
7	1.0194E+03	-4.1449E+02	6.7381E+02	1.4339E+03	3.9771E+02
	7.0287E+00	-2.8578E+00	4.6458E+00	9.8865E+00	2.7421E+00
8	8.7444E+02	-6.3279E+02	4.6684E+02	1.5072E+03	9.4238E+02
	6.0291E+00	-4.3629E+00	3.2188E+00	1.0392E+01	6.4975E+00
9	-1.1168E+02	-1.6587E+03	-5.4768E+01	1.5470E+03	6.9404E+02
	-7.7002E-01	-1.1436E+01	-3.7761E-01	1.0666E+01	4.7852E+00
10	-1.8205E+00	-7.2198E+02	-2.4325E+01	7.2016E+02	1.1792E+01
	-1.2552E-02	-4.9779E+00	-1.6772E-01	4.9653E+00	8.1302E-02
11	-1.5299E+00	-3.5965E+02	-1.1769E+01	3.5812E+02	4.6325E-01
	-1.0548E-02	-2.4797E+00	-8.1148E-02	2.4691E+00	3.1940E-03
12	-1.4230E+00	-2.3316E+02	-9.5176E+00	2.3173E+02	1.8417E+00
	-9.8113E-03	-1.6076E+00	-6.5622E-02	1.5977E+00	1.2698E-02
13	-3.0161E+01	-2.4893E+02	-7.4038E+00	2.1877E+02	1.2882E+02
	-2.0796E-01	-1.7163E+00	-5.1048E-02	1.5083E+00	8.8815E-01
14	5.0146E+01	-1.1204E+02	3.0769E+00	1.6218E+02	8.8051E+01
	3.4574E-01	-7.7248E-01	2.1215E-02	1.1182E+00	6.0709E-01
15	2.6150E+01	-1.3118E+02	1.6050E+01	1.5733E+02	2.7218E+02
	1.8030E-01	-9.0446E-01	1.1066E-01	1.0848E+00	1.8766E+00

16	7.4530E+01	-1.1969E+02	7.3599E+00	1.9422E+02	1.3774E+02
	5.1387E-01	-8.2524E-01	5.0745E-02	1.3391E+00	9.4966E-01
17	6.1480E+01	-7.5500E+01	2.0313E+01	1.3698E+02	8.5774E+01
	4.2389E-01	-5.2055E-01	1.4005E-01	9.4444E-01	5.9139E-01
18	-5.7724E+03	-2.8799E+04	-2.9336E+03	2.3027E+04	8.3368E+02
	-3.9799E+01	-1.9856E+02	-2.0226E+01	1.5876E+02	5.7480E+00
19	1.3004E+03	-2.4318E+03	4.3577E+02	3.7322E+03	4.0845E+03
	8.9659E+00	-1.6767E+01	3.0045E+00	2.5733E+01	2.8162E+01
20	-3.6320E+02	-2.6795E+03	1.3123E+02	2.3163E+03	2.6773E+03
	-2.5042E+00	-1.8474E+01	9.0483E-01	1.5970E+01	1.8459E+01
21	5.2584E+01	-1.4130E+03	-1.9332E+02	1.4656E+03	7.6099E+02
	3.6256E-01	-9.7423E+00	-1.3329E+00	1.0105E+01	5.2469E+00
22	7.2137E+02	-4.9704E+02	3.2801E+02	1.2184E+03	8.1010E+02
	4.9737E+00	-3.4270E+00	2.2615E+00	8.4006E+00	5.5854E+00
23	1.2077E+03	-8.4146E+02	6.6182E+01	2.0492E+03	1.0802E+03
	8.3268E+00	-5.8016E+00	4.5631E-01	1.4128E+01	7.4476E+00
24	-1.1119E+01	-5.7553E+01	-2.1116E+01	4.6434E+01	8.4158E+00
	-7.6666E-02	-3.9681E-01	-1.4559E-01	3.2015E-01	5.8025E-02
25	-1.3311E+03	-1.0184E+04	-1.3318E+03	8.8530E+03	9.8439E+02
	-9.1775E+00	-7.0217E+01	-9.1826E+00	6.1039E+01	6.7871E+00

Table 2-343. Load Combination 301, Head-On Orientation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 301, 102, 201, 211
30-ft. Head-On Drop
100°F Ambient, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	4.39	2.15	6.54	20.00	61.80	8.45
	30.25	14.84	45.09	137.90	426.10	
2	7.26	1.49	8.75	20.00	61.80	4.96
	50.06	10.29	60.35	137.90	426.10	
3	3.20	0.06	3.25	20.00	61.80	>10
	22.04	0.38	22.42	137.90	426.10	
4	3.30	0.39	3.69	20.00	61.80	>10
	22.74	2.71	25.45	137.90	426.10	
5	2.37	0.63	3.00	20.00	61.80	>10
	16.35	4.35	20.70	137.90	426.10	
6	4.03	1.00	5.03	20.00	61.80	9.73
	27.78	6.87	34.66	137.90	426.10	
7	17.28	23.86	41.14	20.00	61.80	0.50
	119.14	164.51	283.65	137.90	426.10	
8	11.32	15.88	27.20	20.00	61.80	1.27
	78.03	109.51	187.55	137.90	426.10	
9	4.44	6.09	10.53	20.00	61.80	4.87
	30.62	41.98	72.59	137.90	426.10	
10	1.33	0.09	1.42	20.00	61.80	>10
	9.16	0.61	9.77	137.90	426.10	
11	1.15	0.00	1.16	20.00	61.80	>10
	7.96	0.02	7.98	137.90	426.10	
12	1.08	0.05	1.12	20.00	61.80	>10
	7.44	0.31	7.75	137.90	426.10	
13	2.24	2.72	4.96	20.00	61.80	>10
	15.43	18.77	34.20	137.90	426.10	

14	2.34	1.95	4.29	20.00	61.80	>10
	16.12	13.47	29.59	137.90	426.10	
15	2.17	2.77	4.94	20.00	61.80	>10
	14.99	19.07	34.05	137.90	426.10	
16	3.94	0.89	4.83	20.00	61.80	9.98
	27.17	6.15	33.31	137.90	426.10	
17	3.79	1.60	5.39	20.00	61.80	>10
	26.12	11.03	37.15	137.90	426.10	
18	5.02	5.51	10.53	20.00	61.80	4.87
	34.59	38.02	72.60	137.90	426.10	
19	4.67	6.14	10.81	20.00	61.80	4.72
	32.17	42.33	74.50	137.90	426.10	
20	3.83	5.69	9.52	20.00	61.80	5.49
	26.41	39.21	65.62	137.90	426.10	
21	5.15	7.80	12.95	20.00	61.80	3.77
	35.53	53.76	89.29	137.90	426.10	
22	6.49	8.76	15.26	20.00	61.80	3.05
	44.76	60.42	105.18	137.90	426.10	

Min MS: 0.502, Location: 7, Combination: Pm+Pb

Table 2-344. Load Combination 302, Side Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 302, 102, 201, 211
30-ft. Side Drop
100°F Ambient, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	16.93	4.41	21.34	20.00	61.80	1.56
	116.72	30.42	147.13	137.90	426.10	
2	14.26	1.62	15.88	20.00	61.80	2.03
	98.34	11.15	109.48	137.90	426.10	
3	15.34	4.45	19.78	20.00	61.80	1.82
	105.73	30.66	136.39	137.90	426.10	
4	10.04	1.43	11.47	20.00	61.80	3.31
	69.25	9.85	79.10	137.90	426.10	
5	16.80	4.55	21.35	20.00	61.80	1.58
	115.81	31.39	147.20	137.90	426.10	
6	14.11	2.33	16.44	20.00	61.80	2.07
	97.30	16.08	113.38	137.90	426.10	
7	16.74	14.30	31.04	20.00	61.80	0.99
	115.42	98.62	214.03	137.90	426.10	
8	15.83	7.97	23.81	20.00	61.80	1.60
	109.17	54.97	164.14	137.90	426.10	
9	11.50	4.59	16.09	20.00	61.80	2.76
	79.26	31.64	110.91	137.90	426.10	
10	8.86	0.97	9.82	20.00	61.80	3.88
	61.07	6.67	67.74	137.90	426.10	
11	8.46	0.92	9.37	20.00	61.80	4.12
	58.30	6.31	64.61	137.90	426.10	
12	8.76	0.96	9.72	20.00	61.80	3.94
	60.43	6.60	67.03	137.90	426.10	
13	10.17	3.41	13.58	20.00	61.80	3.25
	70.15	23.51	93.66	137.90	426.10	

14	10.45	4.56	15.01	20.00	61.80	3.12
	72.05	31.46	103.51	137.90	426.10	
15	8.15	2.61	10.76	20.00	61.80	4.30
	56.22	17.97	74.19	137.90	426.10	
16	12.46	1.11	13.58	20.00	61.80	2.47
	85.94	7.68	93.62	137.90	426.10	
17	12.18	3.38	15.56	20.00	61.80	2.55
	83.97	23.33	107.30	137.90	426.10	
18	8.48	5.59	14.07	20.00	61.80	3.39
	58.47	38.53	97.00	137.90	426.10	
19	11.68	5.78	17.46	20.00	61.80	2.54
	80.54	39.85	120.39	137.90	426.10	
20	10.16	4.58	14.74	20.00	61.80	3.19
	70.04	31.56	101.60	137.90	426.10	
21	10.68	4.19	14.88	20.00	61.80	3.05
	73.66	28.90	102.56	137.90	426.10	
22	13.88	6.15	20.03	20.00	61.80	2.09
	95.71	42.39	138.10	137.90	426.10	

Min MS: 0.991, Location: 7, Combination: Pm+Pb

Table 2-345. Load Combination 303, Cg/Corner Orientation, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 303, 102, 201, 211
30-ft. Cg/Corner Drop
100°F Ambient, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	2.85	2.16	5.01	20.00	61.80	>10
	19.63	14.89	34.51	137.90	426.10	
2	5.44	0.47	5.91	20.00	61.80	6.95
	37.50	3.25	40.75	137.90	426.10	
3	2.73	0.27	3.00	20.00	61.80	>10
	18.80	1.89	20.69	137.90	426.10	
4	2.41	0.36	2.76	20.00	61.80	>10
	16.59	2.47	19.06	137.90	426.10	
5	2.43	0.47	2.89	20.00	61.80	>10
	16.73	3.21	19.94	137.90	426.10	
6	3.41	0.97	4.37	20.00	61.80	>10
	23.48	6.67	30.15	137.90	426.10	
7	11.73	12.42	24.15	20.00	61.80	1.56
	80.86	85.65	166.51	137.90	426.10	
8	8.11	7.98	16.08	20.00	61.80	2.84
	55.89	54.99	110.88	137.90	426.10	
9	5.25	4.47	9.72	20.00	61.80	5.36
	36.20	30.83	67.03	137.90	426.10	
10	3.08	0.18	3.26	20.00	61.80	>10
	21.22	1.24	22.46	137.90	426.10	
11	2.65	0.05	2.71	20.00	61.80	>10
	18.29	0.37	18.67	137.90	426.10	
12	2.02	0.08	2.10	20.00	61.80	>10
	13.93	0.54	14.48	137.90	426.10	
13	2.95	2.93	5.89	20.00	61.80	9.50
	20.36	20.22	40.58	137.90	426.10	

14	2.63	2.00	4.63	20.00	61.80	>10
	18.13	13.82	31.96	137.90	426.10	
15	1.93	2.00	3.94	20.00	61.80	>10
	13.34	13.82	27.16	137.90	426.10	
16	4.12	0.88	5.00	20.00	61.80	9.51
	28.39	6.07	34.46	137.90	426.10	
17	3.97	1.58	5.55	20.00	61.80	9.89
	27.38	10.92	38.29	137.90	426.10	
18	4.90	5.45	10.35	20.00	61.80	4.97
	33.82	37.57	71.39	137.90	426.10	
19	5.94	5.12	11.06	20.00	61.80	4.59
	40.95	35.30	76.26	137.90	426.10	
20	4.72	4.25	8.97	20.00	61.80	5.89
	32.54	29.33	61.87	137.90	426.10	
21	4.58	4.37	8.95	20.00	61.80	5.91
	31.55	30.15	61.71	137.90	426.10	
22	5.84	6.25	12.09	20.00	61.80	4.11
	40.25	43.09	83.34	137.90	426.10	

Min MS: 1.559, Location: 7, Combination: Pm+Pb

Table 2-346. Load Combination 304, Head-On Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 304, 105, 202, 211
30-ft. Head-On Drop at -40°F
-40°F Ambient, 2.5 kW Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	5.89	2.85	8.73	20.00	70.00	7.01
	40.59	19.63	60.22	137.90	482.63	
2	9.15	2.03	11.18	20.00	70.00	4.25
	63.09	13.96	77.05	137.90	482.63	
3	4.27	0.07	4.34	20.00	70.00	>10
	29.41	0.49	29.90	137.90	482.63	
4	4.35	0.42	4.77	20.00	70.00	>10
	30.00	2.92	32.92	137.90	482.63	
5	3.07	0.73	3.79	20.00	70.00	>10
	21.14	5.02	26.15	137.90	482.63	
6	4.61	1.05	5.65	20.00	70.00	9.42
	31.75	7.21	38.97	137.90	482.63	
7	17.39	21.75	39.14	20.00	70.00	0.79
	119.93	149.95	269.88	137.90	482.63	
8	10.16	13.75	23.91	20.00	70.00	1.93
	70.06	94.80	164.87	137.90	482.63	
9	3.82	5.29	9.11	20.00	70.00	6.68
	26.32	36.50	62.83	137.90	482.63	
10	1.55	0.09	1.65	20.00	70.00	>10
	10.71	0.64	11.35	137.90	482.63	
11	1.31	0.00	1.31	20.00	70.00	>10
	9.04	0.02	9.05	137.90	482.63	
12	1.20	0.04	1.24	20.00	70.00	>10
	8.31	0.26	8.57	137.90	482.63	
13	1.89	2.21	4.10	20.00	70.00	>10
	13.00	15.26	28.26	137.90	482.63	

14	2.22	1.90	4.12	20.00	70.00	>10
	15.33	13.07	28.39	137.90	482.63	
15	2.05	2.79	4.84	20.00	70.00	>10
	14.12	19.23	33.35	137.90	482.63	
16	3.70	0.55	4.24	20.00	70.00	>10
	25.48	3.77	29.25	137.90	482.63	
17	3.54	1.11	4.65	20.00	70.00	>10
	24.44	7.63	32.06	137.90	482.63	
18	2.71	1.09	3.80	20.00	70.00	>10
	18.69	7.52	26.21	137.90	482.63	
19	3.01	3.28	6.29	20.00	70.00	>10
	20.74	22.61	43.35	137.90	482.63	
20	2.89	3.99	6.88	20.00	70.00	9.17
	19.94	27.51	47.44	137.90	482.63	
21	4.79	7.06	11.85	20.00	70.00	4.91
	33.03	48.70	81.73	137.90	482.63	
22	5.16	6.11	11.27	20.00	70.00	5.21
	35.59	42.15	77.74	137.90	482.63	

Min MS: 0.788, Location: 7, Combination: Pm+Pb

Table 2-347. Load Combination 305, Side Drop Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 305, 105, 202, 211
30-ft. Side Drop at -40°F
-40°F Ambient, 2.5 kW Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	28.20	7.17	35.36	20.00	70.00	0.70
	194.42	49.42	243.83	137.90	482.63	
2	22.22	2.56	24.78	20.00	70.00	1.16
	153.19	17.63	170.83	137.90	482.63	
3	25.99	6.16	32.14	20.00	70.00	0.85
	179.17	42.46	221.63	137.90	482.63	
4	16.79	2.18	18.96	20.00	70.00	1.86
	115.75	15.00	130.76	137.90	482.63	
5	27.99	7.42	35.41	20.00	70.00	0.71
	193.00	51.15	244.15	137.90	482.63	
6	21.93	3.26	25.19	20.00	70.00	1.19
	151.20	22.50	173.70	137.90	482.63	
7	17.73	8.93	26.66	20.00	70.00	1.63
	122.22	61.59	183.82	137.90	482.63	
8	17.94	2.76	20.71	20.00	70.00	1.68
	123.71	19.06	142.77	137.90	482.63	
9	15.56	3.31	18.87	20.00	70.00	2.09
	107.27	22.81	130.08	137.90	482.63	
10	13.47	1.51	14.98	20.00	70.00	2.56
	92.84	10.45	103.29	137.90	482.63	
11	12.97	1.48	14.45	20.00	70.00	2.70
	89.45	10.17	99.63	137.90	482.63	
12	13.32	1.51	14.83	20.00	70.00	2.60
	91.84	10.39	102.23	137.90	482.63	
13	14.36	3.34	17.71	20.00	70.00	2.34
	99.04	23.04	122.08	137.90	482.63	

14	15.32	6.05	21.37	20.00	70.00	2.13
	105.62	41.73	147.35	137.90	482.63	
15	11.55	2.65	14.21	20.00	70.00	3.15
	79.66	18.30	97.95	137.90	482.63	
16	16.86	0.91	17.77	20.00	70.00	1.85
	116.24	6.28	122.51	137.90	482.63	
17	16.71	3.80	20.52	20.00	70.00	1.87
	115.22	26.23	141.45	137.90	482.63	
18	8.29	1.19	9.49	20.00	70.00	4.79
	57.18	8.22	65.40	137.90	482.63	
19	14.59	2.97	17.56	20.00	70.00	2.29
	100.61	20.48	121.09	137.90	482.63	
20	13.45	2.48	15.92	20.00	70.00	2.57
	92.71	17.07	109.77	137.90	482.63	
21	13.32	2.03	15.35	20.00	70.00	2.60
	91.83	14.00	105.83	137.90	482.63	
22	16.77	2.45	19.23	20.00	70.00	1.86
	115.66	16.92	132.58	137.90	482.63	

Min MS: 0.702, Location: 1, Combination: Pm

Table 2-348. Load Combination 306, Cg/Corner Orientation at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 306, 105, 202, 211
30-ft. Cg/Corner Drop at -40°F
-40°F Ambient, 2.5 kW Decay Heat
Minimum External Pressure, 24 kPa (3.5 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	3.73	2.86	6.60	20.00	70.00	9.61
	25.75	19.72	45.47	137.90	482.63	
2	6.60	0.59	7.19	20.00	70.00	6.27
	45.49	4.09	49.58	137.90	482.63	
3	3.61	0.38	3.98	20.00	70.00	>10
	24.86	2.61	27.46	137.90	482.63	
4	3.10	0.37	3.48	20.00	70.00	>10
	21.40	2.58	23.98	137.90	482.63	
5	3.14	0.50	3.64	20.00	70.00	>10
	21.65	3.42	25.06	137.90	482.63	
6	3.73	1.00	4.74	20.00	70.00	>10
	25.72	6.93	32.65	137.90	482.63	
7	9.62	5.74	15.36	20.00	70.00	3.56
	66.34	39.56	105.91	137.90	482.63	
8	5.67	2.68	8.35	20.00	70.00	7.39
	39.08	18.47	57.55	137.90	482.63	
9	4.95	3.03	7.98	20.00	70.00	7.77
	34.16	20.89	55.05	137.90	482.63	
10	4.00	0.22	4.22	20.00	70.00	>10
	27.60	1.53	29.13	137.90	482.63	
11	3.41	0.08	3.48	20.00	70.00	>10
	23.50	0.52	24.02	137.90	482.63	
12	2.52	0.08	2.61	20.00	70.00	>10
	17.39	0.58	17.97	137.90	482.63	
13	2.89	2.51	5.39	20.00	70.00	>10
	19.90	17.29	37.19	137.90	482.63	

14	2.63	1.97	4.60	20.00	70.00	>10
	18.14	13.56	31.70	137.90	482.63	
15	1.71	1.72	3.44	20.00	70.00	>10
	11.81	11.89	23.70	137.90	482.63	
16	3.94	0.53	4.47	20.00	70.00	>10
	27.18	3.66	30.84	137.90	482.63	
17	3.80	1.08	4.88	20.00	70.00	>10
	26.19	7.46	33.65	137.90	482.63	
18	2.56	1.00	3.56	20.00	70.00	>10
	17.64	6.90	24.54	137.90	482.63	
19	4.79	1.85	6.65	20.00	70.00	9.01
	33.06	12.79	45.84	137.90	482.63	
20	4.14	1.98	6.12	20.00	70.00	>10
	28.54	13.67	42.21	137.90	482.63	
21	3.99	2.27	6.25	20.00	70.00	>10
	27.48	15.65	43.12	137.90	482.63	
22	4.25	2.59	6.84	20.00	70.00	9.23
	29.29	17.88	47.17	137.90	482.63	

Min MS: 3.557, Location: 7, Combination: Pm+Pb

Table 2-349. Load Combination 310, Additional Increase Evaluation Pressure, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 204, 101, 201, 211
Additional Increased External Pressure, 2 MPa (290 psia)
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.77	0.48	1.26	20.00	66.30	>10
	5.31	3.34	8.65	137.90	457.12	
2	2.91	0.27	3.18	20.00	66.30	>10
	20.08	1.86	21.94	137.90	457.12	
3	0.64	0.02	0.66	20.00	66.30	>10
	4.41	0.14	4.55	137.90	457.12	
4	1.03	0.32	1.35	20.00	66.30	>10
	7.12	2.21	9.33	137.90	457.12	
5	0.76	0.46	1.22	20.00	66.30	>10
	5.27	3.17	8.44	137.90	457.12	
6	2.99	1.01	3.99	20.00	66.30	>10
	20.58	6.94	27.52	137.90	457.12	
7	16.94	29.96	46.90	20.00	61.80	0.32
	116.79	206.54	323.34	137.90	426.10	
8	15.62	22.69	38.31	20.00	61.80	0.61
	107.68	156.44	264.12	137.90	426.10	
9	6.80	9.95	16.74	20.00	61.80	2.69
	46.86	68.59	115.45	137.90	426.10	
10	1.71	0.09	1.80	20.00	61.80	>10
	11.77	0.65	12.42	137.90	426.10	
11	1.70	0.00	1.71	20.00	61.80	>10
	11.74	0.02	11.76	137.90	426.10	
12	1.70	0.06	1.76	20.00	61.80	>10
	11.75	0.41	12.15	137.90	426.10	
13	2.74	2.81	5.55	20.00	61.80	>10
	18.88	19.39	38.27	137.90	426.10	

14	2.33	2.13	4.46	20.00	61.80	>10
	16.06	14.71	30.76	137.90	426.10	
15	3.40	4.35	7.75	20.00	61.80	6.98
	23.43	29.99	53.42	137.90	426.10	
16	4.51	2.06	6.57	20.00	61.80	8.40
	31.10	14.21	45.31	137.90	426.10	
17	4.09	2.10	6.18	20.00	61.80	8.99
	28.18	14.46	42.63	137.90	426.10	
18	3.75	5.73	9.47	20.00	61.80	5.52
	25.82	39.49	65.31	137.90	426.10	
19	3.34	5.03	8.37	20.00	61.80	6.38
	23.01	34.69	57.70	137.90	426.10	
20	2.33	3.83	6.17	20.00	61.80	9.02
	16.09	26.41	42.51	137.90	426.10	
21	2.37	3.86	6.23	20.00	61.80	8.92
	16.34	26.62	42.96	137.90	426.10	
22	3.85	5.95	9.79	20.00	61.80	5.31
	26.52	41.01	67.53	137.90	426.10	

Min MS: 0.318, Location: 7, Combination: Pm+Pb

Table 2-350. Load Combination 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 311, 101, 201, 211
4-ft. Drop onto Rod
100°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	66.30	>10
	4.33	2.83	7.17	137.90	457.12	
2	2.52	0.16	2.68	20.00	66.30	>10
	17.36	1.10	18.47	137.90	457.12	
3	0.51	0.01	0.53	20.00	66.30	>10
	3.53	0.10	3.64	137.90	457.12	
4	0.65	0.31	0.96	20.00	66.30	>10
	4.48	2.15	6.62	137.90	457.12	
5	0.62	0.39	1.01	20.00	66.30	>10
	4.30	2.67	6.96	137.90	457.12	
6	2.57	0.86	3.43	20.00	66.30	>10
	17.75	5.92	23.67	137.90	457.12	
7	7.24	11.62	18.86	20.00	61.80	2.28
	49.94	80.11	130.04	137.90	426.10	
8	5.94	7.51	13.45	20.00	61.80	3.60
	40.92	51.79	92.71	137.90	426.10	
9	2.77	3.94	6.70	20.00	61.80	8.22
	19.08	27.14	46.23	137.90	426.10	
10	0.49	0.06	0.55	20.00	61.80	>10
	3.34	0.43	3.77	137.90	426.10	
11	0.48	0.00	0.48	20.00	61.80	>10
	3.33	0.01	3.34	137.90	426.10	
12	0.48	0.04	0.53	20.00	61.80	>10
	3.34	0.29	3.63	137.90	426.10	
13	1.61	2.20	3.81	20.00	61.80	>10
	11.10	15.14	26.24	137.90	426.10	

14	1.65	1.66	3.31	20.00	61.80	>10
	11.41	11.44	22.85	137.90	426.10	
15	1.65	1.85	3.50	20.00	61.80	>10
	11.37	12.78	24.15	137.90	426.10	
16	3.29	0.76	4.05	20.00	61.80	>10
	22.69	5.27	27.95	137.90	426.10	
17	3.22	1.55	4.76	20.00	61.80	>10
	22.19	10.66	32.85	137.90	426.10	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.277, Location: 7, Combination: Pm+Pb

Table 2-351. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 311, 104, 201, 211
4-ft. Drop onto Rod
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	70.00	>10
	4.33	2.83	7.17	137.90	482.63	
2	2.52	0.16	2.68	20.00	70.00	>10
	17.36	1.10	18.47	137.90	482.63	
3	0.51	0.01	0.53	20.00	70.00	>10
	3.53	0.10	3.64	137.90	482.63	
4	0.65	0.31	0.96	20.00	70.00	>10
	4.48	2.15	6.62	137.90	482.63	
5	0.62	0.39	1.01	20.00	70.00	>10
	4.30	2.67	6.96	137.90	482.63	
6	2.57	0.86	3.43	20.00	70.00	>10
	17.75	5.92	23.67	137.90	482.63	
7	7.24	11.62	18.86	20.00	70.00	2.71
	49.94	80.11	130.04	137.90	482.63	
8	5.94	7.51	13.45	20.00	70.00	4.21
	40.92	51.79	92.71	137.90	482.63	
9	2.77	3.94	6.70	20.00	70.00	9.44
	19.08	27.14	46.23	137.90	482.63	
10	0.49	0.06	0.55	20.00	70.00	>10
	3.34	0.43	3.77	137.90	482.63	
11	0.48	0.00	0.48	20.00	70.00	>10
	3.33	0.01	3.34	137.90	482.63	
12	0.48	0.04	0.53	20.00	70.00	>10
	3.34	0.29	3.63	137.90	482.63	
13	1.61	2.20	3.81	20.00	70.00	>10
	11.10	15.14	26.24	137.90	482.63	

14	1.65	1.66	3.31	20.00	70.00	>10
	11.41	11.44	22.85	137.90	482.63	
15	1.65	1.85	3.50	20.00	70.00	>10
	11.37	12.78	24.15	137.90	482.63	
16	3.29	0.76	4.05	20.00	70.00	>10
	22.69	5.27	27.95	137.90	482.63	
17	3.22	1.55	4.76	20.00	70.00	>10
	22.19	10.66	32.85	137.90	482.63	
18	3.54	5.41	8.94	20.00	70.00	6.83
	24.39	37.28	61.67	137.90	482.63	
19	3.18	4.79	7.96	20.00	70.00	7.79
	21.90	33.01	54.91	137.90	482.63	
20	2.22	3.65	5.87	20.00	70.00	>10
	15.31	25.17	40.49	137.90	482.63	
21	2.26	3.69	5.95	20.00	70.00	>10
	15.58	25.43	41.01	137.90	482.63	
22	3.67	5.67	9.33	20.00	70.00	6.50
	25.29	39.07	64.36	137.90	482.63	

Min MS: 2.711, Location: 7, Combination: Pm+Pb

Table 2-352. Load Combination 350, Fire at 30 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 111, 201, 211
Fire at 30 Minutes, 1,475°F Ambient, 2.5 kW Decay Heat
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	61.80	>10
	4.33	2.83	7.17	137.90	426.10	
2	2.52	0.16	2.68	20.00	61.80	>10
	17.36	1.10	18.47	137.90	426.10	
3	0.51	0.01	0.53	16.40	59.20	>10
	3.53	0.10	3.64	113.07	408.17	
4	0.65	0.31	0.96	20.00	61.80	>10
	4.48	2.15	6.62	137.90	426.10	
5	0.62	0.39	1.01	20.00	61.80	>10
	4.30	2.67	6.96	137.90	426.10	
6	2.57	0.86	3.43	20.00	61.80	>10
	17.75	5.92	23.67	137.90	426.10	
7	7.24	11.62	18.86	20.00	61.80	2.28
	49.94	80.11	130.04	137.90	426.10	
8	5.94	7.51	13.45	20.00	61.80	3.60
	40.92	51.79	92.71	137.90	426.10	
9	2.77	3.94	6.70	20.00	61.80	8.22
	19.08	27.14	46.23	137.90	426.10	
10	0.49	0.06	0.55	20.00	61.80	>10
	3.34	0.43	3.77	137.90	426.10	
11	0.48	0.00	0.48	20.00	61.80	>10
	3.33	0.01	3.34	137.90	426.10	
12	0.48	0.04	0.53	20.00	61.80	>10
	3.34	0.29	3.63	137.90	426.10	
13	1.61	2.20	3.81	20.00	61.80	>10
	11.10	15.14	26.24	137.90	426.10	

14	1.65	1.66	3.31	20.00	61.80	>10
	11.41	11.44	22.85	137.90	426.10	
15	1.65	1.85	3.50	20.00	61.80	>10
	11.37	12.78	24.15	137.90	426.10	
16	3.29	0.76	4.05	20.00	61.80	>10
	22.69	5.27	27.95	137.90	426.10	
17	3.22	1.55	4.76	20.00	61.80	>10
	22.19	10.66	32.85	137.90	426.10	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.277, Location: 7, Combination: Pm+Pb

Table 2-353. Load Combination 351, Fire at 60 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 112, 201, 211
Fire at 60 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	61.80	>10
	4.33	2.83	7.17	137.90	426.10	
2	2.52	0.16	2.68	20.00	61.80	>10
	17.36	1.10	18.47	137.90	426.10	
3	0.51	0.01	0.53	17.40	59.20	>10
	3.53	0.10	3.64	119.97	408.17	
4	0.65	0.31	0.96	18.70	59.70	>10
	4.48	2.15	6.62	128.93	411.62	
5	0.62	0.39	1.01	20.00	61.80	>10
	4.30	2.67	6.96	137.90	426.10	
6	2.57	0.86	3.43	20.00	61.80	>10
	17.75	5.92	23.67	137.90	426.10	
7	7.24	11.62	18.86	20.00	61.80	2.28
	49.94	80.11	130.04	137.90	426.10	
8	5.94	7.51	13.45	20.00	61.80	3.60
	40.92	51.79	92.71	137.90	426.10	
9	2.77	3.94	6.70	20.00	61.80	8.22
	19.08	27.14	46.23	137.90	426.10	
10	0.49	0.06	0.55	20.00	61.80	>10
	3.34	0.43	3.77	137.90	426.10	
11	0.48	0.00	0.48	18.70	59.70	>10
	3.33	0.01	3.34	128.93	411.62	
12	0.48	0.04	0.53	20.00	61.80	>10
	3.34	0.29	3.63	137.90	426.10	
13	1.61	2.20	3.81	20.00	61.80	>10
	11.10	15.14	26.24	137.90	426.10	

14	1.65	1.66	3.31	20.00	61.80	>10
	11.41	11.44	22.85	137.90	426.10	
15	1.65	1.85	3.50	20.00	61.80	>10
	11.37	12.78	24.15	137.90	426.10	
16	3.29	0.76	4.05	20.00	61.80	>10
	22.69	5.27	27.95	137.90	426.10	
17	3.22	1.55	4.76	20.00	61.80	>10
	22.19	10.66	32.85	137.90	426.10	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.277, Location: 7, Combination: Pm+Pb

Table 2-354. Load Combination 352, Fire at 90 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 113, 201, 211
Fire at 90 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	61.80	>10
	4.33	2.83	7.17	137.90	426.10	
2	2.52	0.16	2.68	20.00	61.80	>10
	17.36	1.10	18.47	137.90	426.10	
3	0.51	0.01	0.53	18.70	59.70	>10
	3.53	0.10	3.64	128.93	411.62	
4	0.65	0.31	0.96	18.70	59.70	>10
	4.48	2.15	6.62	128.93	411.62	
5	0.62	0.39	1.01	20.00	61.80	>10
	4.30	2.67	6.96	137.90	426.10	
6	2.57	0.86	3.43	20.00	61.80	>10
	17.75	5.92	23.67	137.90	426.10	
7	7.24	11.62	18.86	20.00	61.80	2.28
	49.94	80.11	130.04	137.90	426.10	
8	5.94	7.51	13.45	20.00	61.80	3.60
	40.92	51.79	92.71	137.90	426.10	
9	2.77	3.94	6.70	20.00	61.80	8.22
	19.08	27.14	46.23	137.90	426.10	
10	0.49	0.06	0.55	18.70	59.70	>10
	3.34	0.43	3.77	128.93	411.62	
11	0.48	0.00	0.48	18.70	59.70	>10
	3.33	0.01	3.34	128.93	411.62	
12	0.48	0.04	0.53	18.70	59.70	>10
	3.34	0.29	3.63	128.93	411.62	
13	1.61	2.20	3.81	18.70	59.70	>10
	11.10	15.14	26.24	128.93	411.62	

14	1.65	1.66	3.31	20.00	61.80	>10
	11.41	11.44	22.85	137.90	426.10	
15	1.65	1.85	3.50	20.00	61.80	>10
	11.37	12.78	24.15	137.90	426.10	
16	3.29	0.76	4.05	20.00	61.80	>10
	22.69	5.27	27.95	137.90	426.10	
17	3.22	1.55	4.76	20.00	61.80	>10
	22.19	10.66	32.85	137.90	426.10	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.277, Location: 7, Combination: Pm+Pb

Table 2-355. Load Combination 353, Fire at 120 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 114, 201, 211
Fire at 120 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	61.80	>10
	4.33	2.83	7.17	137.90	426.10	
2	2.52	0.16	2.68	20.00	61.80	>10
	17.36	1.10	18.47	137.90	426.10	
3	0.51	0.01	0.53	18.70	59.70	>10
	3.53	0.10	3.64	128.93	411.62	
4	0.65	0.31	0.96	18.70	59.70	>10
	4.48	2.15	6.62	128.93	411.62	
5	0.62	0.39	1.01	20.00	61.80	>10
	4.30	2.67	6.96	137.90	426.10	
6	2.57	0.86	3.43	20.00	61.80	>10
	17.75	5.92	23.67	137.90	426.10	
7	7.24	11.62	18.86	20.00	61.80	2.28
	49.94	80.11	130.04	137.90	426.10	
8	5.94	7.51	13.45	18.70	59.70	3.44
	40.92	51.79	92.71	128.93	411.62	
9	2.77	3.94	6.70	18.70	59.70	7.90
	19.08	27.14	46.23	128.93	411.62	
10	0.49	0.06	0.55	18.70	59.70	>10
	3.34	0.43	3.77	128.93	411.62	
11	0.48	0.00	0.48	18.70	59.70	>10
	3.33	0.01	3.34	128.93	411.62	
12	0.48	0.04	0.53	18.70	59.70	>10
	3.34	0.29	3.63	128.93	411.62	
13	1.61	2.20	3.81	18.70	59.70	>10
	11.10	15.14	26.24	128.93	411.62	

14	1.65	1.66	3.31	18.70	59.70	>10
	11.41	11.44	22.85	128.93	411.62	
15	1.65	1.85	3.50	18.70	59.70	>10
	11.37	12.78	24.15	128.93	411.62	
16	3.29	0.76	4.05	20.00	61.80	>10
	22.69	5.27	27.95	137.90	426.10	
17	3.22	1.55	4.76	20.00	61.80	>10
	22.19	10.66	32.85	137.90	426.10	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.277, Location: 7, Combination: Pm+Pb

Table 2-356. Load Combination 354, Fire at 150 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 115, 201, 211
Fire at 150 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	61.80	>10
	4.33	2.83	7.17	137.90	426.10	
2	2.52	0.16	2.68	20.00	61.80	>10
	17.36	1.10	18.47	137.90	426.10	
3	0.51	0.01	0.53	18.70	59.70	>10
	3.53	0.10	3.64	128.93	411.62	
4	0.65	0.31	0.96	18.70	59.70	>10
	4.48	2.15	6.62	128.93	411.62	
5	0.62	0.39	1.01	20.00	61.80	>10
	4.30	2.67	6.96	137.90	426.10	
6	2.57	0.86	3.43	20.00	61.80	>10
	17.75	5.92	23.67	137.90	426.10	
7	7.24	11.62	18.86	20.00	61.80	2.28
	49.94	80.11	130.04	137.90	426.10	
8	5.94	7.51	13.45	18.70	59.70	3.44
	40.92	51.79	92.71	128.93	411.62	
9	2.77	3.94	6.70	18.70	59.70	7.90
	19.08	27.14	46.23	128.93	411.62	
10	0.49	0.06	0.55	18.70	59.70	>10
	3.34	0.43	3.77	128.93	411.62	
11	0.48	0.00	0.48	18.70	59.70	>10
	3.33	0.01	3.34	128.93	411.62	
12	0.48	0.04	0.53	18.70	59.70	>10
	3.34	0.29	3.63	128.93	411.62	
13	1.61	2.20	3.81	18.70	59.70	>10
	11.10	15.14	26.24	128.93	411.62	

14	1.65	1.66	3.31	18.70	59.70	>10
	11.41	11.44	22.85	128.93	411.62	
15	1.65	1.85	3.50	18.70	59.70	>10
	11.37	12.78	24.15	128.93	411.62	
16	3.29	0.76	4.05	20.00	61.80	>10
	22.69	5.27	27.95	137.90	426.10	
17	3.22	1.55	4.76	20.00	61.80	>10
	22.19	10.66	32.85	137.90	426.10	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.277, Location: 7, Combination: Pm+Pb

Table 2-357. Load Combination 355, Fire at 180 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-165B

Load Cases: 116, 201, 211
Fire at 180 Minutes, 100°F, 2.5 kW Decay Heat, Maximum Insolation
Maximum Internal Pressure, 1,517 kPa (220 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.63	0.41	1.04	20.00	61.80	>10
	4.33	2.83	7.17	137.90	426.10	
2	2.52	0.16	2.68	20.00	61.80	>10
	17.36	1.10	18.47	137.90	426.10	
3	0.51	0.01	0.53	18.70	59.70	>10
	3.53	0.10	3.64	128.93	411.62	
4	0.65	0.31	0.96	18.70	59.70	>10
	4.48	2.15	6.62	128.93	411.62	
5	0.62	0.39	1.01	20.00	61.80	>10
	4.30	2.67	6.96	137.90	426.10	
6	2.57	0.86	3.43	20.00	61.80	>10
	17.75	5.92	23.67	137.90	426.10	
7	7.24	11.62	18.86	18.70	59.70	2.17
	49.94	80.11	130.04	128.93	411.62	
8	5.94	7.51	13.45	18.70	59.70	3.44
	40.92	51.79	92.71	128.93	411.62	
9	2.77	3.94	6.70	18.70	59.70	7.90
	19.08	27.14	46.23	128.93	411.62	
10	0.49	0.06	0.55	18.70	59.70	>10
	3.34	0.43	3.77	128.93	411.62	
11	0.48	0.00	0.48	18.70	59.70	>10
	3.33	0.01	3.34	128.93	411.62	
12	0.48	0.04	0.53	18.70	59.70	>10
	3.34	0.29	3.63	128.93	411.62	
13	1.61	2.20	3.81	18.70	59.70	>10
	11.10	15.14	26.24	128.93	411.62	

14	1.65	1.66	3.31	18.70	59.70	>10
	11.41	11.44	22.85	128.93	411.62	
15	1.65	1.85	3.50	18.70	59.70	>10
	11.37	12.78	24.15	128.93	411.62	
16	3.29	0.76	4.05	18.70	59.70	>10
	22.69	5.27	27.95	128.93	411.62	
17	3.22	1.55	4.76	18.70	59.70	>10
	22.19	10.66	32.85	128.93	411.62	
18	3.54	5.41	8.94	20.00	61.80	5.91
	24.39	37.28	61.67	137.90	426.10	
19	3.18	4.79	7.96	20.00	61.80	6.76
	21.90	33.01	54.91	137.90	426.10	
20	2.22	3.65	5.87	20.00	61.80	9.52
	15.31	25.17	40.49	137.90	426.10	
21	2.26	3.69	5.95	20.00	61.80	9.39
	15.58	25.43	41.01	137.90	426.10	
22	3.67	5.67	9.33	20.00	61.80	5.62
	25.29	39.07	64.36	137.90	426.10	

Min MS: 2.165, Location: 7, Combination: Pm+Pb

2.10.4.3 Minimum Margins of Safety – Model AOS-165B

Table 2-358 and Table 2-359 list the Model AOS-165B transport package Minimum Margins of Safety (Min MS), for Normal and Hypothetical Accident conditions of transport, respectively.

Table 2-358. Min MS for Normal Conditions of Transport – Model AOS-165B

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
101	101 201 211 0 0	5.906E-01	7	Pm+Pb
102	104 201 211 0 0	5.906E-01	7	Pm+Pb
103	103 201 211 0 0	5.906E-01	7	Pm+Pb
104	101 201 202 211 0	5.549E-01	7	Pm+Pb
105	105 201 202 211 0	5.549E-01	7	Pm+Pb
106	101 201 203 211 0	4.930E-01	7	Pm+Pb
107	105 201 203 211 0	4.930E-01	7	Pm+Pb
215	215 101 201 211 0	5.086E-01	7	Pm+Pb
216	216 101 201 211 0	5.883E-01	7	Pm+Pb
217	216 104 201 211 0	5.883E-01	7	Pm+Pb
221	221 101 201 211 0	5.452E-01	7	Pm+Pb
222	222 101 201 211 0	5.792E-01	7	Pm+Pb
223	223 101 201 211 0	1.495E-01	7	Pm+Pb

Table 2-359. Min MS for Hypothetical Accident Conditions of Transport – Model AOS-165B

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
301	301 102 201 211 0	5.022E-01	7	Pm+Pb
302	302 102 201 211 0	9.908E-01	7	Pm+Pb
303	303 102 201 211 0	1.559E+00	7	Pm+Pb
304	304 105 202 211 0	7.883E-01	7	Pm+Pb
305	305 105 202 211 0	7.023E-01	1	Pm
306	306 105 202 211 0	3.557E+00	7	Pm+Pb
310	204 101 201 211 0	3.178E-01	7	Pm+Pb
311	311 101 201 211 0	2.277E+00	7	Pm+Pb
312	311 104 201 211 0	2.711E+00	7	Pm+Pb
350	111 201 211 0 0	2.277E+00	7	Pm+Pb
351	112 201 211 0 0	2.277E+00	7	Pm+Pb
352	113 201 211 0 0	2.277E+00	7	Pm+Pb
353	114 201 211 0 0	2.277E+00	7	Pm+Pb
354	115 201 211 0 0	2.277E+00	7	Pm+Pb
355	116 201 211 0 0	2.165E+00	7	Pm+Pb

2.10.5 LIBRA Finite Element Analysis Program and Verification Problems

2.10.5.1 LIBRA Finite Element Analysis Program

LIBRA is an efficient, general-purpose, finite element method program applicable to static, dynamic, and heat transfer analyses of structural systems. The program contains a comprehensive element library, and more than 20 solution algorithms. In addition, LIBRA has a fully integrated editor for model generation, as well as comprehensive post-processing and plotting capabilities. LIBRA can execute problems of over 250,000 degrees of freedom, on computers configured with 256 MB of available memory and 20 GB of hard disk drive space. The program contains both Gaussian and iterative solvers.

Program Solution Procedures:

_Linear and nonlinear static analyses

_Analysis of axisymmetric (2D) structures with non-symmetric loads

_Linear buckling analysis

_Modal analysis by Lanzcos, subspace, and vector iteration methods

_Dynamic integration using modal coordinates

_Linear and nonlinear direct dynamic integration

_Modal response solution

_General sub-sectioning capabilities

_Steady-state and transient heat transfer analyses

LIBRA Element Library:

_Straight and curved beam elements

_Triangular and quad plate and shell elements

_Doubly curved, 8-node shell element

_Conic and curved axisymmetric (2D) shell elements

_Standard and hierarchical 2D and 3D elements

_Plane stress, plate, and shell composite elements

2.10.5.2 Verification Problems

The following is a LIBRA Finite Element Analysis Program and Verification Problems report, from Structural Mechanics Analysis, Inc.

1.0 Introduction

This report describes the GE Vallecitos Nuclear Center Libra Finite Element Analysis Program verification. The Libra verification consists of three items: the original verification report, Reference 1, the verification program Libra_Verification.Exe and associated verification problem files, and this report. A Libra verification can be performed at any time by executing the program Libra_Verification. This program executes all of the verification problem files, and tabulates the results in the text file Verificatian.txt. The Libra_Verification program and problem files are installed on the Libra Application Directory as part of the Libra installation. The output file, Verification.txt, is also located on the Libra Application Directory.

The original verification report, Reference 1, documents a number of the verification problems, including all of the thermal verification problems. The thermal verification problems in Reference 1 were updated in Reference la. This report encompasses both References 1 and la. All of the verification problems executed by Libra_Verification are described in this report, however the theoretical solutions of the original verification problems are given in Reference 1, and are not contained in this report. The theoretical solutions for all verification problems not in Reference 1 are given in this report.

The verification program, Libra_Verification, executes 24 problem files. These problems cover a wide spectrum of Libra capabilities, and include all significant types of analyses and elements used at the GE Vallecitos facility. The program compiles the results in two ways. For each verification problem, the program presents a table comparing the Libra solution values with the theoretical values. In addition, since the Libra and theoretical values are not necessarily the same, the program generates a table comparing the current verification results with the expected values. The expected values are not theoretical values, but Libra values from a certified verification.

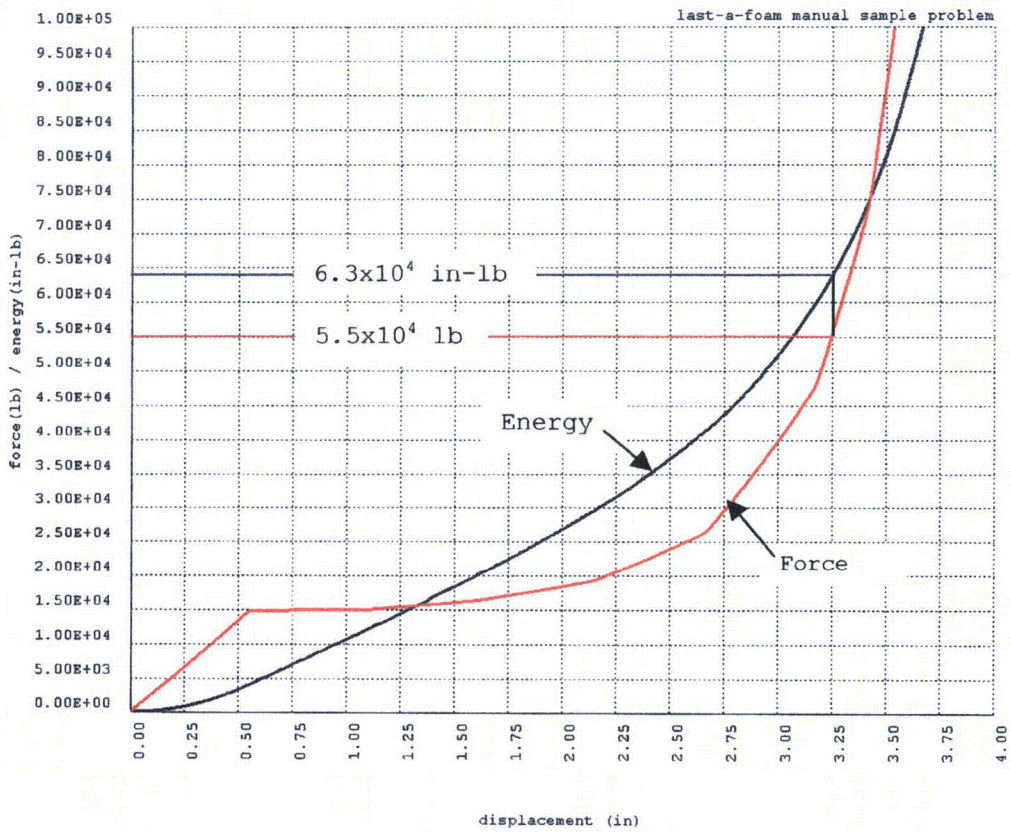
The structure of the Libra program is such that no permanent executable exists. Rather, a new executable is formed whenever the solution or element type changes from the preceding application. To establish the program status, the verification program generates a list of all of Libra subroutines on the file Verification.txt. The verification status of any Libra subroutine can then be established comparing it with the listing in Verification.txt.

This report is structured around the verification problems. Each problem is presented in a separate section. Each section specifies the problem input data file, and the Libra solution and element types used in the problem. In addition, each section contains a description of the problem, a description of the Libra model, and the theoretical or comparative solution.

Additional Problem

Main23, Element 10. Sample problem in Last-A-Foam Manual, "Rigid Polyurethane Foam for Impact and Thermal Protection," pgs. 2-3. 30 ft drop of 700 lb cylinder onto 5 in thick Last-A-Foam disk. Quarter disk modeled by STIF10 elements. From curve on pg. 3, for 3712 foam,

g = impact force / weight = 2820*78.5/700 = 316.2



From Libra force and energy curves for 1/4 model,

$U = 700x30x12/4 = 6.3x10^4$ in-lb
$P = 5.5x10^4$ lb.
$g = 4x5.5x10^4/700 = 314.3$

Difference = 100x(316.2-314.3)/314.3 = 0.6%

Problem 1

Input Data File: VER_PROB.1

Libra Routines: Solution Type12, Elements 32 & 34

Description of Problem

A 0.03 m long carbon resistor is comprised of a 0.001 m radius graphite core, and a micanite thermal conductor with inside radius 0.001m and outside radius .00588 m. 0.4 watt heat through conductor is convected to surrounding air at 310° K. Determine steady-state temperature at outside of graphite core.

k(graphite) = 0.1 $W/m^2/K°$
k(conductor) = 0.1 $W/m^2/K°$
h(air)=17.0W/m/ K°
Q=0.4 W

Description of Model

Axisymmetric model of both resistor and conductor. Heat input through resistor elements.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 2

Input Data File: VER_PROB.2

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

A 0.03 m long carbon resistor is comprised of a 0.001 m radius graphite core, and a micanite thermal conductor with inside radius 0.001m and outside radius .00588 m. 0.4 watt heat through conductor is convected to surrounding air at 310° K. Determine steady-state temperature at outside of graphite core.

$$k(\text{graphite}) = 0.1\ W/m^2/K°$$
$$k(\text{conductor}) = 0.1\ W/m^2/K°$$
$$h(\text{air})=17.0 W/m/K°$$
$$Q=0.4\ W$$

Description of Model

Axisymmetric model of conductor only. Heat input by convection at inside of conductor.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 3

Input Data File: VER_PROB.3

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

A 0.03 m long carbon resistor is comprised of a 0.001 m radius graphite core, and a micanite themal conductor with inside radius 0.001m and outside radius .00588 m. 0.4 watt heat through conductor is convected to surrounding air at 310° K. Determine steady-state temperature at outside of graphite core.

k(graphite) = 0.1 $W/m^2/K°$
k(conductor) = 0.1 $W/m^2/K°$
h(air)=17.0W/m/ K°
Q=0.4 W

Description of Model

Axisymmetric model of conductor only. Heat input by thermal loads at inside of conductor.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 4

Input Data File: VER_PROB.4

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

A 0.03 m long carbon resistor is comprised of a thermal conductor with inside radius 0.001m and outside radius .00588 m. 0.4 watt heat through conductor is convected to surrounding air at 310° K. Determine steady-state temperature at inside of conductor.

k (conductor) = 0.1 $W/m^2/K^\circ$
h(air)=17.0W/m/ K°
Q=0.4 W

Description of Model

Axisymmetric model of resistor. Heat applied to elements. Convection elements at surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 5

Input Data File: VER_PROB.5

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

Determine transient response of 1/32 in copper wire at 300°F immerse in water at 100°

$$h_{water} = 15.0 \text{ Btu/hr/ft}^2/°\text{F}$$
$$k_{copper} = 216.0 \text{ Btu/hr-in-°F}$$
$$\rho_{copper} = 0.091 \text{ lb/in}^3$$
$$c_{copper} = 558.0 \text{ Btu/lbm-°F}$$

Description of Model

Axisymmetric model of wire, with convection elements at surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 6

Input Data File: VER_PROB.6

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

Determine transient response of 1/32 in copper wire at 300°F immerse in air at 100°

$$h_{air} = 2.0 \text{ Btu/hr/ft}^2/°\text{F}$$
$$k_{copper} = 216.0 \text{ Btu/hr-in-°F}$$
$$\rho_{copper} = 0.091 \text{ lb/in}^3$$
$$c_{copper} = 558.0 \text{ Btu/lbm-°F}$$

Description of Model

Axisymmetric model of wire, with convection elements at surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 7

Input Data File: VER_PROB.7

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

Concrete wall initially at 100° F has one side exposed to hot gas at 1600° and other side insulated. Find temperature distribution through wall when temperature at insulated side reaches 500°F. Heat transfer coefficient at xposed side is, h = 5.0 Btu/hr/ft^2/°F.

Description of Model

Two dimensional model of wall, with a convective element at one surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 8

Input Data File: VER_PROB.8

Libra Routines: Solution Type 12, Elements 32 & 34

Description of Problem

Steady-state heat conduction. A furnace has a two layer wall, with k_1=0.8 Btu/hr/ft^2/°F and k_2=0.8 Btu/hr/ft^2/°F. The temperature inside the furnace is 3000°F. The surface conduction at the outside wall is h = 2.0 Btu/hr/ft^2/°F. Find steady-state temperatures through wall.

Description of Model

Two dimensional model of wall, with a convective element at one surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

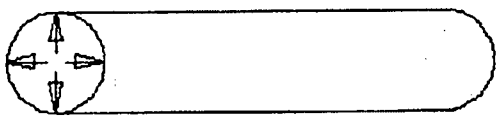
Problem 9

Input Data File: VER_PROB.9

Libra Routines: Solution Type 1, Element 9

Description of Problem

Long cylinder under internal pressure. Determine radial displacement and hoop stress.



Description of Model

Axisymmetric model of cylinder using 8-node quads.

Theoretical Solution

The theoretical solution is presented in Reference 1.

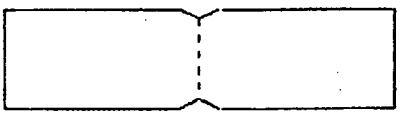
Problem 10

Input Data File: VER_PROB.10

Libra Routines: Solution Type 1, Element 9

Description of Problem

Long, cylindrical tube with axisymmetric, radial pinch at center. Find maximum longitudinal bending stress at pinch.



Description of Model

Axisymmetric model of cylinder using 8-node quads. Half of structure (and load) modeled with symmetric boundary conditions in longitudinal direction.

Theoretical Solution

The theoretical solution is presented in Reference 1.

Problem 11

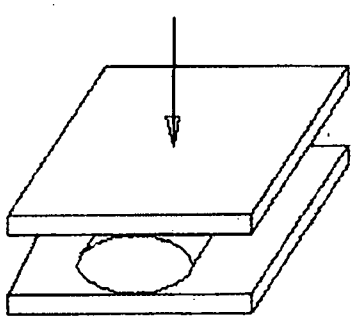
Input Data File: VER_PROB.11

Libra Routines: Solution Type 23, Element 3

Description of Problem

Collapse of a cylindrical ring, 1 in long, 2.485 in outside diameter, 0.185 in wall thickness. Cylinder compressed between two unyielding surfaces.

$$E = 29.5 \times 10^6 \text{ psi}$$
$$E_p = 1.0 \times 10^6 \text{ psi}$$
$$v = 0.3$$
$$\sigma_y = 45000 \text{ psi}$$



Description of Model

3D model composed of triangular shell elements. Half of cylinder modeled with symmetric boundary conditions.

Theoretical Solution

No theoretical solution is available for this problem. FEA solution is checked against test results given in Reference 1.

Problem 12

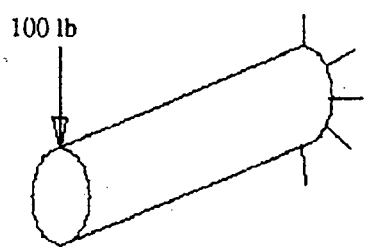
Input Data File: VER_PROB.12

Libra Routines: Solution Type 8, Element 16

Description of Problem

Elastic bending of a 10 in radius, cantilever tube, 1 in wall thickness, 200 in long with a 100 lb concentrated load at free end. Find deflection at load and stress 3 in from fixed end.

$$E = 28.0 \times 10^6 \text{ psi}$$
$$r = 10.0 \text{ in}$$
$$t = 1.0 \text{ in}$$
$$L = 100.0 \text{ in}$$



Description of Model

Tube bending is analyzed as an axisymmetric structure with nonsymmetric loading. 8-node, solid elements are used to model the tube, and only the first cosine mode used in the analysis. In this analysis, the load at node i for mode n is given by,

$$P_i = \int_0^{360} p_i(\theta) \cdot \cos(n\theta) \cdot r d\theta$$

where $p_i(\theta)$ is the circumferential load at node I. For a concentrated load Q at $\theta = 0$, and Δ_0 the Dirac-delta function at $\theta = 0$,

$$P_i = \int_0^{360} Q \cdot \Delta_0 \cdot \cos(n\theta) \cdot r d\theta = Q$$

Problem 12 – Cont'd

Theoretical Solution

Assuming the deflection shear correction for a cylindrical cross-section is the same as for a rectangle, from Reference 2, pg. 175, and Reference 3, Page 72, Table I, Case 11,

$$\delta = (P \cdot L^3 / 3EI) \cdot (1 + 0.98 \cdot D^2/L^2)$$
$$I = \pi \cdot r^3 \cdot t = 3141.59$$
$$P = 1000 \text{ lb}$$
$$L = 200 \text{ in}$$
$$E = 28.0 \text{ psi}$$
$$r = 10.0 \text{ in}$$
$$\delta = 0.030315 \cdot 1.01 = 0.030618 \text{ in}$$

$$\sigma = M \cdot c / I = 1000 \cdot 197 \cdot 10 / 3141.59 = 627.07 \text{ psi}$$

Problem 13

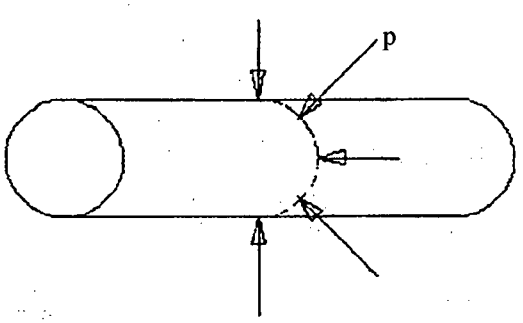
Input Data File: VER_PROB.13

Libra Routines: Solution Type 1, Element 7

Description of Problem

Elastic deflection of a 5 in radius, 0.025 in wall tickness tube, 50 in long by a distributed radial load of 15.9 lb/in (total load 500 lb). Determine deflection and hoop stress under load.

$$E = 28.0 \times 10^6 \text{ psi}$$
$$\nu = 0.3$$
$$r = 5.0$$
$$t = 0.025$$
$$p = 15.916 \text{ lb/in}$$



Description of Model

Tube bending is analyzed as an axisymmetric structure with symmetric loading. 2-node, shell elements are used to model the tube. In this analysis, the load at node i is given by,

$$P_i = \int_0^{360} p_i(\theta) \cdot r d\theta$$

Half of structure (and load) is modeled with symmetric boundary conditions.

Problem 13 – Cont'd

<u>Theoretical Solution</u>

The solution is given in Reference 3, pg.170.

$$\lambda = \sqrt[4]{3(1-\nu^2) / r^2 \cdot t^2} = 3.63538 \text{ in}$$
$$\delta = p \cdot r^2 \cdot \lambda / 2E \cdot t = 0.0010333$$
$$\sigma_H = p \cdot r \cdot \lambda / 2t = 5786.4 \text{ psi}$$

Problem 14

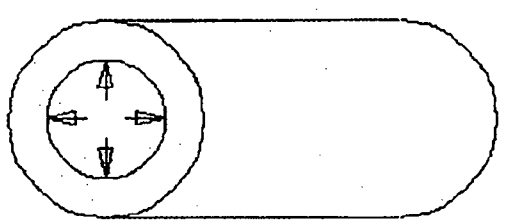
Input Data File: VER_PROB.14

Libra Routines: Solution Type 2, Element 9

Description of Problem

Inelastic deflection of a thick, cylindrical shell under internal pressure. Determine deflection at inside of cylinder for 16 dN/mm^2 and 18 dN/mm^2.

$$E = 2.1 \times 10^4 \text{ dN/mm}^2$$
$$\nu = 0.3$$
$$E_p = 0.0$$
$$\sigma_y = 24.0 \text{ dN/mm}^2$$
$$r(\text{inside}) = 100.0 \text{ mm}$$
$$r(\text{outside}) = 200.0 \text{ mm}$$



Description of Model

Cylinder modeled with 8-node plane strain elements. 90° cylinder segment modeled with symmetry boundary conditions at both ends.

Theoretical Solution

A solution for this problem is given in Reference 4, pgs.262-263 in graphic form. From Figure 7.12, pg. 262,

for p= 16 dN/mm^2, $\delta = 0.185$ mm
for p= 18 dN/mm^2, $\delta = 0.265$ mm

Problem 15

Input Data File: VER_PROB.15

Libra Routines: Solution Type 9, Element 9

Description of Problem

Elastic response of a spherical cap shell with simple supports under instantaneously applied external pressure. Determine the maximum and minimum deflections, and times of occurrence during period 0 - 0.0007 sec.

$$E = 10.5 \times 10^6 \text{ psi}$$
$$\nu = 0.3$$
$$\rho = 2.45 \times 10^{-4} \text{ lb-sec}^2/\text{in}^4$$
$$r(\text{inside}) = 22.27 \text{ in}$$
$$t = 0.41 \text{ in}$$
$$\alpha = 26.67°$$
$$p = 600 \text{ psi}$$

Description of Model

Spherical cap modeled with 8-node axisymmetric elements.

Theoretical Solution

A solution for this problem is given in Reference 4, pgs. 421-422, in graphic form. From Figure 10.4a, pg. 422,

@ t = 0.00037 sec, δ = 0.090 sec
@ t = 0.00055 sec, δ = -0.050 sec

Problem 16

Input Data File: VER_PROB.16

Libra Routines: Solution Type 4, Element 9

Description of Problem

Find fundamental period of a spherical cap shell simply-supported at base.

$$E = 10.5 \times 10^6 \text{ psi}$$
$$\nu = 0.3$$
$$\rho = 2.45 \times 10^{-4} \text{ lb-sec}^2/\text{in}^4$$
$$r(\text{inside}) = 22.27 \text{ in}$$
$$t = 0.41 \text{ in}$$
$$\alpha = 26.67°$$

Description of Model

Spherical cap modeled with 8-node axisymmetric elements. Eigen pairs determined by the Lanzcos method.

Theoretical Solution

The first period is given in Reference 4, pg. 421,

$$T = 0.55 \times 10^{-3} \text{ sec}$$

Problem 17

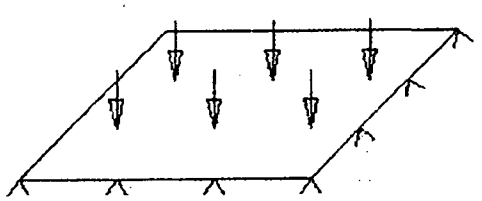
Input Data File: VER_PROB.17

Libra Routines: Solution Type 2, Element 3

Description of Problem

Inelastic bending of an elastic - perfectly plastic, simply-supported, square plate under uniform lateral pressure. Find load corresponding to a displacement of 0.06 in at center of plate.

$$E = 10.92 \times 10^6 \text{ psi}$$
$$\nu = 0.3$$
$$E_p = 0.0$$
$$\sigma_y = 1600.0 \text{ psi}$$
$$L = 10.0 \text{ in}$$



Description of Model

Plate modeled with triangular shell elements. Solution interpolated from displacements at two load steps.

Theoretical Solution

A solution for this problem is given in Reference 4, pgs. 370-371 in graphic form. From Figure 9.8, pg. 371,

$$D = E \cdot t^3 / 12(1-\nu^2) = 1000 \text{ psi}$$
$$M_p = \sigma_y \cdot t^2/4 = 4.0 \text{ in-lb}$$
$$w = 0.06 \text{ in}$$
$$100 \cdot w \cdot D/M_p \cdot L^2 = 15$$

From Figure 9.8: $q \cdot L^2/M_p = 22.5$, $q = 0.90$ psi

Problem 18

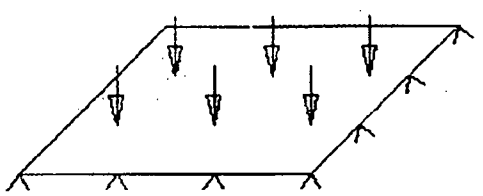
Input Data File: VER_PROB.18

Libra Routines: Solution Type 2, Element 13

Description of Problem

Inelastic bending of an elastic - perfectly plastic, simply-supported, square plate under uniform lateral pressure. Find load corresponding to a displacement of 0.06 in at center of plate.

$$E = 10.92 \times 10^6 \text{ psi}$$
$$\nu = 0.3$$
$$E_p = 0.0$$
$$\sigma_y = 1600.0 \text{ psi}$$
$$L = 10.0 \text{ in}$$



Description of Model

Plate modeled with quad shell elements. Solution interpolated from displacements at two load steps.

Theoretical Solution

A solution for this problem is given in Reference 4, pgs. 370-371 in graphic form. From Figure 9.8, pg. 371,

$$D = E \cdot t^3 / 12(1-\nu^2) = 1000 \text{ psi}$$
$$M_p = \sigma_y \cdot t^2/4 = 4.0 \text{ in-lb}$$
$$w = 0.06 \text{ in}$$
$$100 \cdot w \cdot D/M_p \cdot L^2 = 15$$

from Figure 9.8: $q \cdot L^2/M_p = 22.5$ $\quad q = 0.90$ psi

Problem 19

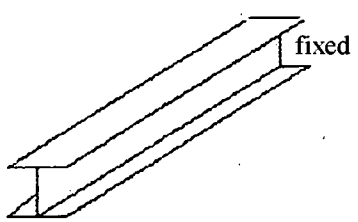
Input Data File: VER_PROB.19

Libra Routines: Solution Type 5, Element 4

Description of Problem

Modal analysis of cantilever steel beam, S-5x10, 20 ft long, 50 lb/ft weight. Determine first three frequencies.

$$E = 28.0 \times 10^6 \text{ psi}$$
$$L = 240.0 \text{ in}$$
$$I_{zz} = 12.3 \text{ in}^4$$
$$I_{yy} = 1.22 \text{ in}^4$$
$$J = 0.114 \text{ in}^4$$
$$A = 2.94 \text{ in}^2$$
$$w = 50.0 \text{ lb/ft}$$
$$\rho = 50.0 / (12 \cdot 2.94 \cdot 386.4) = 0.0108 \text{ lb-sec}^2/\text{in}$$



Description of Model

Beam modeled with 20 STIF4 elements. Z-displacements fixed along entire beam. Eigen-pairs determined by Sub-space iteration.

Theoretical Solution

From Reference 5, pg. 313, Figure E18-2,

$$\omega_1 = (1.875)^2 \cdot \sqrt{EI / \rho L^4} = 10.899 \text{ rad/sec}$$

$$\omega_2 = (4.694)^2 \cdot \sqrt{EI / \rho L^4} = 68.020 \text{ rad/sec}$$

$$\omega_3 = (7.855)^2 \cdot \sqrt{EI / \rho L^4} = 191.29 \text{ rad/sec}$$

Problem 20

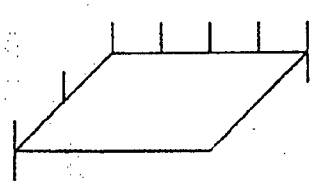
Input Data File: VER_PROB.20

Libra Routines: Solution Type 3, Element 3

Description of Problem

Modal analysis of thin, square plate, two adjacent edges fixed, other two edges free. Determine first three frequencies.

$$E = 28.0 \times 10^6 \text{ psi}$$
$$\nu = 0.3$$
$$t = 0.025 \text{ in}$$
$$D = E \cdot t^3 / 12(1-\nu^2) = 40.064 \text{ in-lb}$$
$$L = 10.0 \text{ in}$$
$$\rho = 0.000725 \text{ lb-sec}^2/\text{in}$$



Description of Model

Beam modeled with triangular shell elements. Eigen-pairs determined by vector iteration.

Theoretical Solution

From Reference 6, pg. 61-23, Table 61.3,

$$\omega_1 = 6.96 \cdot \sqrt{D/\rho L^4} = 16.45 \text{ hz}$$

$$\omega_2 = 24.1 \cdot \sqrt{D/\rho L^4} = 56.65 \text{ hz}$$

$$\omega_3 = 26.8 \cdot \sqrt{D/\rho L^4} = 63.00 \text{ hz}$$

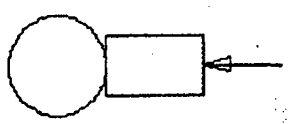
Problem 21

Input Data File: VER_PROB.21

Libra Routines: Solution Type 2, Elements 1 & 8

Description of Problem

Determine contact force between a steel sphere and the bottom flat surface of a steel cylinder due to a displacement at the top of the cylinder. The cylinder radius is 0.0060084 in, and height is 0.006 in. The sphere radius is 0.125 in. The specified displacement is 5.0×10^{-5} in, $E = 28.0 \times 10^6$ psi and $\nu = 0.3$ for both cylinder and sphere.



Description of Model

The cylinder and sphere are modeled separately with STIF8 axisymmetric elements, and are connected with gap spring elements. In this way, the contact area between the cylinder and sphere is determined in the solution. A special node and element generator is used to model the sphere in order to assure proper alignment between the nodes on the cylinder and sphere.

Theoretical Solution

This problem is a form of the Hertz contact problem. A theoretical solution is given in Reference 7, on pg. 376. Solving equation 222 for P,

$$\delta = 1.23 \cdot \sqrt[3]{P^2/E^2 \cdot R}, \quad P = E \cdot \sqrt{R \cdot (\delta/1.23)^3}$$

$$E = 28.0 \times 10^6 \text{ psi}$$
$$R = 0.125 \text{ in},$$
$$\delta = 5.0 \times 10^{-5} \text{ in},$$
$$P = 2.5657 \text{ lb.}$$

Problem 22

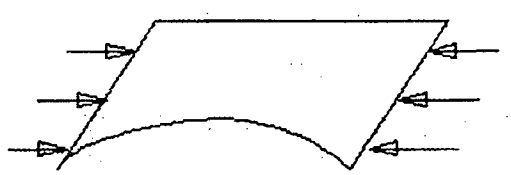
Input Data File: VER_PROB.22

Libra Routines: Solution Type 11, Element 13

Description of Problem

Elastic buckling of thin, square plate under uniform edge compression load, p_0. Plate simply-supported on three sides, free on forth side.

$$E = 28 \cdot 10^6 \text{ psi}$$
$$\nu = 0.25$$
$$L = 10.0 \text{ in}$$
$$t = 0.025 \text{ in}$$
$$p_0 = 2.5 \text{ lb/in}$$



Description of Model

The plate is modeled by quad shell element. The entire plate is modeled with equal and opposite compression load along edges x=0, and x=10. Edges x=0, x=10, and y=0 are fixed in z-direction, edge y=10 is free. The Libra solution gives the problem eigenvalue, λ, and the buckling load is given by, $\sigma_{cr} = \lambda \cdot p_0 / t$.

Theoretical Solution

The theoretical solution for this problem is given in Reference 8, pgs. 360-362. From Equation (j) and Table 9-2 on page 362,

$$\sigma_{cr} = k \cdot \pi^2 \cdot D / b^2 \cdot t$$
$$k = 1.440 \ (a/b = 1)$$
$$D = E \cdot t^3 / (1-\nu^2) = 3.8382 \text{ lb-in}$$
$$b = 10.0 \text{ in}$$
$$t = 0.025 \text{ in}$$
$$\sigma_{cr} = 221.0 \text{ psi}$$

Problem 23

Input Data Files: VER_PROB.23a, VER_PROB.23

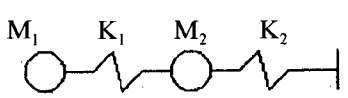
Libra Routines: Solution Types 3 &14, Element 1

Description of Problem

RMS response of a two degree of freedom, spring-mass system to a PSD acceleration spectra. Problem given in Reference 9. Determine the 1σ, RMS force at the base.

$$m_1 = 2.0 \text{ lb}$$
$$k_1 = 50000 \text{ lb/in}$$
$$m_2 = 1.0 \text{ lb}$$
$$k_2 = 180000 \text{ lb}$$

@ 10 hz,	$G^2/hz = 0.020$
@ 100 hz,	$G^2/hz = 0.200$
@ 300 hz	$G^2/hz = 0.200$
@ 2000 hz,	$G^2/hz = 0.005$



Description of Model

The Libra model consists of three nodes, and two spring elements in series. The mass is specified for nodes 1 and 2, and node 3 is fixed. The two system modes are determined using MAIN3 with the file VER_PROB.23a. The combined response is determined using MAIN14 with the file VER_PROB.23.

Modal damping values, ξ, used in the combined response solution are determined from the problem data in Reference 9, pgs 53-54, and the approximation for the maximum complex frequency response given in Reference 10, pg. 44, Equation 2-17.

$$Q = 1/2\xi$$
$$Q_1 = 28.8 \text{ g}, \ \xi_1 = 0.01736$$
$$Q_2 = 43.2 \text{ g}, \ \xi_2 = 0.01157$$

Theoretical Solution

From Reference 9, pg. 56b, $P_{rms} = 109.3$ lb

Problem 24

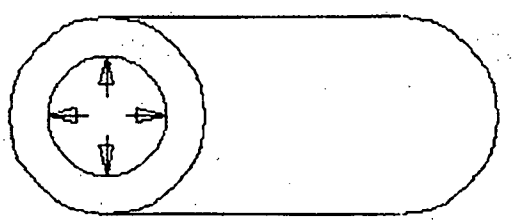
Input Data File: VER_PROB.24

Libra Routines: Solution Type 19, Element 9

Description of Problem

Determine the viscoplastic deflection of a thick, cylindrical shell under internal pressure. Find the radial deflection at inside of cylinder after 1, 2, 3, 5 and 7 days. The shell behavior is that of a Maxwell fluid with n = 0, and fluidity parameter γ=0.001/day.

$$E = 2.1 \times 10^4 \text{ dN/mm}^2$$
$$\nu = 0.3$$
$$E_p = 0.0$$
$$\sigma_y = 24.0 \text{ dN/mm}^2$$
$$p_0 = 14 \text{ dN/mm}^2$$
$$r(\text{inside}) = 100.0 \text{ mm}$$
$$r(\text{outside}) = 200.0 \text{ mm}$$



Description of Model

Cylinder modeled with 8-node plane strain elements. 90° cylinder segment modeled with symmetry boundary conditions at both ends.

Theoretical Solution

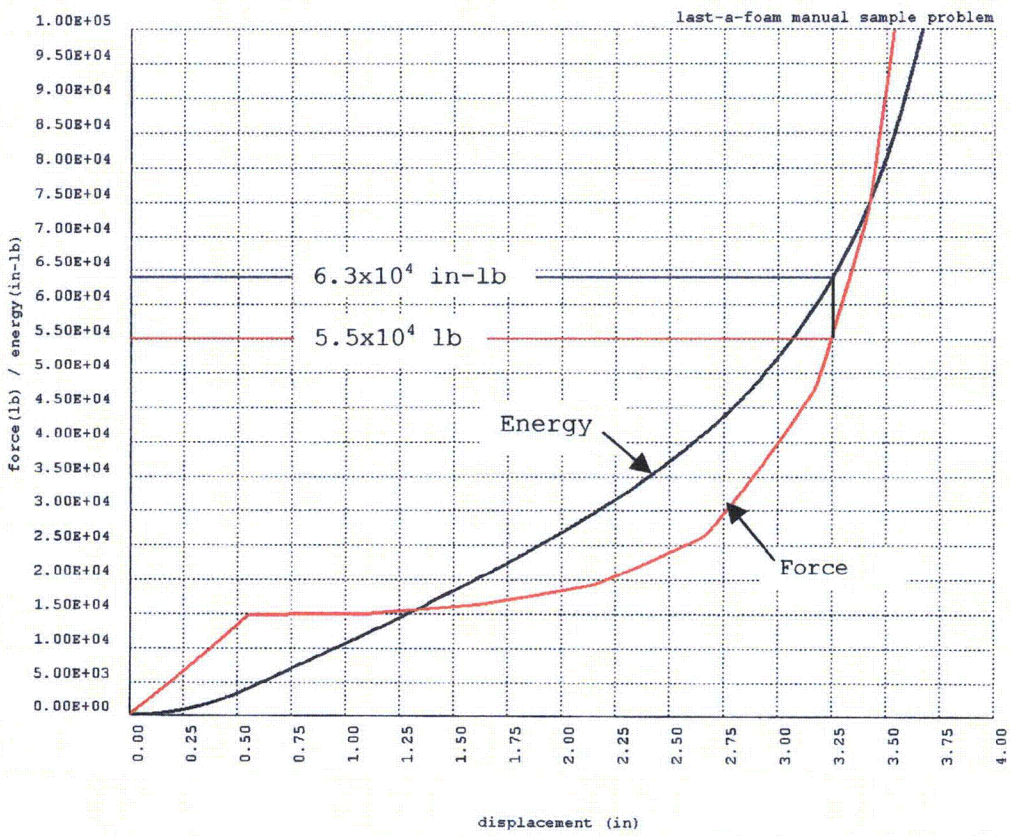
A solution for this problem is given in Reference 4, pgs.312-313 in graphic form. From Figure 8.11, pg. 313,

@ 1 day,	$\delta = 0.132$ mm
@ 2 days,	$\delta = 0.135$ mm
@ 3 days,	$\delta = 0.137$ mm
@ 5 days,	$\delta = 0.139$ mm
@ 7 days,	$\delta = 0.140$ mm

Additional Problem

Main23, Element 10. Sample problem in Last-A-Foam Manual, "Rigid Polyurethane Foam for Impact and Thermal Protection", pgs. 2-3. 30 ft drop of 700 lb cylinder onto 5 in thick Last-A-Foam disk. Quarter disk modeled by STIF10 elements. From curve on pg. 3, for 3712 foam,

g = impact force / weight = 2820*78.5/700 = 316.2



From Libra force and energy curves for 1/4 model,

$U = 700x30x12/4 = 6.3x10^4$ in-lb
$P = 5.5x10^4$ lb.
$g = 4x5.5x10^4/700 = 314.3$

Difference = 100x(316.2-314.3)/314.3 = 0.6%

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2.10.6 Description of Libra Files and Post-Processors: AOS Safety Analysis Report

Description of Libra Files and Post-Processors:

AOS Safety Analysis Report

Prepared for: GE-Hitachi Nuclear Energy
PO No. 431004505
May 3, 2007

Prepared by: Structural Mechanics Analysis, Inc.
P.O. Box 700910
San Jose, CA 95170-0910

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1.0 Introduction

The Alpha-Omega Services (AOS) Safety Analysis Report (SAR) applies to four radioactive materials Type B cask configurations. These four cask configurations are designated by their relative size as AOS-025, AOS-050, AOS-100, and AOS-165. Configuration AOS-025 is approximately 25% the size of configuration AOS-100, configuration AOS-050 approximately 50%, and configuration AOS-165 approximately 165% in comparison to the AOS-100 model. The following provides a description of the Libra post-processors used to perform the structural and thermal analyses to support the preparation of the SAR for the four AOS cask models.

Notwithstanding the scaled nature of the four configurations, the thermal and stress analyses for the four models are not scalable. Rather, an independent set of analyses is required for each model. While the analyses are not scalable, the finite element models used in the analyses are largely scaled, although there are significant differences between models, particularly between model AOS-165 and the others.

Almost all of the thermal and stress analyses in the SAR are based on application of the Structural Mechanical Analysis, Inc. (SMA) Libra finite element program. The Libra program has been used by GE-Hitachi Nuclear Energy Americas, LLC ("GEH") for a number of years, and was used in the licensing of the Model 2000 Type B transport packaging. SMA has proprietorship of the Libra program, as a result, SMA was able to develop sophisticated post-processing tools integrated with the Libra program, that facilitated the AOS analyses.

The majority of the SAR analyses permit use of axisymmetric, finite element models, since for the majority of load cases the cask, loading, and boundary conditions are axisymmetric. As a result, four axisymmetric models were developed corresponding to the four cask configurations, and these models are the cornerstones of all the finite element analyses in the SAR. For load cases such as drop and transport, where assumptions of axisymmetric loading and boundary conditions are not applicable, 3D finite element models are used. These 3D models are generated from the axisymmetric models by rotation of the model. In this way, there is a well-defined relationship between elements in the axisymmetric and 3D models, and this relationship allows combining stress resultants from the two models.

The two U.S. Nuclear Regulatory Commission (NRC) documents that govern the analyses included in the SAR are Regulatory Guides 7.6 and 7.8. Reg. Guide 7.6 defines the allowable stresses for nuclear shipping casks, while Reg. Guide 7.8 defines the required loading conditions and load combinations. Further, Reg. Guide 7.6 specifies allowable stresses in terms of membrane and bending stresses, or more generally stress resultants. Stress resultants are not a direct output of finite element analyses. For the detailed models used in the AOS analyses, forming stress resultants involves identifying and integrating element stresses across a number selected cask cross-sections. This is an arduous and time consuming task. In addition, NRC Reg. Guide 7.8, which defines the load combinations that must be meet, presents additional difficult tasks for analyses based on the finite element method.

1.0 Introduction - Cont'd

Two major post-processing programs were developed to facilitate evaluation of stress resultants and stress combinations required by NRC Reg. Guides 7.6 and 7.8. The first, PmPb, forms the stress resultants required by Reg. Guide 7.6, while the second, CmbLds, forms the load combinations required by Reg. Guide 7.8. The methodology and application of these programs are described in detail in this report. The solution process for all of the four cask configurations involves first finding stresses corresponding to a set of basic load conditions, and then finding the stress combinations. For thermal loading conditions, one or more thermal solutions must be found before solving for stresses. After determining load case stresses, stress resultants are formed by application of the PmPb post-processing program. The PmPb program generates files containing stress resultants for the basic loading conditions. After all of the loading conditions have been run, and corresponding files of stress resultants generated by PmPb, The CmbLds program is executed. The CmbLds program reads the files generated by PmPb, forms the required combinations, and compares the combined stresses to the allowables in Reg. Guide 7.6. This entire process is automated by a Windows Command program, Run_AOS. A section of the Run_AOS batch program is shown in Appendix F.

2.0 PmPb Post Processor Program

The PmPb program forms the stress resultants referenced by Reg. Guide 7.6. The PmPb is a suite of three programs: PmPbData, PmPb, and PmPb3D. Each of these thee programs is described below. All three programs use the input file PmPb.in, which lists the elements at each model cross-section where stress resultants are evaluated. A sample PmPb.in file is shown in Appendix A.

The cross-sections on which PmPb operates are shown in Figures 1 and 2. Figure 1 shows the cross-sections for model 165, and Figure 2 shows the cross-section for models 025, 050, and 100. Model 165 has 25 stress cross-sections, while models 025,050, and 100 have 22 stress cross-sections. The larger number of cross-sections for model 165 is due to the split outer shell. The elements comprising the cross-sections shown in Figures 1 and 2 are defined on the respective input data file PmPb.dat. The 165 cask axisymmetric, and three dimensional finite element models are shown in Figures 3 and 4, respectively.

2.1 AOS Input Load Case designations

AOS Libra input data files all have designations starting with LCnnn, where nnn is a three digit load case number; and ending with suffix mmm, where mmm is a three digit model number. For example, the input file for thermal load case 101, model 025 is, LC101.025. Additional file description is entered following the load case number, with a hyphen preceding the entry. For example LC101-2500-UPDATE.025 is the designation for input file for thermal load case 101, 2500 watts, updated.

AOS load case numbers define the type of loading involved in the load case. Load cases numbered 101-199 are thermal loadings. Load cases 201-299 are pressure or other axisymmetric normal loadings. Load cases 301-399 are accident condition loadings. The load case types are used by the CmbLds program to determine allowable stress for load combinations.

2.2 PmPbData Program

PmPbData program determines the geometry data for the PmPb program, and stores this data on the file PmPb.dat. This geometry function is separated from the PmPb program for efficiency, as it needs to be performed only once for each model. PmPbData must be executed immediately following an execution of the Libra program, as it uses Libra output. The program reads Libra model geometry data from binary file Tape9, and generates the geometric data required to form membrane and moment stress resultants for each stress cross-section. This data is written to the file PmPb.dat, and is utilized by both PmPb and PmPb3D.

2.3 PmPb Program

The PmPb program generates files of membrane and bending stress resultants for axisymmetric loading conditions. The program utilizes the geometry data on the file PmPb.dat, the cross-section elements defined on PmPb.in, and Libra stress data on the binary file Tape8. PmPb generates output files labeled LOAD_CASE.nnn, where nnn is the load case number. For each LCnnn file there is a corresponding LOAD_CASE.nnn file. A typical output file generated by PmPb is shown in Appendix B. Output files list maximum principal stress, and membrane and bending stress for each cross-section. The PmPb program must be executed immediately following execution of a Libra stress run.

2.4 PmPb3D Program

The PmPb3D program generates files containing membrane and moment stress resultants for 3D loading conditions. The program utilizes the geometry data on the file PmPb.dat, cross-section element data on the file PmPb.in, and Libra stress output on the binary file Tape8. All AOS 3D models are generated from axisymmetric models. As a result, each element along a meridian corresponds to a element in the corresponding axisymmetric model. PmPb3D finds the stress resultants for each element along a meridian, and outputs maximum values on the LOAD_CASE file. Stress combinations involving axisymmetric and 3D load cases conservatively combine maximum meridian 3D values with axisymmetric values. The output of PmPb3D is the same as PmPb, and a typical file shown in Appendix B.

2.5 GroupAllow Program

The GroupAllow program finds maximum temperatures at cross-sections where stress resultants are evaluated, and interpolates temperature-dependent, allowable stress data to find the allowable cross-section stress corresponding to these maximum temperatures. This program is executed only for thermal load cases, and is executed after a Libra thermal solution. The GroupAllow program generates files ALLOWABLES.nnn, where nnn is load case number, and the file is subsequently used by the CmbLds program. A typical GroupAllow output file is shown in Appendix C.

3.0 CmbLds Program

As described in Section 2.3, The PmPb program generates stress resultant files LOAD_CASE.nnn, where nnn is the load case number. The CmbLds program forms load combinations using these files, and also determines the allowable stresses against which the combined stresses are compared. A typical CmbLds.in file is shown in Appendix D.

The load case number nnn in the file name LOAD_CASE.nnn defines the type of loading, as described in Section 2.1. LOAD_CASE.nnn files list both membrane and bending stress for each stress cross-section. The ALLOWABES.nnn files, described in Section 2.5, specify allowable stresses for thermal loadings. Based on all this information, the CmbLds program determines the maximum combined stress, the minimum allowable stress, and the minimum margin of safety at all stress cross-sections. The maximum stresses and minimum allowables are output on the file CmbLds.out. A typical output section generated by CmbLds is shown in Appendix E. The table in Appendix E lists the combined stress, allowable stress, and minimum margins of safety for each cross-section. The overall minimum margin of safety is listed at the end of the table.

4.0 AOS Files

The AOS input and output data files, PMPB verification files, and Libra Program files are contained on a single CD. The folders on this disk are listed below, and the following sections describe the contents of these folders.

aos-25	Input data files for AOS cask Model 025
aos-50	Input data files for AOS cask Model 050
aos-100	Input data files for AOS cask Model 100
aos-165	Input data files for AOS cask Model 165
aos-165-2500	Input data files for AOS cask Model 165, 2500 watts
PMPB_Verification	Verification report for post-processors
Source	Post-processors source code
aos-25-out	Output files for AOS cask Model 025
aos-50-out	Output files for AOS cask Model 050
aos-100-out	Output files for AOS cask Model 100
aos-165-out	Output files for AOS cask Model 165
aos-165-2500-out	Output files for AOS cask Model 165, 2500 watts
drop-25	Files for AOS cask Model 025 30' drop analyses
drop-50	Files for AOS cask Model 050 30' drop analyses
drop-100	Files for AOS cask Model 100 30' drop analyses
drop-165	Files for AOS cask Model 165 30' drop analyses

4.1 Input Data Files

The five input data folders, aos-25 ... aos-165-2500, contain all files required to run the Libra stress and thermal analyses for the five cask models. After establishing the Libra program (see Section 4.5), there is a two step process for executing Libra analyses and post-processing programs for a cask model: 1) copy the entire contents of an input data folder onto the Libra.app, or Libra.app sub-folder, directory; 2) execute the batch program RUN_AOS.

All input data is in English units. For thermal problems temperatures are in degrees F, energy in Btu, and length in inches. For structural problems loads are in lb, moduli in lb/in^2, and length in inches.

Libra executions may take several hours. Output from the Libra runs and post-processors consist of a series of text files labeled Load_Case.nnn, where nnn represents the load case number, and a file labeled Cmb_Loads.out. The Load_Case.nnn files contain the Pm and Pb stress measures at the monitored cask cross-sections for the individual load cases. The Cmb_Loads.out file contains the load combination results, including margins of safety for all combined load cases.

4.2 PMPB Verification Files

The PMPB_Verification folder contains both a report and a verification problem for PMPB and Cmb_Loads post-processors. The verification problem is a simple flat-top cylindrical shell under pressure and thermal loads. The stress resultants as two shell cross-sections are determined analytically, and by the PMPB and Cmb_Loads post processors. The two sets of results are shown to compare well.

A folder containing a set of verification problems for the Libra program, with emphasis on the AOS problem types, is established with installation of the Libra program (see Section 4.5). The Source folder contains the Fortran source codes for the six post processing programs used in the AOS Libra analyses.

4.3 Output Data Files

The AOS-25-out ... AOS-165-2500-out folders contain selected output from the individual Libra load case analyses (see Section 2.1). Each folder contains the LOAD_CASE file (see Section 2.4), The ALLOWABLES file (see Section 2.5), and the Libra output file (TAPE6) for each input data file. The extensions on LOAD_CASE, ALLOWABLES, and TAPE6 files are the same as the input file extension.

4.4 Files for 30' Drop Analyses

The four drop analysis folders, drop-25 ... drop-165, contain input and selected output files for the 30' head-on, side and cg/corner drop analyses. Each folder contains files for a single model, and for the three drop analyses. The output files are plot files for force-energy curves, model displacement, and model stress. The file names have -force,- disp, or -stress to indicate content. File names containing -cold are plots for -40° F thermal conditions, all other files are for 75° F.

The same Libra input data file can be used for all three drop orientations, with non-applicable orientation data commented out by an asterisk in column 1. All of the plot files are BMP format files, and may be viewed by means of the MS Paint program. The displacement and stress files are for displacement fields close to, but not necessarily at maximum values.

The drop-165 folder also contains the Libra input data file slap-down.t5 for slap-down analysis. This file is specifically for AOS model 165 cask, but is easily adapted to other cask models by changing the model structure dimensions and contact stiffness values. Contact stiffness values are taken from the 30' side-drop analyses.

5.0 Libra Installation

Libra installation files are contained in the Libra64 folder. The Libra Program is installed by executing the SETTUP program on the Libra64 folder. The SETUP program will request names for Libra Program and Application directories. Libra program files reside on the Program directory, and problems are executed from the Application directory or sub-directories. Default folder names are Libra64 for the program directory, and Libra.app for the application directory. The SETUP program will also prompt for installation of the 64-bit version of Libra. The 64-bit version should be installed only if the host operating system is 64 bits.

On Vista operating systems it may be necessary to set permission for running Script files before executing the Libra SETUP program. The following steps establish permission:

go to Control Panel
click on User Accounts
click on Turn user control on or off
uncheck user account control

After the Libra SETUP program is completed, the Libra program can be executed from the Start menu, or from the Command line in the Libra application folder. The AOS files are organized to run from the Libra Command line. To access the Libra Command line, left click on the Libra Desktop icon. To then execute a Libra input file, at the Command prompt enter,

Libra input_file output_file

If output_file is omitted, the default file name is TAPE6. After a Libra execution, the model can be viewed by entering HPLOT at the command prompt, and stresses viewed by entering STRSPP. Both HPLOT and STRSPP are menu driven.

To execute a set of AOS analyses on the distribution disk, say \aos-25, read the entire contents of \aos-25 onto the application directory (or sub-directory), then enter run_aos at the Command prompt. This executes the batch program run_aos, which executes all of the files and post-processors for AOS Model 025. Output will be contained on a set of files labeled Load_Case.nnn, and on the file Cmb_Loads.out (see Sections 2.3 and 3.0).

Libra installation establishes a folder labeled Verification. This folder contains a number of verification problems for Libra elements and solution procedures. The thermal problems, and several of the structural problems are directly applicable to AOS analyses. In total, the verification problems in this folder encompass all of the Libra elements and solution procedures applied in the AOS analyses. The verification files described in Section 4.2 address the post-processors used in the AOS analyses, and are an adjunct to these Libra verification problems.

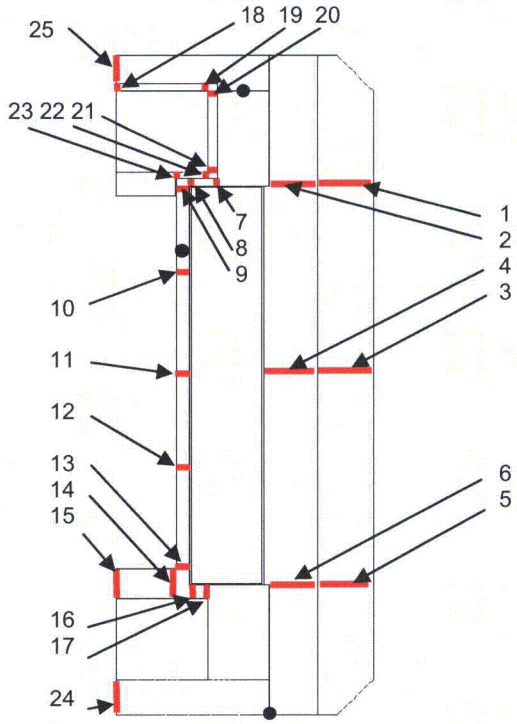


Figure 1. Model 165 PmPb Cross-Sections

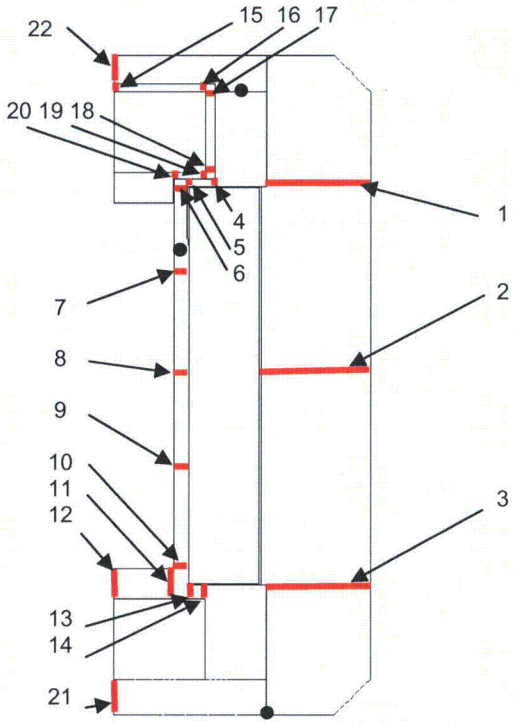


Figure 2. Models 025, 050 and 100 PmPb Cross-Sections

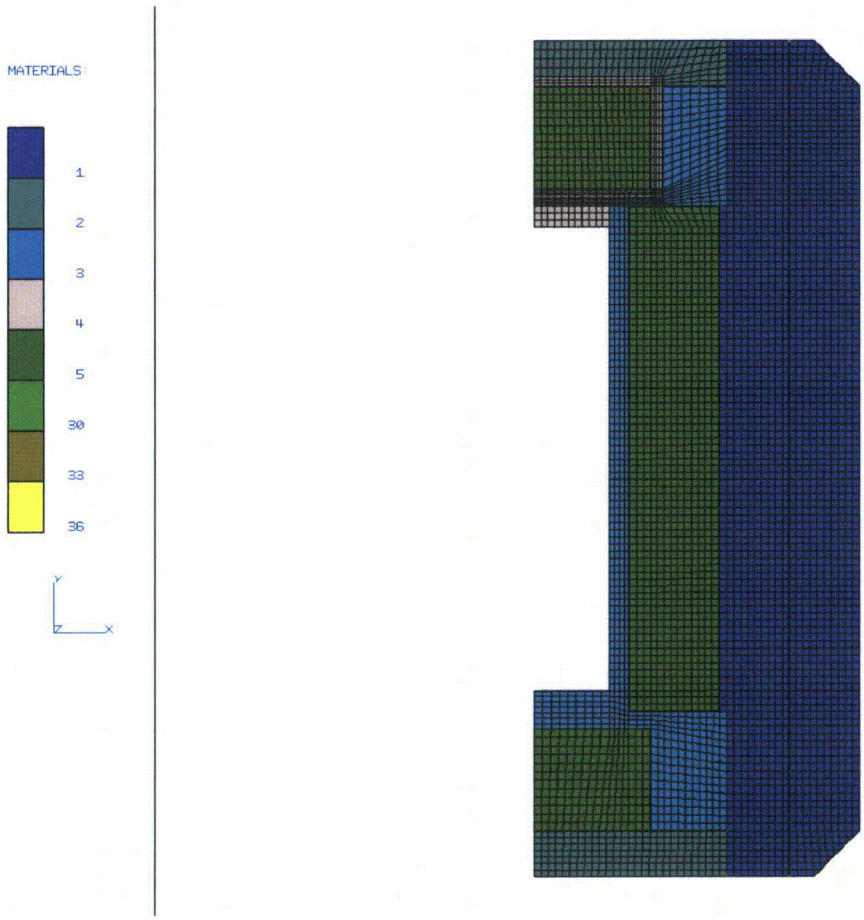


Figure 3. Axisymmetric FEA Model of 165 Cask

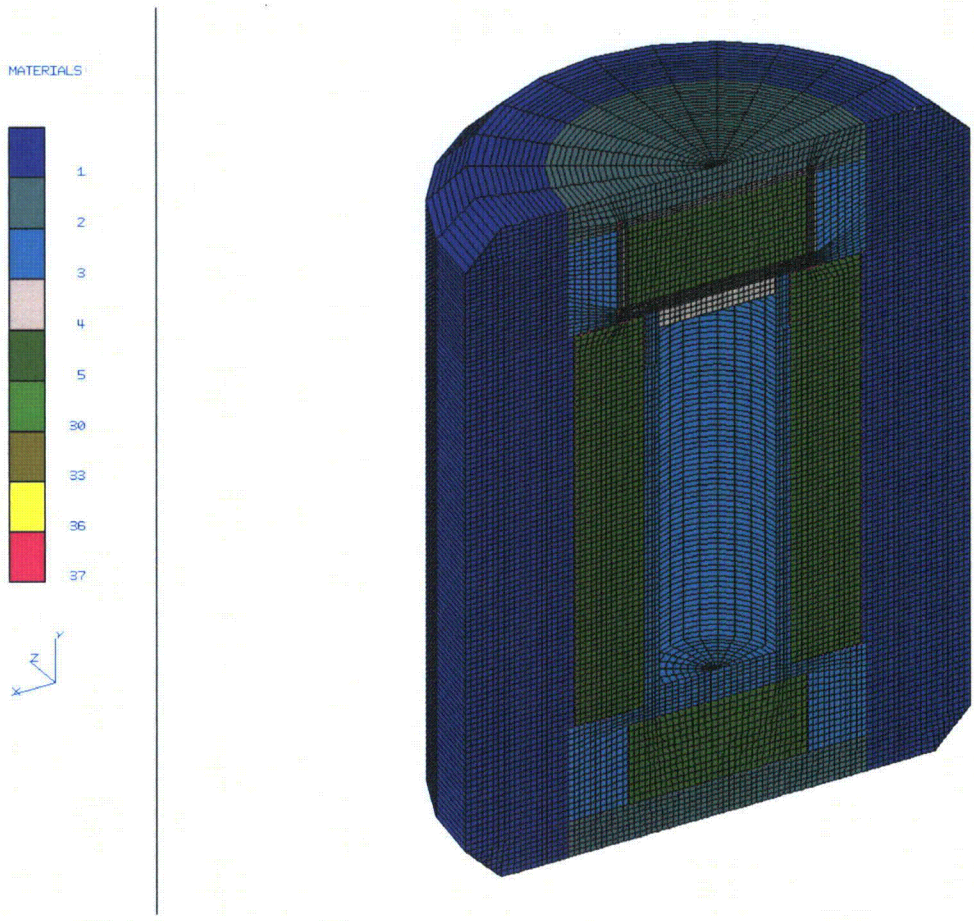


Figure 4. Three Dimensional FEA Model of 165 Cask

Appendix A. Typical PmPb.in File

The following is a typical PmPb.in file listing elements at each stress cross-section. For ease of viewing, cross-section entries are not confined to one line, and blank lines separate entries. In the actual file all section entries are on one line, and there are no blank lines.

```
1957,1958,1959,1960,1961,1962,1963,1964,1965,2146,2147,2148,2149,2150,
2151,2152,2153,2154,2155

552,904,905,906,907,908,909,910,911,912,1587,1588,1589,1590,1591,1592,
1593,1594,1595,1596

348,349,350,351,352,353,354,355,356,507,508,509,510,511,512,513,514,515,
516

4587,4591,4595,4599

4572,4575,4578,4581

552,4553,4554,4555

4476,4477,4478,4479

4408,4409,4410,4411

4344,4345,4346,4347

4280,4281,4282,4283

4141,4150,4159,4168,4177,4186,4195

4133,4142,4151,4160,4169,4178,4187

4212,4215,4218,4221

4214,4217,4220,4223

5218,5236,5254

5235,5253,5271

5214,5215,5216,5217

5166,5167,5168,5169

5140,5143,5146,5149

5122,5126,5130,5134

3001,3017,3033,3049,3065,3081,3097

3190,3208,3226,3244
```

Appendix B. PmPb output file, LOAD_CASE.101

The following is the PmPb output file for load case LC101.025. The file lists maximum principal stresses, and calculated membrane and bending stress at each section analyzed. Stresses are listed in both English and metric units.

Load Case_101 - 100F Ambient, Max Decay Heat

Stress (psi/MPa)

Location	Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2232E+01	-2.5191E+01	-1.8387E+00	3.7423E+01	5.8177E+01
	8.4340E-02	-1.7369E-01	-1.2677E-02	2.5803E-01	4.0111E-01
2	1.6225E+01	-3.2962E+01	-6.5255E+00	4.9187E+01	1.0016E+02
	1.1187E-01	-2.2727E-01	-4.4992E-02	3.3913E-01	6.9059E-01
3	1.0870E+01	-2.3382E+01	-1.1174E+00	3.4252E+01	5.3526E+01
	7.4943E-02	-1.6122E-01	-7.7043E-03	2.3616E-01	3.6905E-01
4	6.2382E+01	-2.3843E+02	-4.1530E+01	3.0081E+02	5.9563E+02
	4.3011E-01	-1.6439E+00	-2.8634E-01	2.0740E+00	4.1067E+00
5	6.1432E+01	-2.6905E+02	-1.2242E+02	3.3048E+02	5.2038E+02
	4.2356E-01	-1.8550E+00	-8.4406E-01	2.2786E+00	3.5879E+00
6	6.4534E+00	-1.3381E+02	-1.5795E+02	1.4026E+02	1.6725E+02
	4.4494E-02	-9.2256E-01	-1.0890E+00	9.6705E-01	1.1532E+00
7	-1.9752E+00	-4.9672E+01	2.5928E+00	4.7697E+01	4.3899E+01
	-1.3619E-02	-3.4248E-01	1.7877E-02	3.2886E-01	3.0267E-01
8	-2.0037E+00	-4.9648E+01	1.9949E-03	4.7644E+01	4.3457E+01
	-1.3815E-02	-3.4231E-01	1.3755E-05	3.2850E-01	2.9962E-01
9	-1.9811E+00	-4.9582E+01	-5.2273E-01	4.7600E+01	4.1764E+01
	-1.3659E-02	-3.4185E-01	-3.6041E-03	3.2819E-01	2.8795E-01
10	-7.5888E+00	-6.6970E+01	1.0700E+01	5.9381E+01	1.2009E+02
	-5.2323E-02	-4.6174E-01	7.3772E-02	4.0942E-01	8.2802E-01
11	-1.6114E+01	-1.0104E+02	-5.3150E+01	8.4930E+01	7.0193E+00
	-1.1110E-01	-6.9668E-01	-3.6645E-01	5.8557E-01	4.8396E-02
12	4.9440E+00	-1.1870E+02	-1.1938E+02	1.2364E+02	7.5796E+00
	3.4087E-02	-8.1839E-01	-8.2311E-01	8.5248E-01	5.2260E-02

13	-1.3346E+01	-1.7829E+02	-2.9776E+01	1.6495E+02	8.7679E+01
	-9.2016E-02	-1.2293E+00	-2.0530E-01	1.1373E+00	6.0452E-01
14	-1.2832E+01	-1.5680E+02	3.6799E+00	1.4396E+02	9.5911E+01
	-8.8473E-02	-1.0811E+00	2.5372E-02	9.9259E-01	6.6128E-01
15	3.4752E+02	-3.2306E+02	-3.0278E+01	6.7058E+02	1.1250E+03
	2.3960E+00	-2.2274E+00	-2.0876E-01	4.6235E+00	7.7568E+00
16	1.2110E+02	-2.3963E+02	-7.8259E+01	3.6074E+02	5.8708E+02
	8.3498E-01	-1.6522E+00	-5.3958E-01	2.4872E+00	4.0478E+00
17	5.3313E+01	-1.6483E+02	7.7898E+00	2.1815E+02	3.7767E+02
	3.6758E-01	-1.1365E+00	5.3709E-02	1.5041E+00	2.6039E+00
18	1.3652E+01	-8.6978E+01	1.2149E+02	1.0063E+02	1.5144E+02
	9.4130E-02	-5.9969E-01	8.3767E-01	6.9382E-01	1.0442E+00
19	3.7352E+01	-1.4759E+02	9.9594E+01	1.8495E+02	3.1090E+02
	2.5754E-01	-1.0176E+00	6.8668E-01	1.2752E+00	2.1436E+00
20	2.5189E+01	-1.9576E+02	9.1481E+00	2.2095E+02	4.1088E+02
	1.7367E-01	-1.3497E+00	6.3074E-02	1.5234E+00	2.8329E+00
21	6.6491E+00	-2.2294E+00	-1.0467E+00	8.8785E+00	6.0550E+00
	4.5844E-02	-1.5371E-02	-7.2168E-03	6.1215E-02	4.1748E-02
22	2.7655E+00	-1.5235E+01	-3.0961E+00	1.8000E+01	4.4221E+01
	1.9068E-02	-1.0504E-01	-2.1347E-02	1.2411E-01	3.0489E-01

Appendix C. GroupAllow Program Output File

The following is the GroupAllow program output file for load case LC101.025. This file lists maximum and average temperatures at each stress section, and the allowable membrane, yield, and ultimate stress at these sections.

Allowable Stress for Load Case 101

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	138.91	138.74	20.00	30.00	70.00
2	138.94	138.59	20.00	30.00	70.00
3	138.62	138.37	20.00	30.00	70.00
4	139.15	139.13	20.00	30.00	70.00
5	139.61	139.54	20.00	30.00	70.00
6	139.79	139.72	20.00	30.00	70.00
7	140.04	139.89	20.00	30.00	70.00
8	139.99	139.85	20.00	30.00	70.00
9	139.92	139.77	20.00	30.00	70.00
10	139.78	139.64	20.00	30.00	70.00
11	139.92	139.66	20.00	30.00	70.00
12	140.39	140.09	20.00	30.00	70.00
13	139.33	139.20	20.00	30.00	70.00
14	139.04	138.97	20.00	30.00	70.00
15	139.08	139.03	20.00	30.00	70.00
16	139.19	139.14	20.00	30.00	70.00
17	139.22	139.19	20.00	30.00	70.00
18	139.37	139.34	20.00	30.00	70.00
19	139.50	139.44	20.00	30.00	70.00
20	140.26	140.14	20.00	30.00	70.00
21	138.43	138.36	20.00	30.00	70.00
22	138.82	138.76	20.00	30.00	70.00

Appendix D. Typical CmbLds.in File

The following is a typical PmPb.in file. The first entry is the number of stress cross-sections. The next set of entries is the load case numbers, and this set is terminated with a -1. The second and last set of entries are the load combination numbers, and the combination load cases. Text following entries is descriptive, and not used by the program

```
22
101       ; 100F Ambient, Max Decay Heat
102       ; 100F Ambient, Max Decay Heat, Max Insolation
103       ; -20F Ambient, Zero Decay Heat, Zero Insolation
104       ; -40F Ambient, Zero Decay Heat, Zero Insolation
105       ; -40F Ambient, Max Decay Heat
111       ; Fire @ 30 Min, 1475F Ambient, Max Decay Heat
112       ; Fire @60 Min, 100F, Max Decay Heat,Max Insolation
113       ; Fire @90 Min, 100F, Max Decay heat,Max Insolation
114       ; Fire @120 Min, 100F, Max Decay Heat,Max Insolation
115       ; Fire @150 Min, 100F, Max Decay Heat,Max Insolation
116       ; Fire @180 Min, 100F, Max Decay Heat,Max Insolation
201       ; Maximum Internal Pressure, 30 psi
202       ; Minimum External Pressure, 3.5 psia
203       ; Maximum Increased Pressure, 20 psia
204       ; Additional Increased External Pressure, 290 psi
211       ; Fabrication Stress
215       ; Compression Load
216       ; Rod Drop
221       ; Forward 5g Vibration Inertia Load
222       ; Lateral 5g Vibration Inertia Load
223       ; Vertical 10g Vibration Inertia Load
231       ; 4 ft head-on drop
232       ; 30 ft head-on drop, normal conditions
301       ; 30 ft Head-on drop
302       ; 30 ft Side drop + slap-down
303       ; CG/Corner Drop
304       ; 30 ft Head-on drop, low temp
305       ; 30 ft Side drop + slap-down, low temp
306       ; CG/Corner Drop, low temp
311       ; 3 ft drop onto rod
-1
101, 101,201,211          ; hot environment
102, 104,201,211          ; cold environment
103, 103,201,211          ; increaded ex pres
104, 101,201,202,211      ; min ex pres
105, 105,201,202,211      ; cold environment
106, 101,201,203,211      ; max pres, hot environment
107, 105,201,203,211      ; max pres, cold environment
215, 215,101,201,211      ; compression load
216, 216,101,201,211      ; rod drop
217, 216,104,201,211      ; rod drop cold environment
221, 221,101,201,211      ; fwd vibration
222, 222,101,201,211      ; lateral vibration
```

```
223, 223,101,201,211     ; vertical vibration
231, 231,102,201,211     ; 4 ft head-on drop, normal conditions
232, 232,102,201,211     ; 30 ft head-on drop, normal conditions
301, 301,102,201,211     ; head-on drop
302, 302,102,201,211     ; side drop
303, 303,102,201,211     ; cg/corner drop
304, 304,105,202,211     ; head-on drop, cold environment
305, 305,105,202,211     ; side drop, cold environment
306, 306,105,202,211     ; cg/corner drop, cold environment
310, 204,101,211         ; add ext pres (290 psi)
311, 311,101,201,211     ; 3 ft drop onto rod
312, 311,104,201,211     ; 3 ftdrop onto rod, cold environment
350, 111,201,211         ; fire @ 30 min
351, 112,201,211         ; fire @ 60 min
352, 113,201,211         ; fire @ 90 min
353, 114,201,211         ; fire @ 120 min
354, 115,201,211         ; fire @ 150 min
355, 116,201,211         ; fire @ 180 min
-1
```

Appendix E. Typical Output from CmbLds Program

The following is a typical output file from the CmbLds program. The load combination is listed at the top of the table. The file lists maximum membrane and bending stress, and minimum allowables at each section analyzed. Stresses are listed in both English and metric units. Minimum MS and associated values are listed at the end of the table.

```
Normal Load Combination  101
----------------------------
Load Cases: 101 201 211
100F Ambient, Max Decay Heat
Maximum Internal Pressure - 30 Psia
Fabrication Stress
```

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	0.75	1.10	0.04	1.85	1.89	20.00	70.00	>10
	5.16	7.60	0.26	12.75	13.01	137.90	482.63	
2	0.14	0.20	0.05	0.34	0.38	20.00	70.00	>10
	0.96	1.35	0.34	2.31	2.65	137.90	482.63	
3	0.08	0.08	0.03	0.16	0.20	20.00	70.00	>10
	0.58	0.54	0.24	1.12	1.36	137.90	482.63	
4	1.16	1.78	0.30	2.94	3.24	20.00	70.00	9.20
	8.00	12.28	2.07	20.28	22.35	137.90	482.63	
5	1.18	1.00	0.33	2.18	2.51	20.00	70.00	>10
	8.17	6.88	2.28	15.05	17.32	137.90	482.63	
6	0.78	1.17	0.14	1.95	2.09	20.00	70.00	>10
	5.40	8.05	0.97	13.44	14.41	137.90	482.63	
7	0.34	0.07	0.05	0.40	0.45	20.00	70.00	>10
	2.34	0.45	0.33	2.79	3.12	137.90	482.63	
8	0.32	0.04	0.05	0.36	0.41	20.00	70.00	>10
	2.21	0.27	0.33	2.48	2.81	137.90	482.63	
9	0.36	0.07	0.05	0.43	0.48	20.00	70.00	>10
	2.48	0.48	0.33	2.97	3.29	137.90	482.63	
10	1.23	0.15	0.06	1.38	1.44	20.00	70.00	>10
	8.49	1.03	0.41	9.52	9.93	137.90	482.63	

11	0.93	1.23	0.08	2.17	2.25	20.00	70.00	>10
	6.44	8.51	0.59	14.95	15.53	137.90	482.63	
12	1.01	1.49	0.12	2.50	2.62	20.00	70.00	>10
	6.95	10.27	0.85	17.23	18.08	137.90	482.63	
13	1.19	1.05	0.16	2.24	2.40	20.00	70.00	>10
	8.21	7.23	1.14	15.44	16.58	137.90	482.63	
14	1.21	1.54	0.14	2.75	2.89	20.00	70.00	9.91
	8.36	10.61	0.99	18.97	19.96	137.90	482.63	
15	1.70	1.94	0.67	3.64	4.31	20.00	70.00	7.25
	11.69	13.38	4.62	25.07	29.70	137.90	482.63	
16	1.70	2.69	0.36	4.39	4.75	20.00	70.00	5.83
	11.72	18.55	2.49	30.27	32.75	137.90	482.63	
17	1.12	1.79	0.22	2.90	3.12	20.00	70.00	9.33
	7.71	12.31	1.50	20.02	21.52	137.90	482.63	
18	0.87	1.40	0.10	2.27	2.37	20.00	70.00	>10
	5.99	9.65	0.69	15.64	16.33	137.90	482.63	
19	1.46	2.17	0.18	3.63	3.82	20.00	70.00	7.26
	10.09	14.96	1.28	25.05	26.33	137.90	482.63	
20	1.82	2.90	0.22	4.72	4.95	20.00	70.00	5.35
	12.58	19.99	1.52	32.57	34.09	137.90	482.63	
21	0.32	0.44	0.01	0.76	0.77	20.00	70.00	>10
	2.24	3.00	0.06	5.24	5.30	137.90	482.63	
22	0.46	0.47	0.02	0.93	0.95	20.00	70.00	>10
	3.20	3.23	0.12	6.43	6.55	137.90	482.63	

Min MS: 5.350, Location: 20, Combination: Pm+Pb

Appendix F. Typical Section of Batch Program to Execute AOS Load Cases

The AOS input data files and post-processor executions are organized and run by a Command batch program. A separate batch program is required for each of the four model configurations. A section of a typical batch program is shown below. Note that the program PmPbData is run before the first execution of PmPb. The GroupAllow program is only run after a Libra thermal analysis. The PmPb (or PmPb3D) program is run after each Libra stress analysis. Calls to the Libra program include the input file name, output file name, and a flag set to 1 to prevent Libra pausing after execution.

```
rem load case 101
call libra lc101-t-update.025  tape6 1
call libra lc101-update.025  tape6 1
groupallow lc101-update.025
pmpbdata
pmpb

rem load case 102
call libra lc102-t-update.025  tape6 1
call libra lc102-update.025  tape6 1
groupallow lc102-update.025
pmpb

rem load case 103
call libra lc103-t-update.025  tape6 1
call libra lc103-update.025  tape6 1
groupallow lc103-update.025
pmpb

rem load case 104
call libra lc104-t-update.025  tape6 1
call libra lc104-update.025  tape6 1
groupallow lc104-update.025
pmpb

rem load case 105
call libra lc105-t-update.025  tape6 1
call libra lc105-update.025  tape6 1
groupallow lc105-update.025
pmpb

rem load case 106
call libra lc106-t-update.025  tape6 1
call libra lc106-update.025  tape6 1
groupallow lc106-update.025
pmpb
```

2.10.7 Properties of Materials References

This appendix provides information related to materials:

- Contact Resistance
- Decay Heat
- Stainless Steel (SS304)
- Tungsten Alloy
- General Plastics LAST-A-FOAM
- Air Properties
- Port Seal
- Lid Seal

A list of References is also included.

Contact Resistance

Contact Resistance

- Surfaces with 0.0 clearance.
- All contact surfaces are assumed low a resistance (approximately 30 psi) and have a value of:

$$1/h_c = 0.03 \frac{\text{hr-ft}^2\,^\circ\text{F}}{\text{Btu}} \qquad h_c = 0.231 \text{ Btu/hr-in}^2\,^\circ\text{F}$$

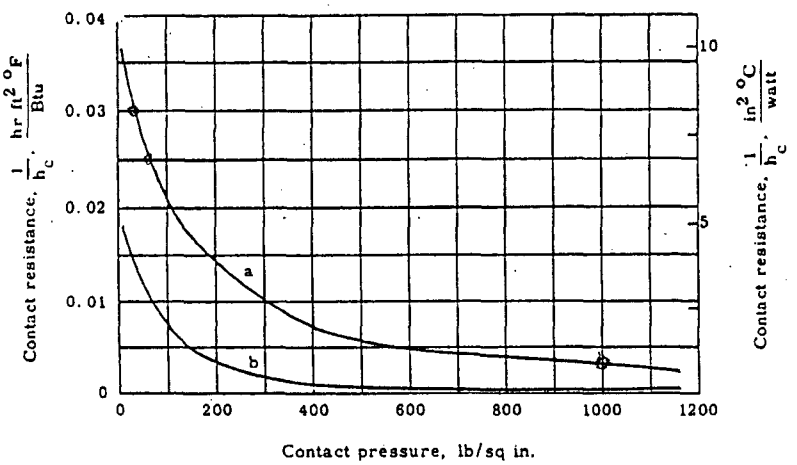
The exception is the shrinkfit surface at the outside shell, where the contact pressure is approximately 2 ksi.

$$1/h_c = 0.003 \frac{\text{hr-ft}^2\,^\circ\text{F}}{\text{Btu}} \qquad h_c = 2.315 \text{ Btu/hr-in}^2\,^\circ\text{F}$$

STEEL, BARE SURFACES AT HIGH CONTACT PRESSURES (0 to 1200 psi) - Solid blocks in air at reduced pressure ($p < 0.1$ atm)

For steel with bare surfaces in air, see pages 5-6.
For steel with sandwich material in air, see page 8.
For steel in other gases, see page 9.
For steel with dissimilar metal in air, see page 20; at reduced pressure ($p < 0.1$ atm), see page 21.
For other metals in air, see pages 10-11, 17; at reduced pressure ($p < 0.1$ atm), see pages 12-13, 18-19.
For laminated steels in air, see page 23.

Curve	Material[4]	Finish	Roughness Rms (μ in.) Block 1	Roughness Rms (μ in.) Block 2	Fluid in Gap	Temp (°F)	Condition	Ref. No.[5]
a	Stainless Steel 304	Ground	42-60	43-48	Air	75	Clean, 10^{-4} mm Hg abs	45
b	Stainless Steel 304	Ground	15-15	10-10	Air	84	Clean, 10^{-4} mm Hg abs	45



$\frac{1}{h} = 0.03 * 144 = 4.32 \rightarrow h = .231$

[4-5] See page 24

The decay heat of the cask contents is introduced in the model by two-node convective boundary elements along the cask cavity wall. In the model, it is assumed that the load is uniformly distributed over the entire cavity surface.

Convective boundary elements define the convective and radiative properties at the interface between the impact limiter outer surface and the regulatory environments. Another convective surface is located on the side of the cask's outer shell, between the upper and lower impact limiter structures. In addition to convective and radiative properties, these boundary two-node elements have the capability to include required solar heat flux loads.

Figure 3-2 illustrates all components and interfaces of the thermal model.

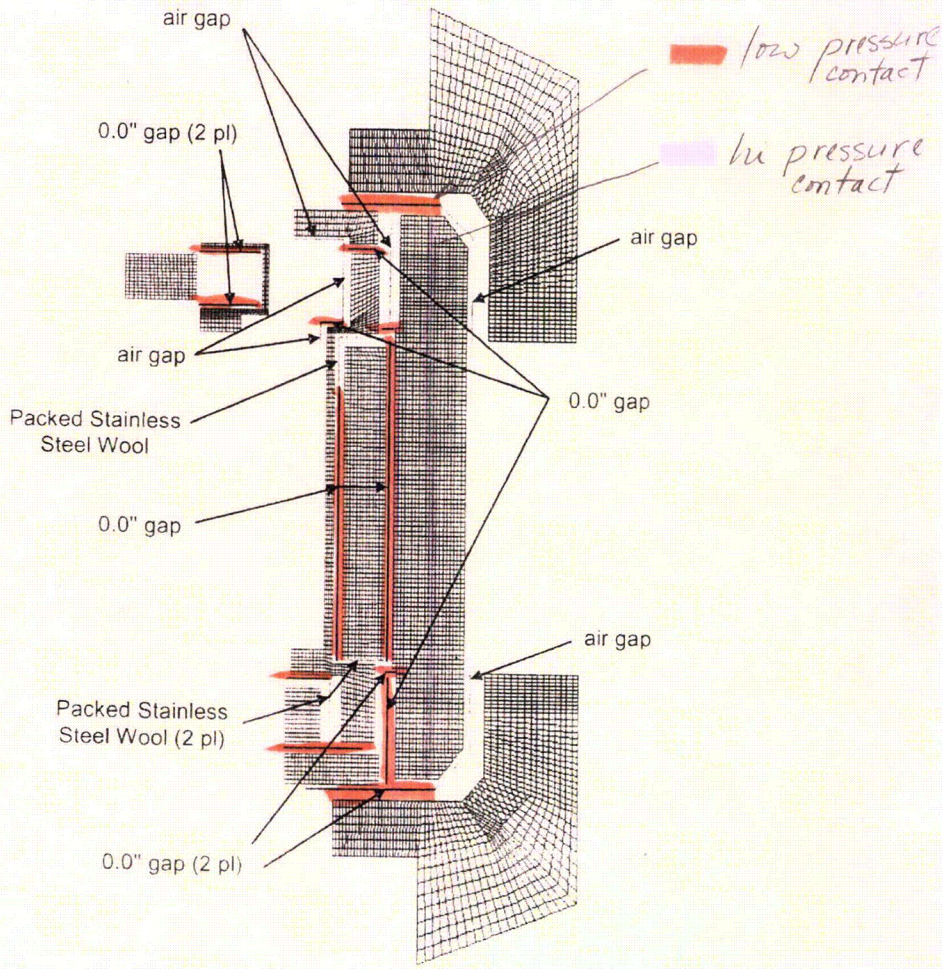
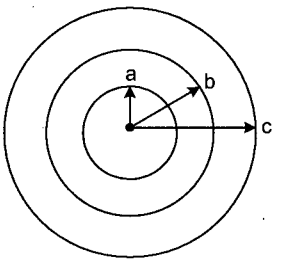


Figure 3-2. Expanded View of Thermal Model Defining Component Interfaces

Shrinkfit

1/13/06

Reference – Shigley, Joseph Edward, *Mechanical Engineering Design*, McGraw Hill Companies, 3rd Ed., 1977.



$$P = \frac{E\delta}{b}\left[\frac{(c^2 - b^2)(b^2 - a^2)}{2b^2(c^2 - a^2)}\right]$$

where:

a	=	13.2 and 13.7
b	=	18.1
c	=	23.1
E	=	$28.3 * 10^6$
δ	=	0.02

$$P_1 = \left(\frac{28.3 * 10^6 * 0.02}{18.1}\right)\left[\frac{(23.1^2 - 18.1^2)(18.1^2 - 13.2^2)}{(2 * 18.1^2)(23.1^2 - 13.2^2)}\right]$$

$$= (0.031271 * 10^6)\left[\frac{(206)(153.37)}{235466.41}\right]$$

$$= 4{,}196 \text{ psi}$$

$$P_2 = 31271\left[\frac{(206)(18.1^2 - 13.7^2)}{(2 * 18.1^2)(23.1^2 - 13.7^2)}\right]$$

$$= 31271\left[\frac{(206)(139.92)}{226654}\right]$$

$$= 3{,}977 \text{ psi}$$

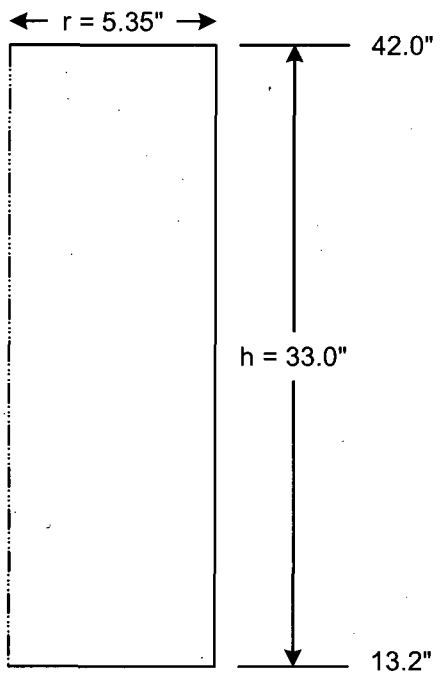
for $\delta = 0.01$ in.

P ~ 2,000 psi

Decay Heat

Decay Heat

Cask Radius and Height – Model AOS-165



$$A = 2\pi (5.36)^2 + 2\pi (5.36)(33.0)$$

$$= 1{,}291.88 \text{ in}^2$$

Heat Flux at Inside Cask Surface

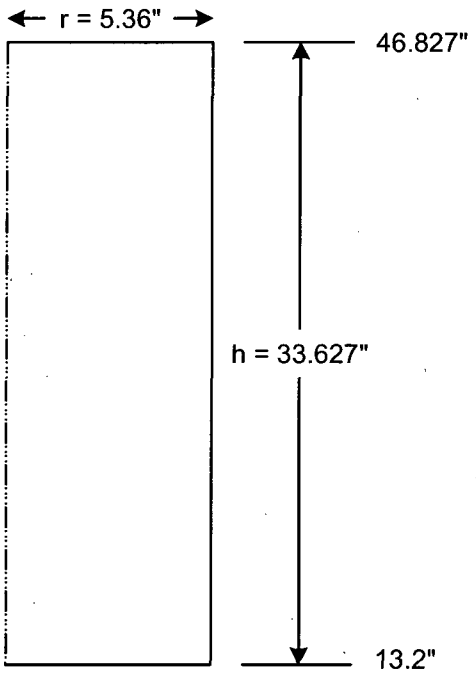
$$q = 23{,}666.3 / 1{,}291.88 = 18.319 \text{ Btu/hr-in}^2$$

Decay Heat Load

450,000 Curies = 6,936W = 23,666.3 Btu/hr

(64.88c = 1W)

Cask Surface Area – Model AOS-165



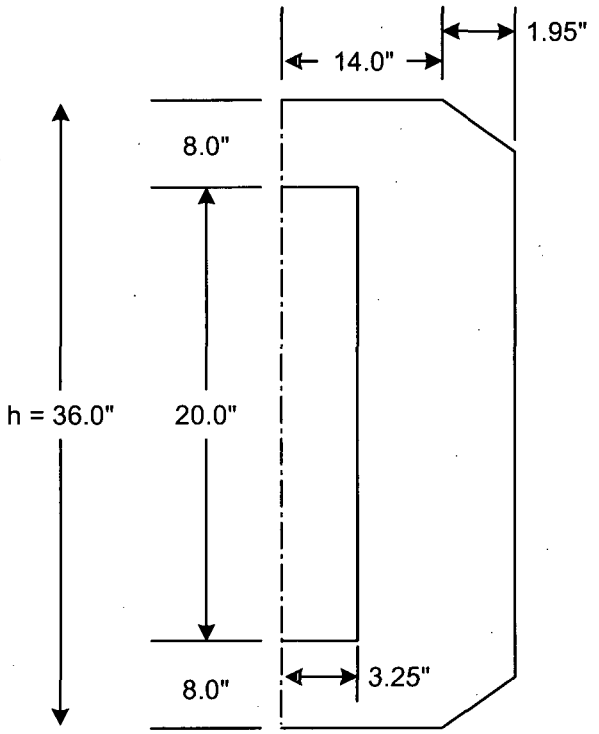
$$A = 2\pi (5.36)^2 + 2\pi (5.36)(33.627) = 1{,}313.0 \text{ in}^2$$

Heat Flux @ Inside Cask Surface

$$q = 23{,}666.3 / 1{,}313.0 = 18.02 \text{ Btu/hr-in}^2$$

Model AOS-100 Cask

Outside Cask Body and Cask Height – Model AOS-100



Decay Heat = 400W

400W = 3.4121 * 400 = 1,365 Btu/hr

Cavity Surface Area

$2\pi\ (3.25^2 + ((3.25)\ (20))) = 474.77\ in^2$

Heat Flux

$1{,}365\ /\ 474.77\ in^2 = 2.88\ Btu/hr\text{-}in^2$

Model AOS-050 Cask

Decay Heat = 200W

200W = 3.4121 * 200 = 682.4 Btu/hr

Cavity Area

$2\pi\ (1.62424^2 + 1.62424 * (14.0 - 4.0))$

= 118.63 in^2

Heat Flux

682.4 / 118.63 = 5.75 Btu/hr-in^2

2.875 (100W)

Model AOS-025 Cask

Decay Heat = 10W

Heat Flux

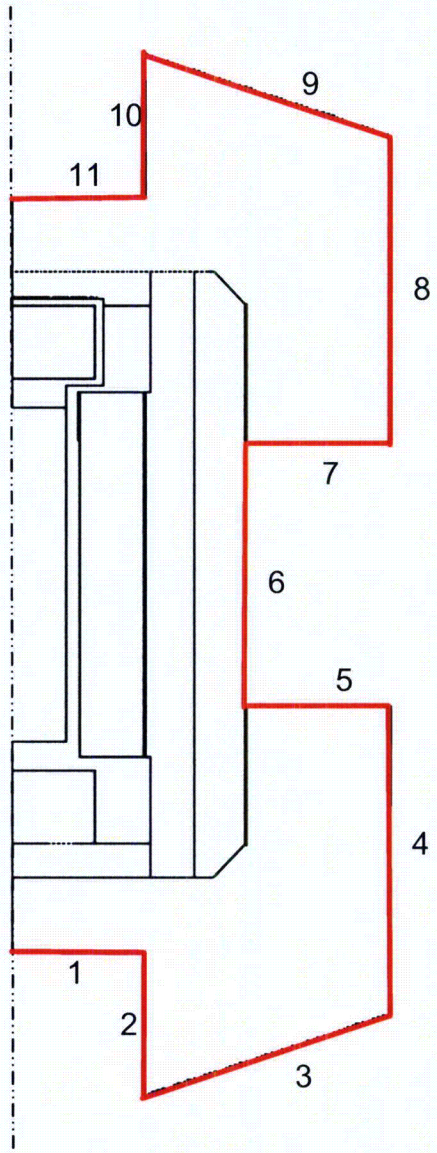
$(3.4121 * 10) / (2\pi)\ (0.812^2 + ((0.812)\ (7.0 - 2.0))$

= 1.151 Btu/hr-in^2

Insolation

Treat surfaces as follows:

Cask Assembly External Surface Identification



1 cal/cm^2 = 0.0256 Btu/in^2

Horizontal Surface	Total Insolation (cal/cm^2)	(Btu/in^2)	Heat Rate BTU/hr-in^2
1, 11	200	5.12	0.4267
2, 10	400	10.24	0.8533
3, 9	400	10.24	0.8533
4, 8	400	10.24	0.8533
5, 7	200	5.12	0.4267
6	400	10.24	0.8533

Stainless Steel (SS304)

2.3 MECHANICAL PROPERTIES OF MATERIALS

The transport package is fabricated from pig lead per Federal Specification QQ-L-171e and 304 stainless steel per ASTM A240. The mechanical properties used in the structural analysis are listed in Tables 2.3.1 and 2.3.2.

TABLE 2.3.1. MECHANICAL PROPERTIES OF LEAD[2.11.7]

Temp. (°F)	E:10^6(psi)	μ	α:10^{-6}(1/°F)	ρ(Lbm/in.3)[2.11.8]	σ_y(psi)[2.11.9]
-50	-	0.43	13.94	0.4097	810
-40	2.58		-		795
75	2.41		16.0		620
100	2.38		16.025		580
150	2.30		16.12		550
200	2.21		16.26		505
250	2.14		16.46		495
300	2.04	0.43	16.7	0.4097	390

TABLE 2.3.2. MECHANICAL PROPERTIES OF STAINLESS STEEL[2.11.10]

Temp. (°F)	E:10^6(psi)	μ	α:10^{-6}(1/°F)	ρ(Lbm/in.3)[2.11.11]	σ_y:10^3(psi)
-100	29.4	0.30	7.35	0.29	-
70	28.3		-		-
100	-		8.03		30.0
200	27.7		8.20		25.0
300	27.1		8.37		22.5
400	26.6	0.30	8.54	0.29	20.7

TABLE 2.3.3. MECHANICAL PROPERTIES OF BOLTS

Bolt Size/ASTM Standard	Stress Area (in.2)	Min. Tensile Strength (ksi)	Yield Strength (ksi)
1.25-7 UNC-2A Socket Head/[2.11.12] ASTM A540, GR B-22 Class 3	0.969	145	130
7/8-9 UNC-2A Shoulder Screw/ ASTM A540, GR B-22 Class 3	0.462	145	130
1-8 UNC-2A Hexagonal Head/[2.11.13] ASTM A193-B6	0.606	110	85

2.11 REFERENCES

1. Code of Federal Regulations, Title 10, Part 71, 1983.

2. U.S. NRC Regulatory Guide 7.6, "Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels".

3. U.S. NRC Regulatory Guide 7.8, "Load Combinations for the Structural Analysis of Shipping Casks", Table 10.

4. W. R. Holman and R. T. Langland, "Recommendations for Protecting Against Failure by Brittle Fracture in Ferritic Steel Shipping Containers Up to Four Inches Thick", Lawrence Livermore Laboratory; Livermore, California; August, 1981; NUREG/CR-1815.

5. ASME, Boiler and Pressure Vessel Code, Section III, Division I, Appendix 1, 1980, Figure I-9.2.

6. Bruhn, E. F., "Analysis and Design of Flight Vehicle Structures", Tri-State Offset Company, Cincinnati, 1965.

7. W. Hoffman, "Lead and Lead Alloys", English Translation of the Second Revised German Edition, Springer-Verlag, New York-Heidelberg-Berlin, 1970.

8. Heat Transfer Data Book, D. A. Kaminski, Ed., General Electric Company, NY, 1981, Sct. G515/29, p. 5.

9. Tietz, E. Thomas, "Determination of the Mechanical Properties of a High Purity Lead and a 0.05% Copper-Lead Alloy", Stanford Research Institute; Menlo Park, California; April, 1958; WADC Technical Report 57-695, ASTIA Document No. 151165.

10. ASME, Boiler and Pressure Vessel Code, Section III, Division 1, Appendix 1, 1980.

11. The International Nickel Company, Inc.; Mechanical and Physical Properties of Austenitic Chromium-Nickel Stainless Steels at Ambient Temperature, 3rd Edition, New York, 1963.

3.2.2 Stainless Steel (304 Type)

TABLE 3.2.2.1. THERMOPHYSICAL PROPERTIES[3.7.4]

Temp.	k(Btu/hr-ft-°F)	α(ft2/hr)
70	8.6	0.151
100	8.7	0.152
200	9.3	0.156
300	9.8	0.160
400	10.4	0.165
500	10.9	0.170
600	11.3	0.174
700	11.8	0.179
800	12.2	0.184
900	12.7	0.189
1,000	13.2	0.194
1,100	13.6	0.198
1,200	14.0	0.203
1,300	14.5	0.208
1,400	14.9	0.212
1,500	15.3	0.216

Conductivity, K (Btu/hr-in.-°F)

$$K(T) \Big|_{70°F}^{1,500°F} = 7.0287 \times 10^{-1} + 3.8987 \times 10^{-4}\ T$$

Thermal Diffusivity, α (in.2/hr)

$$\alpha(T) \Big|_{70°F}^{1,500°F} = 21.110 + 6.7346 \times 10^{-3}\ T$$

Density, p (lb/in.3)

$$\rho(T) \Big|_{70°F}^{1,000°F} = 0.29$$

Specific Heat, Cp (Btu/lb-°F)

$$Cp(T) = K(T)/\alpha(T)(\rho)$$

$$Cp(T) \Big|_{70°F}^{1,000°F} = K(T)/(6.1219 + 1.953 \times 10^{-3}\ T)$$

3.7 REFERENCES

1. Touloukian, Y. S., Thermophysical Properties of Matter, Purdue University, 1970, Vol. 1, p. 191.

2. Ibid, Vol. 4, p. 115.

3. Heat Transfer Data Book, D. A. Kaminski, Ed.; General Electric Company, New York, 1981, Sct. G515.29, p. 5.

4. ASME, Boiler and Pressure Vessel Code, Section III, Division I, Appendix 1, 1980.

5. Kreith, F., Principles of Heat Transfer, International Textbook Company, Pennsylvania, 2nd Ed., 1969, Table A-3.

6. Ibid, Table A-1.

7. Gebhart, B., Heat Transfer, McGraw-Hill Book Company, New York, 2nd Ed., 1971, p. 377.

8. Ibid, p. 355.

9. Ibid, p. 376.

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11. Heat Transfer Data Book, D. A. Kaminski, Ed.; General Electric Company, New York, 1981, Sct, G515.5, p. 13.

12. Gebhart, B., Heat Transfer, McGraw-Hill Book Company, New York, 2nd Ed., 1971, p. 371.

13. Kreith, F., Principles of Heat Transfer, International Textbook Company, Pennsylvania, 2nd Ed., 1969, p. 340.

14. Regulatory Guide 7.8, Load Combinations for Structural Analysis of Shipping Casks, U.S. Nuclear Regulatory Commission; May, 1977; Table 1.

15. D. R. Smith and R. H. Jones, "GE Model 1500 Shipping Package Heat Test for Thermal Benchmarking", GE Vallecitos Nuclear Center, NEDO-24899; April, 1981.

Tungsten Alloy

ATI Firth Sterling
Allegheny Technologies

1297 County Line Road, Madison, AL 35756

Date: 8 November 2006

To: Alpha-Omega Services, Inc.
GE Energy

Elevated Temperature Material Characterization

-- Summary of Findings --

Abstract

Summarized herein are the results of specific thermal property tests performed with SD180 as requested by the customer. Elevated temperature tensile testing of this alloy identified a gradual decrease in both offset yield strength and UTS with increasing temperature whereas the elongation at failure rose sharply and then leveled off. Thermal conductivity testing was inconclusive, as thermal testing firms now utilize laser flash diffusivity measurement, which has been shown to provide unreliable results for this material.

Background

ATI Firth Sterling tungsten heavy alloy (WHA) grade SD180 was selected for use in a new large scale design of gamma shield. This alloy has a nominal composition of 95W-3.57Ni-1.43Fe and a nominal density of 18.0 g/cc. The intensity of the gamma flux will result in significant heating of the shield, such that elevated temperature material properties are of significant interest. As a result, this application requires that the shielding material possess a multiplicity of attributes:

- adequate strength and ductility
- good γ radiation attenuation
- sufficient thermal conductivity

The customer specified the tests and the temperatures at which measurements should be made. Temperatures of interest were ambient, 200F, 400F, 600F, and 800F. Further, so as to match the application, testing was to be performed in air. As ATI Firth Sterling is presently equipped only for room temperature material characterization, elevated temperature testing was contracted out to two selected testing firms.

Experimental

Elevated Temperature Tensile Testing

Tensile Testing Metallurgical Lab (Cleveland, OH) was selected to perform the required elevated temperature tests. Tensile testing was conducted using ASTM E8 1" gauge length

specimens pulled at a constant speed of 0.05 in/min. The notch sensitivity of WHA precluded the use of scribe lines or grooves for positioning of a high temperature extensometer. Therefore, crosshead motion was used to generate the displacement measurements in this low compliance, lead screw testing machine. For comparison purposes, a pair of room temperature tensile tests was also performed at ATI Firth Sterling using the same test parameters but with a servohydraulic machine and extensometer. Two specimens were pulled for each test temperature. Averaged results are shown in Table 1.

Table 1. Summary of tensile testing results for SD 180 lot 1808..

Test Temperature	UTS (ksi)	0.2% YS (ksi)	EL (%)
RT (ATIFS)	114.0	93.9	5.0
RT (TTML)	109.7	94.3	3.5
200F (TTML)	112.4	70.8	15.5
400F (TTML)	105.2	60.2	21.8
600F (TTML)	98.2	51.9	21.9
800F (TTML)	95.4	47.8	21.6

The data pairs for each temperature exhibited good agreement, suggesting test results were free from anomalies.

Thermal Property Measurement

Anter Laboratories (Pittsburgh, PA) was selected for measurement of thermal diffusivity and specific heat at the various temperatures of interest. Anter specified that a single disk sample of 0.500" nominal diameter and 0.140" nominal thickness with parallel surfaces and known density be supplied. A SD180 sample from lot 1748 giving a measured ASTM B311 density of 18.11 g/cc was prepared and supplied by ATIFS. Measurements were conducted per ASTM E1461-01. Results are presented in Table 2.

Table 2. Summary of thermal property evaluation of SD 180 lot 1748.

Test Temperature Nom. (F)	Actual (C)	Diffusivity (cm^2/sec)	Specific Heat (J/(kg-K))	Conductivity (W/m-K)
RT	25	0.2742	154.7	76.8
200	97	0.2700	159.2	77.8
400	206	0.2624	163.4	77.6
600	316	0.2553	170.3	78.8
800	427	0.2451	173.9	77.2

The thermal conductivity remained relatively constant over the entire test temperature range, whereas specific heat showed a gradual increase and thermal diffusivity a slow decrease. The room temperature density was applied to all conductivity calculations, as the very low CTE of WHA (less than 5.0×10^{-6} K^{-1}) would result in a change of calculated value of only 0.5 W/m-K or less even at the highest test temperature. This was a factor of 4 less than the reported uncertainty of the test procedure.

Discussion of Results

In reviewing the tensile data set generated, the most pronounced effect was that of moving above the ductile to brittle test temperature (DBTT) for WHA, which in most metallurgical conditions is in the vicinity of room temperature. This accounts for the significant increase in alloy ductility, as measured by %EL. Accompanying this increase in ductility was a gradual decrease in both the ultimate and offset yield strengths, which is to be expected in light of induced thermal effects on various dislocation mechanisms that determine deformation response under load. These effects can be seen clearly when the data of Table 1 are plotted and displayed in Figure 1.

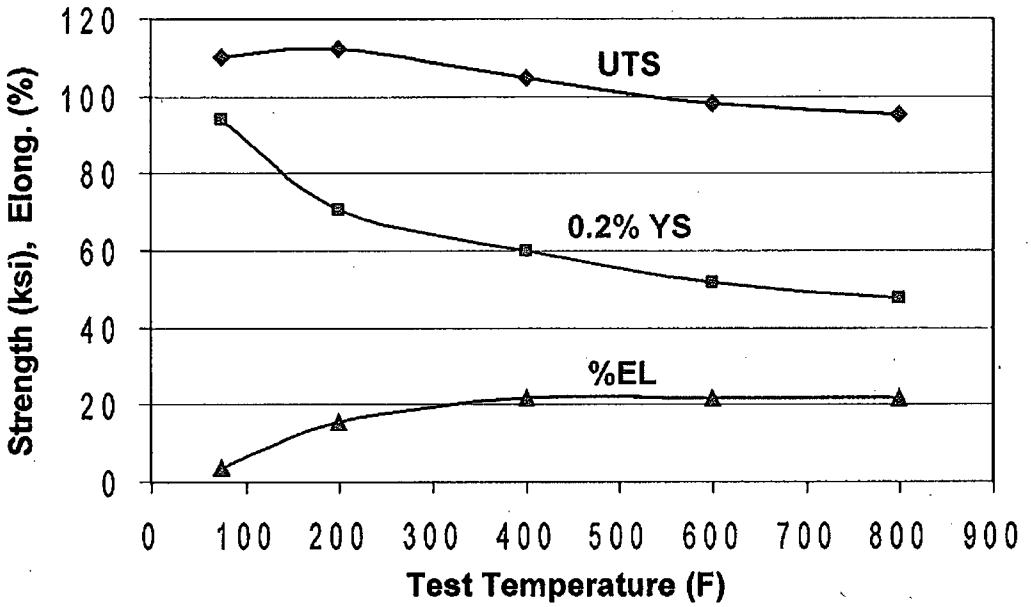


Figure 1. Graphical display of tensile property variation with test temperature.

While the strength of the gamma shield would decrease slightly with heating, the durability of the shield would tend to increase, depending on the magnitude of temperature rise attained.

The data set obtained from thermal property evaluation exhibited consistent trends. However, the resultant calculated values for thermal conductivity, which averaged 78 W/m-K, were well below the accepted industry values for this composition class of WHA. The literature for about two decades has reported values in the range of 110-130 W/m-K. This range is much more in keeping with an alloy having 95 wt.% of a metal that has a conductivity of ~160 W/m-K and is present as a virtually pure phase in the two phase WHA microstructure. The reason for the low measured values is presently unknown. The results obtained appear to underestimate the accepted thermal conductivity by about 35%. Dialogue with Anter revealed no apparent test execution problems. The data set obtained from Anter Laboratories did show that for the temperature range of interest, the thermal conductivity of the WHA, though of systematically low magnitude, did not vary significantly. It was decided that a second independent test be conducted in an effort to understand these results relative to industry accepted values.

Supplemental Testing

In view of the question posed from thermal conductivity testing of the SD180 alloy, a second test sample was prepared for submission to a different laboratory for analysis. While

Anter is nationally recognized for both thermal analysis and the manufacture of thermal analyzers, it was desirable to have a completely independent measurement made. Raul Pomares forwarded the firm of M & P Lab, in that they performed thermal measurements for GE Energy in the past. However, when their thermal analysis contact M. B. Bolduc was contacted, it was learned that they do not perform any thermal conductivity measurements. Harrop likewise, while performing other thermal measurements, does not perform conductivity measurement. Netzsch was therefore chosen as the second source for SD180 thermal conductivity measurement. Netzsch indicated that they also use the laser flash method per ASTM E1461 and calculate the thermal conductivity from measured diffusivity. After about a 6 week lead time, the room temperature test was completed and is shown in Table 3. Netzsch used a density of 18.0 g/cc for the calculation, whereas our measurement yielded 18.06 g/cc.

Table 3. Second conductivity evaluation of grade SD 180.

Test Temperature		Diffusivity	Specific Heat	Conductivity
Nom. (F)	Actual (C)	(mm^2/sec)	(J/(g-K))	(W/m-K)
RT	25	16.6	0.153	45.9

This new value for thermal conductivity was even further away from the expected value based on composition and density. This measurement underestimated the accepted average conductivity by at least 60%. After obtaining this margin of error, testing was halted, as any elevated temperature values would likewise be of no value.

Conclusions

The selected elevated temperature characterization of SD180 provided a more comprehensive prediction of alloy performance in the target application. The identified property trends were in keeping with fundamental elevated temperature response of metallic materials. Excellent ductility was retained over the entire range of test temperature.

Thermal conductivity measurements however were inconclusive. Two independent tests – both using nationally recognized testing firms that not only routinely perform toll thermal testing but also actually manufacture the equipment – failed to provide results that were even in approximate agreement or close to the accepted values used for decades within the refractory metals industry. These low values should therefore be disregarded, as they cannot be independently repeated. As the entirety of this testing was conducted off site, the reasons for this extreme variation in measurements are presently unknown. Both testing houses guarantee conformance to ASTM E1461. Whatever the case, those skilled in performing laser flash tests have not demonstrated that this technique, now used almost universally for thermal conductivity measurements, is appropriate for tungsten heavy alloy. To the contrary, conductivity measurements obtained to date suggest the flash diffusivity approach is unreliable for this material. The higher industry accepted values of 110-130 W/m-K were no doubt made by techniques that predated laser flash diffusivity and measured conductivity directly using larger size samples. No presently available source for repeating earlier test methods is known.

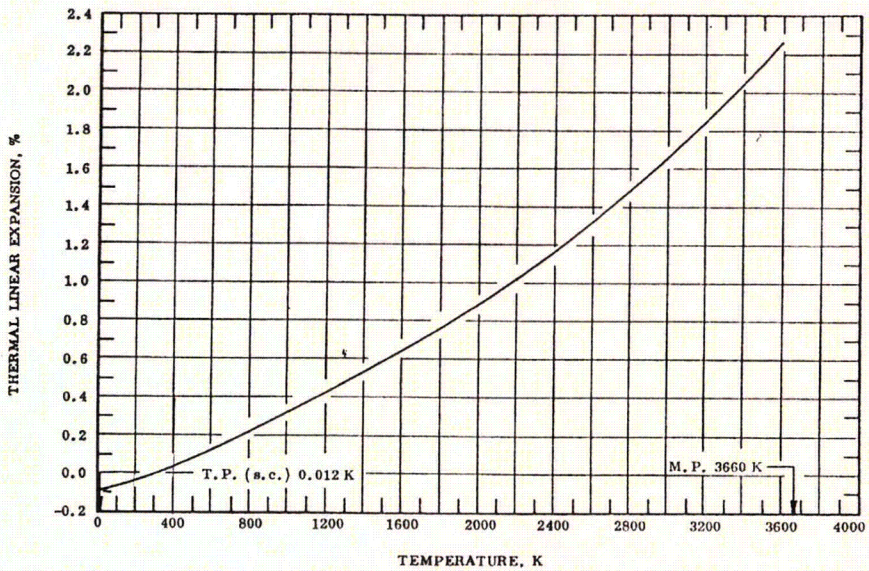
S. G. Caldwell
Technical Director – Tungsten Alloys

ATI Firth Sterling Tungsten Products, with Focus on SD180

Alloy Type	SD170	SD175	SD180	SD185	DENS 21	DENS 23	DENS 25
Material Specifications							
Mil.T-21014 Rev.D	Class 1	Class 2	Class 3	Class 4	Class 1	Class 2	Class 3
SAE-AMS-T-21014	Class 1	Class 2	Class 3	Class 4	Class 1	Class 2	Class 3
AMS 7725 C	7725C	—	—	—	7725C	—	—
ASTM B777-87	Class 1	Class 2	Class 3	Class 4	Class 1	Class 2	Class 3
Typical Density (g/cc)	17.1	17.6	18.1	18.5	17.1	17.6	18.1
Typical Density (lbs/in^3)	0.618	0.636	0.654	0.659	0.618	0.636	0.654
Nominal W Content (wt. %)	90	92.5	95	97	90	92.5	95
Maximum Magnetic Perm	N/A	N/A	N/A	N/A	<1.05	<1.05	<1.05
Typical Hardness (HRC)	28	28	29	29	28	28	29
Modulus of Elasticity (x106psi)	45	48	50	52	45	48	50
Ultimate Tensile Strength Min. (ksi)	120	120	120	110	110	110	110
0.2% Offset Yield Strength Min. (ksi)	80	80	80	80	75	75	75
Minimum % Elongation (1" Gage Length)	10	8	6	2	4	3	3

Note: *The above chart is for reference only. Higher properties can be achieved on a custom-made basis.*

FIGURE AND TABLE NO. 58R. RECOMMENDED VALUES FOR THERMAL LINEAR EXPANSION OF TUNGSTEN W



RECOMMENDED VALUES

[Temperature, T, K; Linear Expansion, $\Delta L/L_0$, %; α, K^{-1}]

T	$\Delta L/L_0$	$\alpha \times 10^6$
5	-0.086	0.0006
25	-0.086	0.21
50	-0.085	0.88
100	-0.076	2.6
200	-0.040	4.1
293	0.000	4.5
400	0.048	4.5
500	0.093	4.6
600	0.140	4.7
700	0.188	4.8
800	0.237	5.0
900	0.287	5.0
1000	0.339	5.2
1200	0.444	5.3
1400	0.551	5.4
1600	0.661	5.6
1800	0.774	5.8
2000	0.893	6.1
2200	1.020	6.6
2400	1.157	7.1
2600	1.307	7.8
2800	1.469	8.3
3000	1.646	9.2
3200	1.837	10.0
3400	2.042	10.8
3600	2.263	11.6

REMARKS

The tabulated values are considered accurate to within ±3% over the entire temperature range. These values can be represented approximately by the following equations:

$$\Delta L/L_0 = 4.266 \times 10^{-4} (T - 293) + 8.479 \times 10^{-8} (T - 293)^2 - 1.974 \times 10^{-11} (T - 293)^3 \qquad (293 < T < 1395)$$

$$\Delta L/L_0 = 0.548 + 5.416 \times 10^{-4} (T - 1395) + 1.952 \times 10^{-8} (T - 1395)^2 + 4.422 \times 10^{-11} (T - 1395)^3 \qquad (1395 < T < 2495)$$

$$\Delta L/L_0 = 1.226 + 7.451 \times 10^{-4} (T - 2495) + 1.654 \times 10^{-7} (T - 2495)^2 + 7.568 \times 10^{-12} (T - 2495)^3 \qquad (2495 < T < 3600)$$

Excerpt, *Formulas for Stress, Strain, and Structural Matrices*, by Walter D. Pilkey, 1st Ed. Table 4-1 (Partial), "Moduli of Elasticity, Poisson's Ratios, and Thermal Coefficients of Expansion," Page 176

TABLE 4-1 (continued) MODULI OF ELASTICITY, POISSON'S RATIOS, AND THERMAL COEFFICIENTS OF EXPANSION

Material	Modulus of Elasticity, E		Poisson's Ratio, ν	Thermal Coefficient of Expansion, α	
	$\times 10^6$ psi[a]	GPa		$\times 10^{-6}$/°C[b]	$\times 10^{-6}$/°F
Teflon—TFE	0.038–0.065	0.26–0.45	—	55	99
TiC	67	462	—	4	7.2
Titanium—6 Al-4V	16.5	115	0.34	4.9	8.8
Titanium—pure	15.1	104	0.34	4.8	8.6
Titanium—silicate	9.8	68	0.17	0.0 (±0.017)	0.0 (±0.03)
Tungsten	50	345	0.28	2.4–2.6	4.3–4.7
Tungsten-Carbide Cermet	61.6–94.3	425–650	—	2.5–3.0	4.5–5.4
Vanadium	18–20	124–138	—	4.6	8.3
Vinyl Chloride—rigid	0.3–0.5	2–3.5	0.28–0.34	28–56	50–100
Wood—structural	1–2	7–14	—	1–3	2–5
Zircaloy-2	11	76	0.37–0.41	2.9	5.2
Zirconium	13.7–14.0	95–96.5	0.37–0.41	3.1	5.6

[a] For psi, multiply tabulated values by 10^6. For example, if the entry is 40, this corresponds to 40×10^6 psi. An entry of 0.2–0.4 means that the values of E range from 0.2×10^6 psi to 0.4×10^6 psi.
[b] For α, multiply tabulated value by 10^{-6}. For example, for "Aluminum-Alloy 2024-T4", the α values are 12.9×10^{-6}/°F and 23.2×10^{-6}/C°.
[c] E_1, ν_1 properties in fiber direction.
[d] E_2, ν_2 properties in 90° to fiber direction.

Firth Sterling
ATI Engineered Products

1297 County Line Road, Madison, AL 35756 256-464-7738 scaldwell@atimwp.com

4 September 2008

Troy Hedger / Raul J. Pomares
Alpha-Omega Services, Inc.
9156 Rose Street
Bellflower, CA 90706

Dear Troy / Raul:

I have prepared the following comments in response to your request to address the differences between our previously reported data (under Alpha-Omega Services P.O. #AOS-03590) and the cited specific heat values listed in NUREG/CR-6150.

In briefly revisiting previously submitted project reports, the initial thermal analysis data presented as part of our 7 September 2006 report contained a *Transmittal of Test Results* document from Anter Laboratories, a leading thermal analysis equipment manufacturer and provider of toll thermal analysis services. Testing of our tungsten heavy alloy grade SD180 material used in work defined by the referenced AOS purchase order was conducted by laser flash measurement, as described by ASTM E1461-01 using NIST traceable standards in a NADCAP certified laboratory. This testing house was extremely well qualified to make accurate measurements of specific heat.

Data were obtained at 5 temperatures of interest. The following values were reported by Anter for the 18.1 g/cc density tungsten heavy alloy (nominal composition 95W-3.57Ni-1.43Fe):

Nominal Temperature (F)	Specific Heat (J/[kg-K])
RT	154.7
200	159.2
400	163.4
600	170.3
800	173.9

Then, at a later date, additional thermal analysis of a SD180 sample was performed by Netzsch, who is also both a manufacturer of thermal analysis equipment as well as a toll service provider. As our 11 December 2006 report detailed, Netzsch obtained the following result using the same laser flash ASTM E1461 technique:

Nominal Temperature (F)	Specific Heat (J/[g-K])
RT	0.153

When the reported unit of measure is converted from a gram to kilogram basis, this supplemental testing by a second independent testing house yielded excellent agreement in specific heat – a value of 153 compared to the earlier 154.7 (J/[kg-K]). These values were thus in agreement within ~1.1% - an excellent match for single test data comparison.

In examining Section 15 of NUREG/CR-6150, it is not surprising to find disagreement in specific heat values to those we reported – it is rather to be expected. Tables 15-1 and 15-2 both list date for pure, elemental tungsten (W) – <u>not</u> tungsten heavy alloy. The SD180 alloy additionally contains Fe and Ni, and possesses a lower theoretical alloy density that pure W.

The relevance of previously reported specific heat values for the SD180 used in the aforementioned project over those contained in the cited NUREG document can therefore be summarized as follows:

1. NUREG/CR-6150 does not even relate to the tungsten heavy alloy used in the cask project.
2. NUREG/CR-6150 contains calculated values only, whereas our reported values were from actual material testing conducted by equipment manufacturers to an ASTM standard.
3. The thermodynamic data used for computation of NUREG/CR-6150 data are not given in Section 15. Even for the case of pure W, the calculated density reported in NUREG/CR-6150 Section 15.3 is 19.600 g/cc, which is greater than the tungsten industry accepted value of 19.3 g/cc for W as well as the value of 19.30 g/cc specified in the National Institute of Standards Physical Reference Data listing. It would appear that at least that input datum used in thermal calculations is in slight error even for the case of pure W. Calculated data are only as good as the input data and model.
4. Specific heat values we reported previously accounted for the actual measured density of the SD180 tungsten heavy alloy, as was determined using ASTM B311. As both chemical makeup and density varied from that of pure W, it is only natural that the thermal properties would differ from pure W as well.
5. The values we reported from Anter and Netzsch tests are consistent in trend with data for pure W in Table 15-1 of NUREG/CR-6150. For example, room temperature specific heat for pure W is listed as ~138 J/(kg-K), whereas testing of SD180 gave ~155 J/(kg-K) – an increase of ~12%. The tungsten heavy alloy contained 5 wt.% of transition metals having significantly higher specific heats than W (~460 J/(kg-K) for Ni, ~440 J/(kg-K) for Fe). It is therefore only expected that the room temperature specific heat for the SD180 heavy alloy would be higher than that of pure W.

There is therefore no reason whatsoever to question the specific heats reported by ATI Firth Sterling for SD180 based on NUREG/CR-6150. At best, the cited Section 15 data are not applicable for the reasons described above. Please contact me if further information is needed.

Yours truly,

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Tungsten Heavy Alloy

Engineering Manual

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v. 4.0

1. Introduction to Tungsten Heavy Alloys

Why Use WHAs?

WHAs provide a unique combination of density, mechanical strength, machinability, corrosion resistance, stiffness, and economy. Consequently, WHAs are widely used for counterweights, inertial masses, radiation shielding, sporting goods, and ordnance products. These versatile materials provide distinct advantages when compared to alternate high density materials, as seen in the table below.

Choices for Very Dense Metals

Material	Density (g/cc)	Tensile Strength	Stiffness	Machin-ability	Toxicity	Radio-activity	Material Cost
WHA	17.0-19.0	moderate	high	excellent	low	none	moderate
Lead	11.4 max.	very low	very low	very low	high	none	low
Gold	19.3	low	low	moderate	none	none	very high
Uranium	18.7-19.1	moderate	medium	special	high	present	moderate

As can be seen from these data, WHA overcomes the toxicity, deformability, and inferior density of lead and its alloys. Likewise, it can provide equivalent density to depleted uranium (DU) but without the special machining considerations (necessary due to its pyrophoricity), chemical reactivity, and licensing requirements for a radioactive substance. WHA is truly the economical and effective material of choice for high density applications. These unique alloys provide the designer with many new freedoms.

History and General Metallurgy

The name "tungsten" is derived from the Swedish term meaning "heavy stone". Tungsten has been assigned the chemical symbol W after its German name *wolfram*. While sometimes regarded as a scarce or exotic metal, its abundance in nature is actually about the same as that of tin. The largest known tungsten reserves are in mainland China, though plentiful reserves also exist in North America.

Tungsten has the highest melting point (3410°C or 6170°F) of all metals. The extremely high melting point of pure tungsten makes the common manufacturing techniques such as melt and cast impractical. Specialized methods make possible the processing of pure tungsten into rod, sheet, and wire for a wide variety of high temperature applications including incandescent lamp wire, TIG welding electrodes, arc lamp electrodes, and high temperature components.

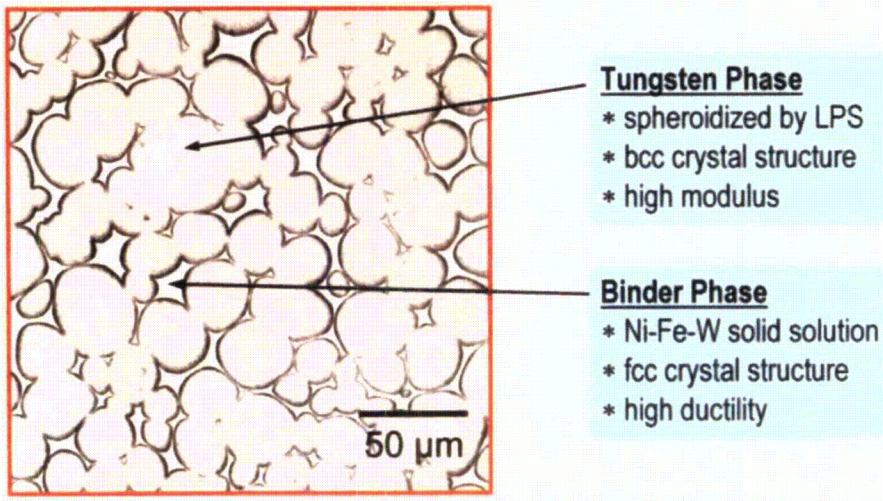
Another important industrial property of tungsten is its high density of 19.3 g/cc (0.70 lbs/in^3). Density has two key manifestations – gravimetric and radiographic. For density applications not requiring high temperature service, tungsten is commonly alloyed with metals such as nickel, iron, cobalt and/or copper in order to circumvent the extremely high processing temperature and size/shape limitations that would otherwise be present in the processing of the pure metal. The metal matrix composites thus formed are commonly referred to as tungsten heavy alloys (WHAs). This family of materials finds a wide range

of applications relating to either gravimetric density (balancing weights, inertial masses) or radiographic density (shielding and collimators for energetic x- and γ-radiation).

WHAs are ideally suited to a wide range of density applications, offering a density approaching that of pure tungsten but without the very costly processing and inherent size and shape limitations of the former. WHAs are produced by a powder metallurgy (P/M) technique known as liquid phase sintering (LPS), in which completely dense, fully alloyed parts are formed from pressed metal powders at a temperature less than half the melting point of pure tungsten. While (solid state) sintered steel and copper alloy parts commonly contain significant residual porosity that may require polymeric infiltrants to seal, sintered WHAs present a nonporous surface.

WHA is made from very fine, high purity metal powders – commonly tungsten, nickel, and iron. The blended metal powder is compacted under high pressure (up to 30 ksi) to form a specific, oversize shape that mimics the geometry of the final part. By utilizing this near net shape forming approach, economy is realized by the elimination of excess material and the time and energy necessary to remove unwanted stock from mill shapes. Pressed parts are then subjected to high temperature sintering in hydrogen. As the parts are slowly heated, the hydrogen reduces metal oxides present and provides a clean, active surface on each of the very small metal particles. As temperature increases further, chemical diffusion takes place between particles. Neck growth occurs between particles, and surface energy drives pore elimination and part densification. The pressed part shrinks uniformly, with about 20% linear shrinkage (equating to approximately 50% volumetric shrinkage) being typical. Once the temperature is sufficiently high to form the liquid phase, any remaining densification occurs very quickly as the alloy assumes a "spheroidized" microstructure by a mechanism know as Ostwald Ripening. The sintered structure of a common commercial WHA is two-phase, consisting of a linked network of tungsten spheroids surrounded by the ductile alloy matrix phase.

Typical Microstructure of WHA



The microstructure shown above is typical for most commercial WHA products. The spheroidized phase (~30-60 μm in diameter) is essentially pure tungsten, and is surrounded

by a metallic nickel-iron binder phase containing some (20+%) dissolved tungsten. This structure provides the maximum mechanical properties for a given alloy composition. Through the process of pressing and LPS, metal powders are transformed into fully dense shapes that are very close to the dimensions of the finished parts. While transient LPS ("undersintering") and solid state sintering offer greater shape retention and more precise dimensional control, mechanical properties (especially ductility) are significantly compromised. Fully spheroidized material is essential in high performance applications.

WHAs can subsequently be subjected to post-sinter heat treatment and mechanical deformation to increase tensile properties or create directional microstructures. While such operations are commonly required for military applications, commercial WHAs generally do not require this additional processing and are supplied in the as-sintered state for maximum economy.

WHAs are a special class of materials, differing from pure tungsten. They likewise are distinctly different from "tungsten steels" (high speed T grade steels) and tungsten carbide. While this manual focuses on standard commercial grade WHAs, it is also possible to provide tungsten-nickel-iron alloys on a custom basis that have:

- Density approaching 19 g/cc
- Tensile elongation up to 35%
- Hardness to 48 HRC
- Tensile strength to 200 ksi or greater

Certain size and shape limitations apply when these post-sinter processing steps are required, and the above listed properties are not available simultaneously. This engineering manual has been compiled to convey some of the special characteristics of this family of materials that will be of importance to proper design and use. Only by observing these guidelines can optimum product design, economy, and performance be realized. We at ATI Firth Sterling strive to provide you – the customer – with the best material and most complete technical support available in the industry today.

2. Alloy Selection Criteria

Density

Density is the single most important property that makes a WHA the material of choice for virtually all applications. The selection of a specific composition for a given density application may ultimately be made on the basis of mechanical property requirements in conjunction with sintering considerations, unless a density is mandatory.

As is true with most mechanical designs, the optimum design is the one that adequately addresses all critical parameters and offers the best compromise of the remaining options. As the density of a WHA is increased, the available ductility decreases. Alloy density varies according to tungsten content, as can be seen in the following table of ATI Firth Sterling standard alloys. These alloys conform to the various classes as defined by industry standard MIL-T-21014D (alternately AMS-T-21014 and ASTM B777).

Grade Specification Conformance

Alloy*	Nom. Composition (Wt. %)	MIL-T-21014D Classification	Typical Density (g/cc)	Typical Density (lbs/in²)	Magnetic Permeability (μ)
SD170	90W-7.14Ni-2.86Fe	Class 1	17.09	0.618	5.0-5.5
Dens21	89.8W-8.92Ni-1.28Fe	Class 1	17.16	0.620	<1.01
SD175	92.5W-5.36Ni-2.14Fe	Class 2	17.62	0.637	4.5-5.0
Dens23	92.5W-6.56Ni-0.94Fe	Class 2	17.67	0.639	<1.01
SD180	95W-3.57Ni-1.43Fe	Class 3	18.12	0.655	4.0-4.5
Dens25	95W-4.37Ni-0.63Fe	Class 3	18.16	0.656	<1.01
SD185	97W-2.14Ni-0.86Fe	Class 4	18.56	0.671	1.6-2.0

Dens21 is manufactured with a tungsten content slightly under the nominal in order to have a sintered density positioned more centrally within the defined interval. In addition to these standard compositions, ATI Firth Sterling can also manufacture custom alloys.

Mechanical Properties

Mechanical properties of modern WHAs far surpass those available from WHAs even a few decades ago. Three factors primarily contribute to this advance: (1) higher purity raw materials, (2) cleaner and more precisely controlled process environments, and (3) the use of modern tungsten-nickel-iron (W-Ni-Fe) compositions rather than the older alloys containing copper.

It is also important to note as a general consideration that the maximum attainable property set for these alloys varies with the size of the blank. This is a direct consequence of the nature of the sintering operation used to make the parts. A number of gradients – thermal, chemical, and gravitational – exist during sintering. As the maximum section thickness of a given part is increased, thermochemical removal of impurities from the center of the pressed part prior to surface pore closure becomes more difficult. Therefore, small parts will always tend to have higher mechanical properties than larger ones.

As seen in the table below, the nominal properties listed meet or exceed the industry standard requirements. All values shown are for material in the as-sintered state, as this is the most commonly supplied condition of the material for commercial applications.

Typical Densalloy™ Properties

Alloy*	Wt.% W (nominal)	UTS (ksi)	0.2% YS (ksi)	EL (%)	Elastic Modulus (x 10^6 psi)	Hardness (HRC)
SD170	90	120	80	10	45	28
Dens21	90	110	75	4	45	28
SD175	92.5	120	80	8	48	28
Dens23	92.5	110	80	3	48	28
SD180	95	120	75	6	50	29
Dens25	95	110	75	3	50	29
SD185	97	110	75	2	52	30

All WHAs are susceptible to hydrogen embrittlement, which lowers the ductility of the alloy. ATI Firth Sterling can provide alloys in a hydrogen outgassed condition, which in some cases can double the tensile elongation. Further property enhancement is possible through additional post-sinter processing.

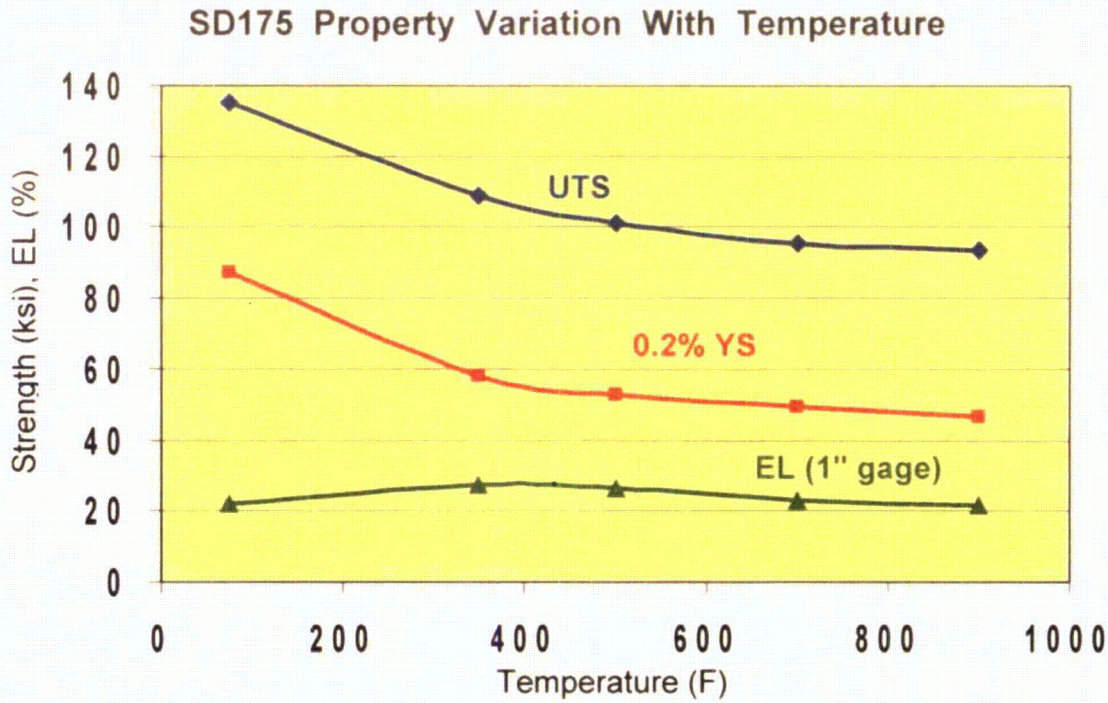
For structural (load bearing) applications, it is recommended that alloy be used in the most ductile condition feasible for the given part. This promotes "bend before break" behavior needed for critical parts. Part durability is favored by use of lower tungsten content Class 1 and 2 alloys such as SD170 and SD175.

Thermal and Electrical Properties

The properties of WHA are governed by the properties of its principal constituent, tungsten. While properties will vary slightly with tungsten content, binder composition, and microstructure, several example properties will be cited for SD180, as it is near the middle of the commercially defined compositional range.. The thermal conductivity of the alloy is ~80 W/m-°K and a corresponding electrical conductivity of ~13% IACS. The thermal expansion is very low, with a CTE of only ~5.0E-6/°C at 20°C – only about 1/3 that of ferrous alloys. The specific heat of SD180 at room temperature is ~0.037 cal/g-°C. While the melting point of pure tungsten is extremely high, WHAs will begin to form a liquid phase when heated in excess of ~1450°C (2642°F). Therefore, unlike pure W, WHAs are not suitable for high temperature applications.

The change in tensile properties of WHA at elevated temperature is of increasing interest to oilfield engineers. As drilling depths approach 5 miles, there is growing interest in the ability of WHA components to survive the harsh pressure and elevated temperature conditions. The following graph shown below illustrates the systematic change in mechanical properties with temperature for vacuum annealed SD175 typical of what that industry uses. For applications in which the service temperature will exceed ~300°C, slight surface oxidation will occur in air. A protective atmosphere should be considered for prolonged exposure at or above this temperature. It is important to note that at service temperatures exceeding ~500°C – beyond the range of the data shown below – WHA

strength will fall off rapidly. The upper practical service temperature is therefore determined by both surface reaction and strength reduction. While pure tungsten works well for high temperature applications in vacuum, inert, or H_2, if additionally a reactive atmosphere is present, the better choice for a dense material may be a platinum group metal – but at considerably higher cost.



"Mag" versus "Non-Mag"

It is unfortunate that industry literature has described families of "magnetic" and "non-magnetic" WHAs, thus implying significant magnetization of the former. "Magnetic" simply denotes a reasonable attraction to a magnet – not that the WHA itself behaves as a permanent magnet as supplied. The magnetic response of WHAs is most commonly measured with an instrument such as the *Low Mu Permeability Indicator* (Severn Engineering Co., Annapolis, MD). By governing industry specifications, "non-magnetic" character is defined as a magnetic permeability of 1.05 μ or less – a condition indicated by this tester on a go/no-go basis. For comparison, a typical austenitic stainless steel such as AISI 304 exhibits a permeability of 1.01-1.02. A strong neodymium magnet will stick weakly to either material, thus indicating this response is a matter of definition rather than true "either/or" character. As both classes of WHA are electrical conductors, eddy currents can be induced in either one if subjected to an EM field. "Non-magnetic" WHAs are typically used whenever existing (functional) magnetic fields cannot be perturbed in accelerators or for certain well logging applications in which the shielding is positioned near electrical sensors or when magnetometer scanning is performed.

Historically, the older tungsten-nickel-copper compositions have been used in these applications. While current "non-mag" tungsten-nickel-iron formulations provide improved mechanical properties, their properties are still lower than those available from

"mag" grades. Therefore, unless specifically required for a given application, standard "magnetic" alloys are the better general choice.

WHAs Within the Scope of Engineering Materials

Given the preceding property discussions, it is often insightful to consider where these various properties fall relative to other elements and engineering materials. The following table contrasts grade SD175 – perhaps the best "general choice" WHA – to other materials on the basis of 5 selected properties commonly considered in engineering design.

SD175: Selected Property Comparison

Density (g/cc)		Thermal (W/m-K)		CTE (ppm/°K)		E x 10^6 (psi)		Melting Point (°C)	
22.6	Ir	2000	Diamond	40	Zn	~140	Diamond	3890	HfC
19.3	W	400	Cu	23	Al	~110	CBN	3410	W
19.3	Au	285	BeO	17	Cu	99	WC	3050	ThO_2
19.1	U	225	1100 Al	16	304 SS	~90	WC-6Co	2710	ZrO
17.5	WHA	180	W-15Cu	13	Inco 625	80	Os	2620	Mo
16.6	Ta	100	WC-10Co	12	4140 steel	70	SiC	2015	Al_2O_3
15.6	WC	85	Ni	9	Glass	60	W	1710	SiO_2
13.5	Hg	80	WHA	7	Al_2O_3	54	Al_2O_3	1670	Ti
11.4	Pb	52	1020 steel	5	Si	50	WHA	1536	Fe
10.2	Mo	30	Al_2O_3	5	Mo	44	Be	1453	Ni
8.9	Cu	16	316 SS	5	WHA	29	Fe	~1450	WHA
7.9	Fe	10	Bi	4	W	19	Cu	1085	Cu
4.5	Ti	7	Ti-6Al-4V	3	Pyrex	17	Ti-6Al-4V	960	Ag
2.7	Al	2	ZrO_2	2	Invar	10	Al	660	Al
1.7	Mg	1	Pyrex	0.5	SiO_2	2	Pb	660	Al
0.5	Li	0.2	PMMA	0.0	Cer-Vit	0.4	PMMA	328	Pb

(* all listed alloy characteristics are for reference only and subject to change without notice)

3. Design Considerations

The Nature and Advantages of P/M

P/M is a very useful modern manufacturing process that provides a means of producing parts from blended metal powders that circumvents the need to start with larger than needed mill shapes and then spend money and time removing excess stock. Powder metallurgy (P/M) offers two options for WHA manufacturing – near net shape blanks or net shape parts. These same options apply as well to P/M parts of other materials such as copper and steel. Through P/M, individual parts can sometimes be made (net shape) without any machining in the following series of steps:

BLEND → PRESS → SINTER

This sequence is typically limited to smaller parts that have no significant angular features, thin walls, extreme dimensions, webs, steps, or undercuts. Consistent press density in such parts must be maintained so as to create uniform shrinkage in sintering. Parts are typically compacted in a uniaxial hydraulic press, and may necessitate the use of an organic binder that is removed prior to sintering. A slight relief angle on vertical sides is also useful to aid in damage-free part release and ejection from the pressing die. This fabrication route provides the best economy. Under certain conditions, sintered dimensions can be held to 0.5% or better. P/M favors the production of blank shapes with reasonably uniform dimensions. Therefore, extreme combinations such as large area/minimal thickness, small horizontal section/deep fill, and significant front to back geometry differences should likewise be avoided in the design phase if this simplified fabrication approach is desired.

Most parts however, by nature of size or geometric complexity, require some secondary machining and are fabricated as near net shape blanks as follows:

BLEND → PRESS → SINTER → MACHINE

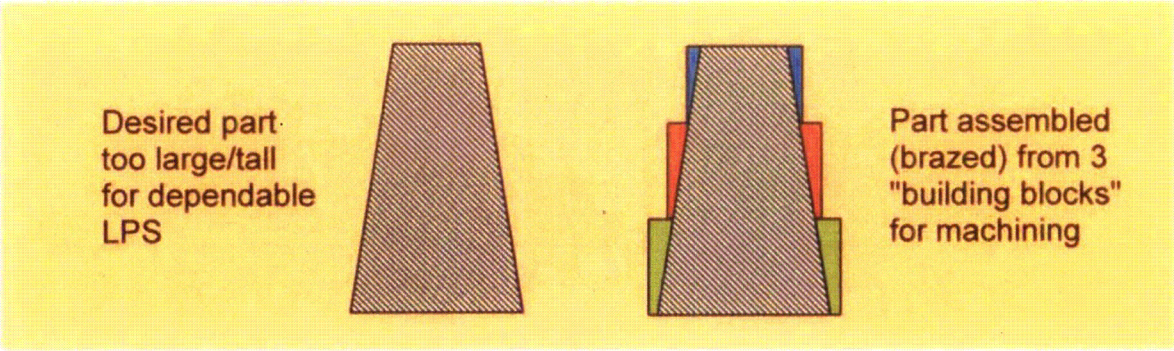
This approach is mandatory for components containing angular features and steps and for simple shapes with very tight dimensional requirements. It is important to keep in mind for parts of critical weight and tight tolerance that some provision be made for weight adjustment to compensate for slight variations in density from nominal values on a per-piece basis. Additional constraints may apply when post-sinter processing is required.

During high temperature LPS, gravity tends to distort or "slump" parts. This behavior becomes more prominent the greater the part height is with respect to the basal area. Higher %W alloys should be used for greater slump resistance. For many applications, due to these P/M considerations, a 92.5%W alloy will be a good choice.

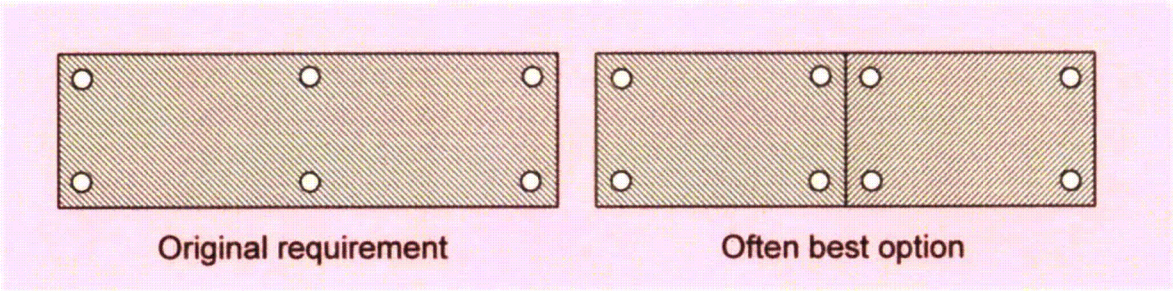
Single Piece or Multi-Part?

While conventional wisdom holds that there is economy in size, this philosophy has a limit when applied to P/M. As part size increases, attainable mechanical properties decrease slightly. Large parts also invite the formation of a front to back density gradient, especially in lower %W alloys. Also, as part size increases, machining allowances must

also be increased to guarantee clean up of the blank to the finished geometry. Very tall parts would prove impractical to make as a single piece because of furnace height limitations and tendency for gravitation collapse during LPS.



The solution for large or special geometry parts is to fabricate them as smaller "building blocks" which can either be mechanically fastened to supporting structures or furnace brazed into a large monolithic component and then machined. The building block approach also makes possible the creation of functionally gradient materials when utilized in furnace brazed or sinter bonded assemblies.



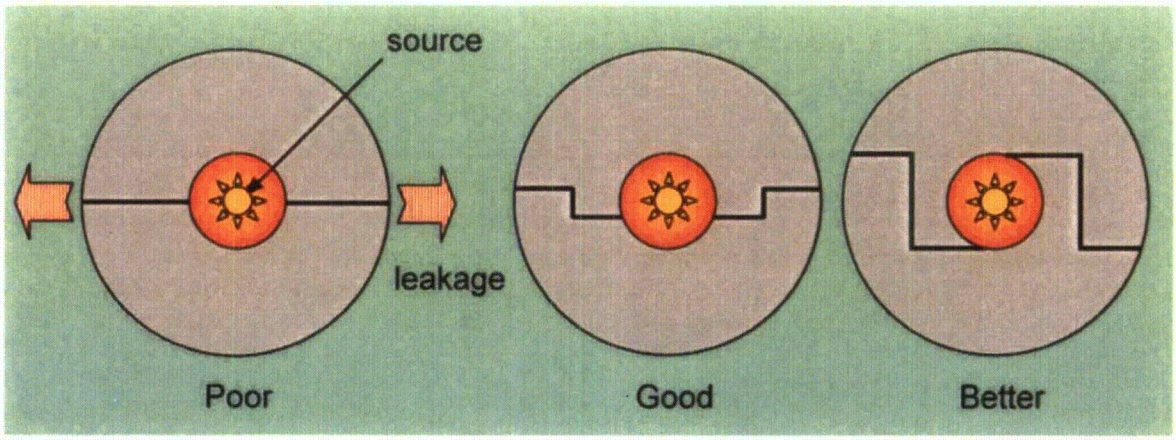
Making a large weight component as a series of smaller, mechanically attached ones overcomes manufacturing size limitations and can result in better mechanical properties and more economical parts that if damaged in service, can be replaced by section as needed rather than as a whole. This may be the best option in many instances.

ATI Firth Sterling currently offers 7 standard grades of WHA in a variety of block, flat, and round shapes – or custom machined to final form. Sizes can range from gram weight to many hundreds of kilograms. Sheet is available in thicknesses down to 0.025".

"Radiation Joints"

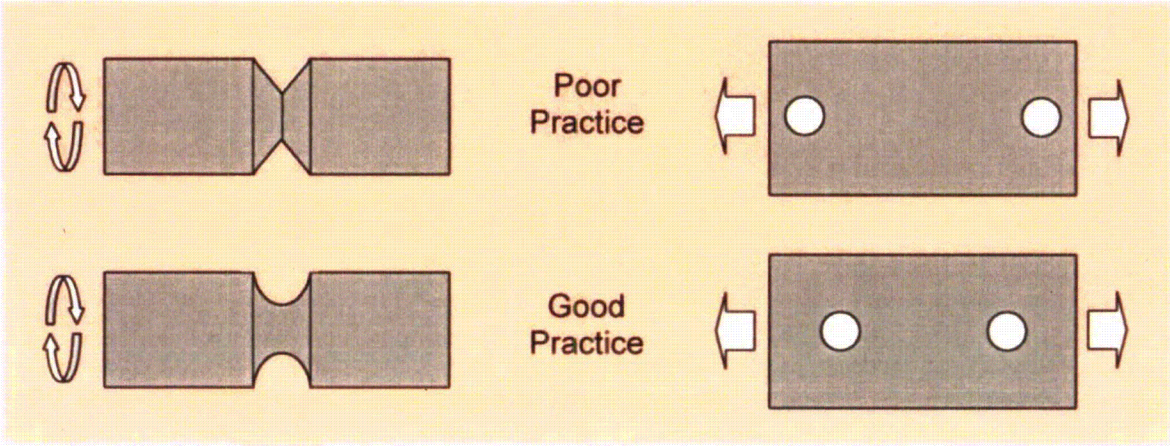
Many cylindrical shaped radioisotope containers having noncircular radial windows would be virtually impossible to manufacture as a single piece, as it would be extremely difficult to devise a method to EDM the aperture and preserve any sharp angular definition. The solution is to employ ATI Firth Sterling's "radiation joint" construction, which prevents any possibility of straight line of sight radiation leakage by means of geometric offsets in the mating halves. As seen in the transverse cross sectional diagrams below, even very carefully machined flat joints can allow some radiation penetration. By use of a simple step, the risk of direct line leakage from the contained source is eliminated. A more

elaborate joint with larger offsets that further reduces radial features may be justified in some applications. Securing hardware such as bolts can be also made of WHA to preserve protection level.



Preserving Maximum Mechanical Strength

Good mechanical designs avoid unnecessary stress concentration. This is especially important considering the notch sensitivity of all WHAs. Attention to details such as the sharpness of internal corners, root radii of notches, grooves and threads, and the proximity of holes or other cutouts to part edges help preserve the maximum attainable strength from a WHA part. Concave radii should be limited to 0.020" or greater whenever possible. Holes should not be located closer than 1.5 times the hole diameter from the edge of a part. While most weights are required to support only low acceleration centrifugal or inertial loads, these strength of materials considerations become even more important in parts that additionally serve a structural function or are utilized in high speed applications.



4. Machining Guidelines

The Character of WHA

A principal advantage of WHAs over pure tungsten for density applications is their ability to be readily machined into complex geometries using common metalcutting tools and techniques. While it is generally said that WHAs machine similar to gray cast iron, this description can be misleading. Lower %W alloys with high ductility tend to machine more like a stainless steel of comparable hardness. Due to the high elastic stiffness of WHAs, cutting forces will be higher than for most metals. Rigid tooling and adequate spindle torque are mandatory for good results. Coolant/lubricants, if employed, should be the non-alkaline, water soluble type.

Sawing

Blanks of WHA may be readily cut using a heavy duty shop bandsaw equipped with either a bi-metal blade with hook profile teeth or a segmented edge carbide blade at low speed (100-250 sfm). Coolant is not required for bandsaw sectioning. WHAs may also be cut on an abrasive saw using bonded alumina or silicon carbide blades with coolant.

Grinding

WHAs are capable of excellent surface finishes when centerless or surface ground. Vitrified bond alumina or silicon carbide wheels of medium hardness are recommended. A water soluble coolant should be used. Diamond wheels should not be used due to rapid loading. Surface grinding of very thin stock should be performed carefully so as to avoid bowing from introduced residual stress.

Milling

Virtually all commercial WHAs easily form short chips when machined. The exception to this rule is low %W alloys supplied in a very ductile state, in which case chipbreaking must be addressed in tooling selection. Milling of WHAs is best performed using multi-insert cutter heads. The use of coolant/lubricant is optional.

Roughing

ISO Carbide Grade	Rake (°)	Clearance (°)	Edge Condition	Tooth Load (in)	Depth of Cut (in)	Speed (sfm)
K15 or K20	-7° to 0°	0°	honed	0.005-0.015	0.030-0.125	200-400

Finishing

ISO Carbide Grade	Rake (°)	Clearance (°)	Edge Condition	Tooth Load (in)	Depth of Cut (in)	Speed (sfm)
K15 or K20	0° to +7°	0° to -11°	sharp	0.003-0.010	0.005-0.030	300-500

Some modern cutter/insert combinations will permit depths of cut on roughing to exceed 0.25" on machines of sufficient power. Best final surface finish is promoted by the use of large nose radius inserts, high spindle speeds, light feed rates, and positive rake inserts.

While coated inserts offer improved life when machining most metals, this advantage is sometimes offset when machining WHAs due to the higher cutting forces created by the rounded (honed) edges necessary for coating of the insert. This should be evaluated in advance of a job on a case by case basis.

Turning/Facing/Boring

While HSS cutting tools can be used, optimum performance will be realized through the use of sharp edged carbide inserts. If chatter occurs with longer extensions, toolholders fabricated from WHA provide the best solution to the problem.

Roughing

ISO Carbide Grade	Rake (°)	Clearance (°)	Edge Condition	Feed Rate (ipr)	Depth of Cut (in)	Speed (sfm)
K15 or K20	-7° to 0°	0°	honed	0.005-0.020	0.030-0.125	200-350

Finishing

ISO Carbide Grade	Rake (°)	Clearance (°)	Edge Condition	Feed Rate (ipr)	Depth of Cut (in)	Speed (sfm)
K15 or K20	0° to 7°	7°-11°	sharp	0.005-0.010	0.005-0.015	250-400

Optimal insert geometry for both turning and milling will be determined by the specific application. Diamond shapes from 35-80° all work well, with larger angles providing more durable cutting edges and also offering the possibility of using the complementary angle corners as well. Hexagonal inserts provide further economy with 6 usable cutting edges but are restricted from machining narrow features.

Drilling

Standard surface treated HSS twist drill bits generally perform satisfactorily. Very high %W alloys or special high hardness WHAs may mandate the use of carbide bits. As hole size decreases, attention to clearance and debris removal become more critical to avoid seizing or breakage. The use of tapping lubricant is recommended.

Tapping

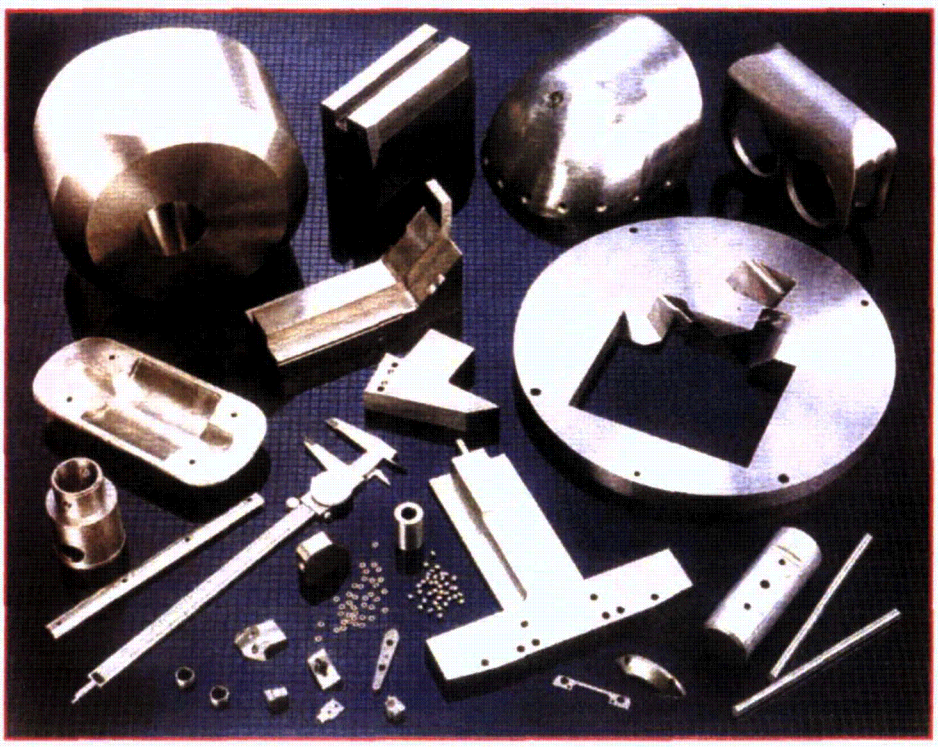
Tapping can be the most challenging operation for WHAs due to the high resultant torque on the tap shank. For this reason, 2 or 3 flute, positive rake, spiral point, high clearance taps should be used. Premium cobalt steel taps perform best for this application. The use of tapping lubricant (such as a heavy sulfonated oil) is essential. Choose the coarsest thread possible for a given diameter and application. Holes should be tapped to completion without back threading to avoid binding. With care, threads as fine as 2-56 can be successfully tapped. It is generally best to tap large holes with a single point tool. For other difficult to tap situations, the use of a slightly larger pilot hole may solve the problem but with reduced thread engagement area.

EDM Shaping

EDM, both wire and sinker types, is routinely used to shape WHA blanks. EDM should, however, be a "last resort" technique for several reasons. First, it is inefficient compared to other metalcutting alternatives. WHAs have high arc erosion resistance, and are occasionally used as EDM tools. EDM shaping is therefore very slow. Also, even at lower spark energy settings, EDM can still introduce surface layer damage that can in some applications prove detrimental. Using EDM to shape highly ductile WHAs can sometimes embrittle them through reintroduction of hydrogen into the metal. Still, EDM remains the only practical shaping technique in some specific applications. An example is the machining of blind, non-circular holes with relatively sharp corners and taper.

Thermal Contouring

Techniques such as oxyfuel, plasma jet, and laser cutting should never be used for WHAs. These methods typically produce unacceptable levels of oxidation and can result in localized thermal cracking.



5. Joining

When A Choice Can Be Made

WHA can readily be joined to itself or other materials. *Whenever feasible, mechanical methods of attachment are preferred,* as they are easily inspected and avoid possible thermochemical alteration and its effect on local mechanical properties.

Mechanical

Joining is most commonly performed using standard fasteners such as bolts and pins. WHA parts can be likewise be threaded to function as fasteners (in such applications as radiation shielding). In choosing a mechanical joining method, it is important to keep in mind the notch sensitivity, impact sensitivity, and low CTE (only ~33% of that for 304 stainless) of WHAs. Threads should have as generous a root radius as possible for maximum strength. Impact fastening techniques such as riveting are not recommended. Shrink fitting is possible provided the WHA part is the inner member. For shrink fitting, an interference fit of ~0.005" per side is prepared and the WHA part cooled in dry ice or LN_2 while the outer member is heated to several hundred degrees before fit up.

Brazing

Brazing is best performed in a hydrogen furnace to protect the WHA part from oxidation. A variety of filler metals such as pure copper, Monel 400, and standard brazing alloys such as BAg-13a can be used. Brazing temperature constraints and the end application generally determine the filler metal choice. Large components can be assembled from a number of smaller pieces using this approach. As with any brazing operation, good joint preparation is essential for producing fully bonded interfaces. Clearances of ~0.002" or less are typical. Brazing can alter the chemistry within the immediate vicinity of the joint. Points of attachment should not be located along such zones. Manual torch brazing using a flux is also possible but will result in oxidation and is limited to joining smaller components. Low temperature solders will not wet WHAs.

Welding

Welding is generally not performed on WHAs due to the vast difference in melting point between the W phase and binder phase. Microcracking can occur in the vicinity of the weld. A TIG (GTA) torch can however be used as a very intense heat source to flow fillers such as Monel, pure nickel, or nickel-based alloys into a joint for a "quasi-weld". This technique requires considerable experience for good results.

Sinter Bonding

This is a technique that is typically limited to joining parts at the time of manufacture to form larger assemblies. It is best limited to WHAs containing 93%W or less. Similar to hydrogen furnace brazing, the assembled parts are heated to the point of liquid phase formation to bond the interface(s). A brazing foil may be used in joining larger sections, which sometimes creates a slightly visible bond line. Good strength can be obtained.

6. Finishing

The Corrosion Resistance of WHA

WHAs are reasonably resistant to corrosion and are not susceptible to stress corrosion cracking (SCC) as is a competitive high density material, DU. For some density applications such as aircraft counterbalance weights, long term corrosion resistance becomes a concern due to persistent exposure to harsh environments. In such cases, a variety of protective finishes can be applied. While relatively resistant to corrosion under ambient conditions, extreme humidity, salt spray, and the presence of strong electrolytes can prompt surface corrosion. This is due to the electrochemical difference between the matrix and the tungsten phases, which sets up micro-scale galvanic cells on the exposed surface. The matrix phase is most readily attacked by acidic solutions, whereas the tungsten phase is most rapidly dissolved by alkaline solutions.

It is important to note that certain conversion coatings (black oxide, chromate, phosphate, etc.), though in widespread industrial use, are not suitable for WHAs. As an example, the chemistry of black oxide processes for steels is based on the presence of an iron-rich surface, which is definitely not the case for any commercial WHA. Similarly, anodizing processes which are widely used for aluminum and reactive metals are not appropriate for WHAs, which by nature do not form the same type of surface oxide layer.

Conversely, when a uniform chemical attack is desirable (such as for decorative etching, marking, or chemical machining), the same electrochemical differences between the two phases comprising WHA prevent consistency of dissolution response. If high definition, solvent resistant patterns or ID markings are required on WHA parts, it is recommended that either vibratory scribe or laser marking systems be employed.

Metallic Coatings

Cadmium plating with a chromate overcoat is commonly used for aircraft weights. This type of plating is ideal should the coating need to be periodically stripped. For more durable coatings, nickel and hard chrome are excellent choices. Alkaline plating solutions should be used to avoid hydrogen introduction into highly ductile parts, which could result in both embrittlement and possible blistering of the plating.

Organic Coatings

A variety of polymeric finishes, including epoxy and acrylic based types, may be effectively used for corrosion protection. Organic coatings are probably the best choice in most applications. Paints additionally allow convenient color coding and ID marking of components when required. Organic coatings also provide a dielectric layer, useful in preventing the formation of a galvanic couple when WHA weights are fastened to dissimilar metals such as aluminum alloys. For optimum durability, organic coatings should be dried by baking at the recommended temperature to ensure the full set of curing reactions occur.

7. Typical Applications

Radiation Shielding

Modern industrial radiography and oncology systems currently utilize beam energies that can exceed 1 MeV from isotopic sources and well over 20 MeV from small accelerators. The absorption behavior of WHAs for high energy electromagnetic radiation is derived primarily from the high linear absorption coefficient of the tungsten phase. The following table of tenth layer values illustrates the excellent shielding effectiveness.

Tenth Value Layer (90% Attenuation) Thickness (cm)**

	SD170	SD175	SD180	SD185	Dens21	Dens23	Dens25	Pb ref.
Energy (MeV)								
0.10	.033	.032	.030	.029	.033	.031	.030	.037
0.14 Tc^{99m}	.079	.074	.070	.068	.078	.074	.070	.085
0.20	.187	.177	.168	.162	.186	.177	.168	.203
0.47 Ir^{192}	.934	.894	.863	.837	.931	.891	.861	1.14
0.66 Cs^{137}	1.41	1.35	1.31	1.27	1.40	1.35	1.30	1.83
1.00	2.05	1.98	1.92	1.88	2.04	1.98	1.92	2.86
1.25 Co^{60} (avg)	2.42	2.34	2.28	2.22	2.41	2.34	2.27	3.45
6.00	3.28	3.16	3.05	2.96	3.26	3.15	3.04	4.62
10.00	2.94	2.82	2.72	2.63	2.92	2.81	2.71	4.08
20.00	2.39	2.28	2.20	2.13	2.38	2.28	2.19	2.19

**The above values are estimates calculated using the NIST XCOM routine and do not include any buildup factor. Actual required thickness should be empirically verified before final shielding design and/or use.

These alloys are excellent materials for the shielding and collimation of x-and γ-radiation due to their combination of radiographic density, machinability, strength, and low toxicity. WHAs offer a superior protection level to lead in an equivalent thickness. But unlike lead, WHAs resist deformation and can be accurately fastened – important factors in the construction of multi-leaf radiation collimators. WHA can be supplied in the form of thin rolled and machined sheet for such applications. For bulk shielding applications, ATI Firth Sterling has manufactured many shielding components in the 100-1000 kg size range. Large isotope containers can be fabricated with complex geometry radial beam ports using "radiation joint" construction. Class 2, 3, or 4 WHAs are typically used for shielding. WHAs are not effective neutron shielding materials and should not be used for β shielding.

Aircraft Counterbalances

Counterbalance weights for fixed and rotary wing aircraft have been used for many years. WHA weights, unlike lead that creeps under its own weight at room temperature, can be securely fastened to aerostructures. In contrast to DU weights, WHA weights are free from high corrosion, special service site licensing requirements, disposal issues, and the negative public opinion to having many pounds of radioactive material routinely flying overhead. WHA weights are typically machined from near net shape blanks to precise tolerances and provided with a protective coating to the customer's specification. This is an application where a coating is highly recommended to resist corrosion from temperature

and moisture cycling, de-icing fluids, aggressive aircraft cleaning agents, and galvanic contact with fasteners and the airframe. Class 1 or 2 WHAs are most commonly used.

Well Logging

WHA is an excellent casing material for down hole logging of oil wells. Casings must be sufficiently heavy to readily sink through drilling mud and strong enough to withstand the hydrostatic pressure of this harsh environment. Most designs are highly machined for sensor and window positioning. Mechanical properties are very significant to the survivability of these rather large components. ATI Firth Sterling has years of experience in producing high properties in large bars of class 1, 2, or 3 material. Additionally, we offer a complete line of high performance tungsten carbide components for the drilling and mining industries.

Racing Weights

Drivers consistently report they can sense differences in how a car handles on the track if the weight on a given wheel varies only by a couple of pounds. Fine tuning a race car to a given track is a very cumbersome and time consuming ordeal with conventional lead plate weights. WHA weight blocks offer up to 50% more weight in a given volume, with the added advantages of direct attachment via threaded holes or thru-bolting and the freedom from deformation that is a constant problem with lead. Class 1 or 2 WHAs are most commonly used. The high density of WHAs permit weights to be placed in the lower half of Nascar weight adjustment tubes, effectively lowering the overall center of gravity for improved handling. ATI Firth Sterling has a specialized line of racing weights for these applications.

High Stiffness Tooling

The high density, high elastic (Young's) modulus, and machinability of WHAs make them ideal materials for chatter free boring bars and long extension toolholders of various types. High extension ratios (up to 10:1 in larger diameters) are possible due to the high stiffness of this family of materials. WHAs have a distinct advantage over cemented carbide in terms of both durability and the fact that pockets for replaceable cutting inserts can be machined directly into the toolholder. The high density of WHA makes for effective mass damping of cutting induced vibration. Class 1 or 2 (preferred) WHAs are most commonly used.

Ordnance Applications

WHAs have been routinely used in high density fragmenting devices and armor piercing (AP) ammunition ranging in size from small caliber 5.56 mm rounds up to 120 mm anti-tank projectiles and beyond. Material for kinetic energy penetrators is typically hydrogen outgassed and resolutionized/quenched for maximum ductility (25-35% EL typical) and toughness prior to being cold worked by swaging. Deformation processing generates a directional microstructure, high yield strength (150-200 ksi for most designs), and elevated hardness (40-44 HRC). Even higher mechanical properties are attainable

from W-Ni-Fe-Co and W-Ni-Co compositions. These high property sets provide a useful indication of the wide range of properties in which WHAs can be supplied.

Concluding Comments

We hope that this WHA Engineering Manual has proven both useful and interesting. WHAs provide an extremely versatile property set to design engineers, and we at ATI Firth Sterling strive to be the industry leader not only in supplying the highest performance alloys, but also the best customer and technical support available. Our ISO 9002 and AS9100 certifications stand as proof of our ongoing commitment to quality and continuous improvement. Whether your application is for high density horseshoes or state-of-the-art aerospace components, we welcome your specific inquiries. Explore the Densalloy™ difference and what it can mean to you.

ATI Firth Sterling ... your best value choice

for

tungsten heavy alloys !

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15. TUNGSTEN

15.1 Specific Heat (TUNGCP)

Specific heat is calculated by subroutine **TUNGCP** as a function of temperature. The temperature dependent specific heat[15-1] values are shown in Table 15-1. Linear interpolation is provided for temperature calls which fall between tabular values. Calls to **TUNGCP** that are outside of the table range will be returned with either the first or last table value.

Table 15-1. Specific heat of tungsten as a function of temperature.

Temperature (K)	Specific Heat (J/kg • K)
295	138.2
373	141.2
573	148.6
773	155.6
1,023	163.9
1,273	171.6
1,523	178.8
1,773	185.3
2,023	191.3
2,273	196.7
2,523	201.6
2,723	205.1
3,073	210.2

15.2 Thermal Conductivity (TUNGK)

Thermal conductivity is calculated by subroutine **TUNGK** as a function of temperature. The temperature dependent thermal conductivity[15-1] values are shown in Table 15-2. Linear interpolation is provided for temperature calls which fall between tabular values. Calls to **TUNGK** that are outside the table range will be returned with either the first or last table value.

Table 15-2. Thermal conductivity of tungsten as a function of temperature.

Temperature (K)	Thermal Conductivity (W/m • K)
573	124.7
673	122.9
773	121.2
873	119.4
1,073	161.1
1,773	114.5
1,373	111.5
1,573	108.6
2,573	96.73
2,973	93.16
3,173	91.63

15.3 Density Correlations (TUNGRO)

A constant value density[15-1] is returned by subroutine **TUNGRO**. The density value returned is 19600 (kg/m^3).

15.4 Reference

15-1 M. Firnhaber, K. Trambauer, S. Hagen, P. Hofmann, *Specification of the International Standard Problem ISP-31: CORA 13 Experiment on Severe Fuel Damage,* Gesellschaft für Reaktorsicherheit (GRS) mbH, August 1991.

General Plastics LAST-A-FOAM