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 + Slap-Down	Table 2-205
303	30-ft. Cg/Corner Drop	Table 2-206
304	30-ft. Head-On Drop at -40°F, Low Temperature	Table 2-207
305	30-ft. Side Drop + Slap-Down at -40°F, Low Temperature	Table 2-208
306	30-ft. Cg/Corner Drop at -40°F, Low Temperature	Table 2-209
311	4-ft. Drop onto Rod	Table 2-210

MARKUP

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

Load Combination	Load Cases[a]	Description	Data
301	301, 102, 201, 211	Head-On Drop Orientation	Table 2-211
302	302, 102, 201, 211	Side Drop Orientation	Table 2-212
303	303, 102, 201, 211	Cg/Corner Drop Orientation	Table 2-213
304	304, 105, 202, 211	Head-On Drop Orientation at -40°F, Cold Environment	Table 2-214
305	305, 105, 202, 211	Side Drop Orientation at -40°F, Cold Environment	Table 2-215
306	306, 105, 202, 211	Cg/Corner Drop Orientation at -40°F, Cold Environment	Table 2-216
310	204, 101, 211	Additional Increased External Pressure (290 psi)	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, Cold Environment	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

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

MAIN

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

WAS PRESENT

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

WAIVER

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

Stress (psi/MPa)

Location	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

WAIVER

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

WATERMARK

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

WAS PRELIMINARY

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

MARKED FOR REVISION

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

WORKING DRAFT

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

MARKUP

Table 2-205. Load Case 302, 30-ft. Side Drop + Slap-Down, 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

WATERMARK

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

MARKUP

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

MARPAK

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

MARKUP

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

Stress (psi/MPa)

Location	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

MARSHALL

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

MARKUP

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

Stress (psi/MPa)

Location	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

WORKING DRAFT

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

MARKUP

Table 2-209. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Low Temperature, 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

WAIVER

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

MARKUP

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

Stress (psi/MPa)

Location	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

WAIVER

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

MARKUP

Table 2-211. Load Combination 301, Head-On Drop 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	

WORKING UP

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

MARKUP

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 + Slap-Down
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	

MARKUP

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

MARKUP

Table 2-213. Load Combination 303, Cg/Corner Drop 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	

WORKUP

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

MARKUP

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

Load Cases: 304, 105, 202, 211
30-ft. Head-On Drop at -40°F, Low Temperature
-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	

MARKUP

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

MARKUP

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

Load Cases: 305, 105, 202, 211
30-ft. Side Drop + Slap-Down at -40°F, Low Temperature
-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	

WATERMARK

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

MARKUP

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

Load Cases: 306, 105, 202, 211
30-ft. Cg/Corner Drop at -40°F, Low Temperature
-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	

MARKUP

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

MARKUP

Table 2-217. Load Combination 310, Additional Increased External Pressure (290 psi), 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	

MARKUP

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

MARKUP

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	

WATERMARK UP

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

MARKUP

Table 2-219. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Cold Environment, 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	

WATERMARK UP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WATERMARK UP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WARMUP

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

MARKUP

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

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2.10.2.4 Free Drop – Model AOS-050

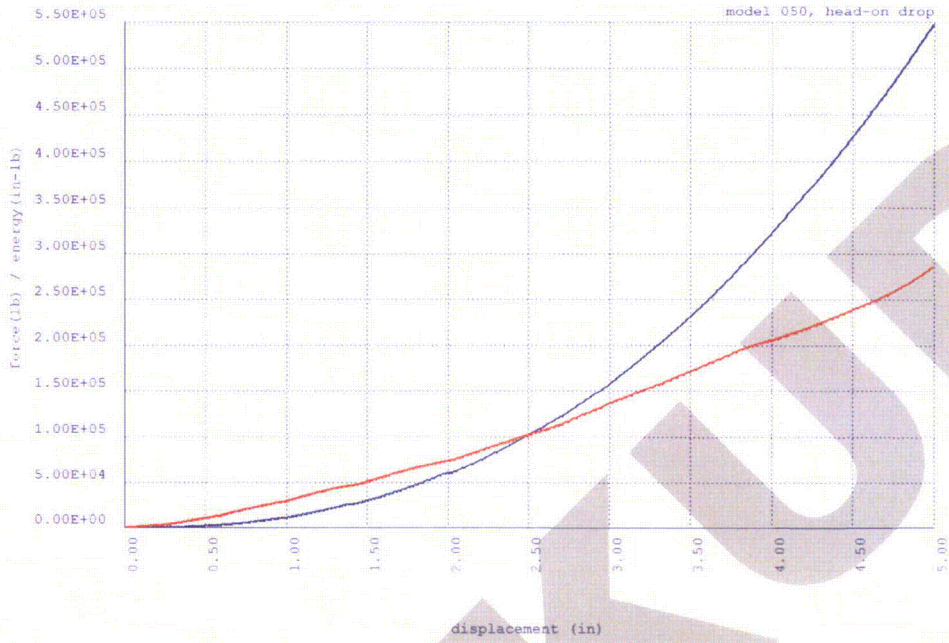

Figure 2-43. Head-On Drop Force and Energy, 10-lb. Foam – Model AOS-050

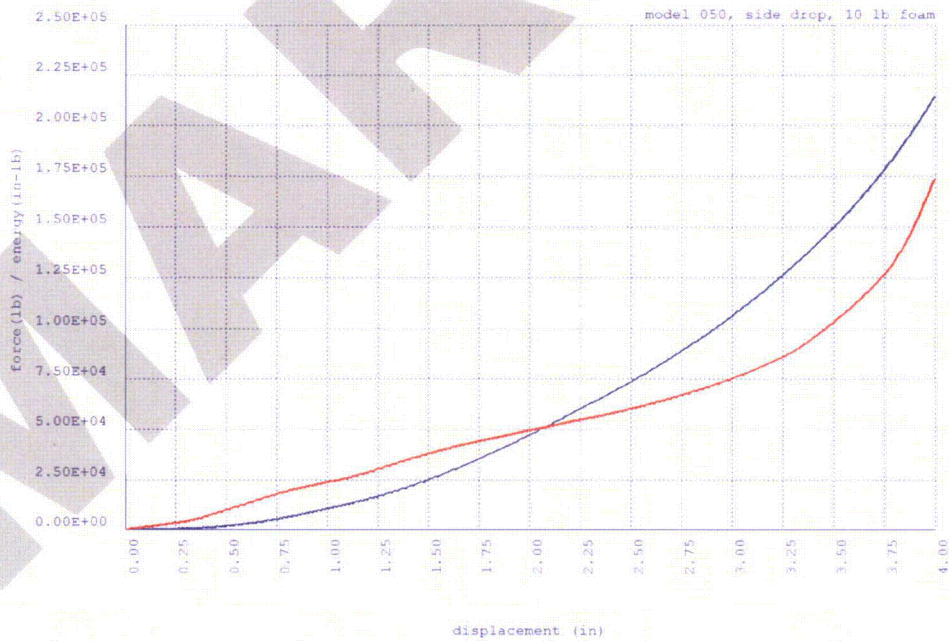

Figure 2-44. Side Drop Force and Energy, 10-lb. Foam – Model AOS-050

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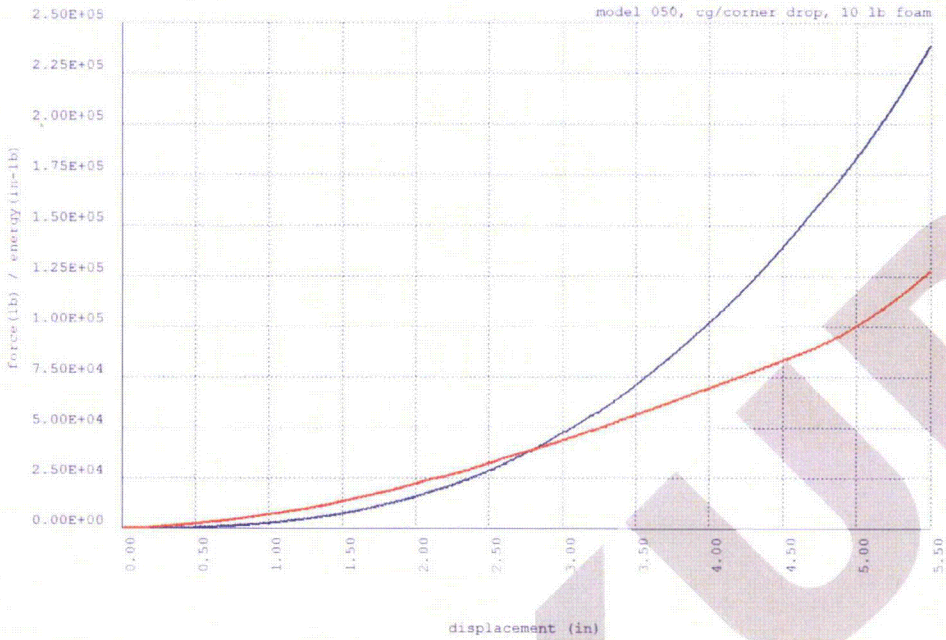

Figure 2-45. Cg/Corner Drop Force and Energy, 10-lb. Foam – Model AOS-050

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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

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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 Increased 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	30-ft. Head-On Drop Impact Test, Normal Conditions	Table 2-247

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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[a]	232, 102, 201, 211	Impact Test, Normal Condition	–

a. 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.*

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

Stress (psi/MPa)

Location	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

MAGNASTOR

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

MARKUP

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

MARKUP

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

WITHDRAWN

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

MARKUP

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

MARKUP

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

Stress (psi/MPa)

Location	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

WAS PRELIMINARY

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

Stress (psi/MPa)

Location	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

MARKED FOR REVISION

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

MARKUP

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

MARKUP

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

WITHDRAWN

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

MARKUP

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

MARKUP

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

Stress (psi/MPa)

Location	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

WATERMARK

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

MARKUP

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

MARKED

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

MARKUP

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

Stress (psi/MPa)

Location	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

WORKING DRAFT

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

MARKUP

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

Stress (psi/MPa)

Location	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

MAGNUM

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

MARKUP

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

Stress (psi/MPa)

Location	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

MARKED

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

MARKUP

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

WORKING DRAFT

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

MARKUP

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

Stress (psi/MPa)

Location	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

NAC PROPRIETARY

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

MARKUP

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

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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

MARKUP

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

MARGIN

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

MARKUP

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

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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

MARKUP

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

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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

MARKUP

Table 2-247. Load Case 232, 30-ft. Head-On Drop Impact Test, Normal Conditions, 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

WAPRS

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

MARKUP

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	

WORKING DRAFT

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

MARKUP

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	

WORKING DRAFT

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

MARKUP

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	

WATERMARK

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WORKING DRAFT

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

MARKUP

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 Increased 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	

MARKUP

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

MARKUP

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 Increased 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	

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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

MARKUP

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	

WORKING UP

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

MARKUP

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	

WORKING DRAFT

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WORKING DRAFT

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

MARKUP

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	

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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

MARKUP

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	

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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

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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	

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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

MARKUP

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 + Slap-Down	Table 2-271
303	30-ft. Cg/Corner Drop	Table 2-272
304	30-ft. Head-On Drop at -40°F, Low Temperature	Table 2-273
305	30-ft. Side Drop + Slap-Down at -40°F, Low Temperature	Table 2-274
306	30-ft. Cg/Corner Drop at -40°F, Low Temperature	Table 2-275
311	4-ft. Drop onto Rod	Table 2-276

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

Load Combination	Load Cases[a]	Description	Data
301	301, 102, 201, 211	Head-On Drop Orientation	Table 2-277
302	302, 102, 201, 211	Side Drop Orientation	Table 2-278
303	303, 102, 201, 211	Cg/Corner Drop Orientation	Table 2-279
304	304, 105, 202, 211	Head-On Drop Orientation at -40°F, Cold Environment	Table 2-280
305	305, 105, 202, 211	Side Drop Orientation at -40°F, Cold Environment	Table 2-281
306	306, 105, 202, 211	Cg/Corner Drop Orientation at -40°F, Cold Environment	Table 2-282
310	204, 101, 211	Additional Increased External Pressure (290 psi)	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, Cold Environment	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

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

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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

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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

MARKUP

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

MARKUP

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

MARKED FOR

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

MARKUP

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

MARKUP

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

MARSHIP

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

MARKUP

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

MARKUP

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

MARINE

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

MARKUP

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

MARKUP

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

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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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

Stress (psi/MPa)

Location	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

WAIVER

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

MARKUP

Table 2-271. Load Case 302, 30-ft. Side Drop + Slap-Down, 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

WAIVER

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

MARKUP

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

MARSHALL

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

MARKUP

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

Stress (psi/MPa)

Location	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

WAIVER

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

MARKUP

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

Stress (psi/MPa)

Location	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

MAGNUS

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

MARKUP

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

Stress (psi/MPa)

Location	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

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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

MARKUP

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

Stress (psi/MPa)

Location	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

WAIVER

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

MARKUP

Table 2-277. Load Combination 301, Head-On Drop 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	

MARKUP

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

MARKUP

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 + Slap-Down
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	

MARKUP

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

MARKUP

Table 2-279. Load Combination 303, Cg/Corner Drop 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	

MARKUP

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

MARKUP

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

Load Cases: 304, 105, 202, 211
30-ft. Head-On Drop at -40°F, Low Temperature
-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	

WORKUP

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

MARKUP

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

Load Cases: 305, 105, 202, 211
30-ft. Side Drop + Slap-Down at -40°F, Low Temperature
-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	

MARKUP

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

MARKUP

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

Load Cases: 306, 105, 202, 211
30-ft. Cg/Corner Drop at -40°F, Low Temperature
-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	

WATERMARK UP

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

MARKUP

Table 2-283. Load Combination 310, Additional Increased External Pressure (290 psi), 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	

MARKUP

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

MARKUP

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	

WORKING UP

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

MARKUP

Table 2-285. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Cold Environment, 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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WORKING UP

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

MARKUP

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	

WATERMARK UP

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

MARKUP

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	

WORKING UP

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

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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	

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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

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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

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

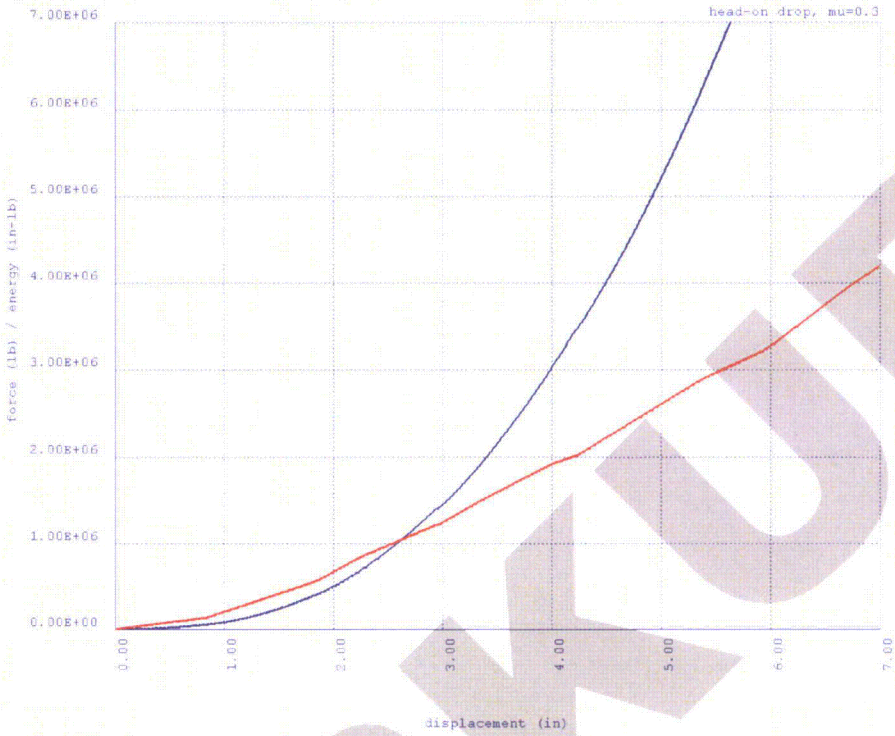

Figure 2-46. Head-On Drop Force and Energy – Model AOS-165A and AOS-165B

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

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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."

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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 Increased 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	30-ft. Head-On Drop Impact Test, Normal Conditions	Table 2-313

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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[a]	232, 102, 201, 211	Impact Test	–

a. *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.*

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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

WITHDRAWN

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

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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

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

Stress (psi/MPa)

Location	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

WAIVER

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

MARKUP

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

MARKUP

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

WATERMARK

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

MARKUP

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

MARKUP

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

WATERMARK

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

MARKUP

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

MARKUP

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

WITHDRAWN

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

MARKUP

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

MARKUP

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

Stress (psi/MPa)

Location	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

WAIVER

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

WITHDRAWN

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

MARKUP

Table 2-304. Load Case 203, Maximum Increased 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

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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

MARKUP

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

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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

MARKUP

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

WATERMARK

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

MARKUP

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

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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

MARKUP

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

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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

MARKUP

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

MARGIN

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

MARKUP

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

MARKUP

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

MARKUP

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

Stress (psi/MPa)

Location	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

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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

MARKUP

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

WITHDRAWN

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

MARKUP

Table 2-313. Load Case 232, 30-ft. Head-On Drop Impact Test, Normal Conditions, 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

WITHDRAWN

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

MARKUP

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	

WITHDRAWN

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

MARKUP

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	

WATERMARK

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

MARKUP

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	

WATERMARK

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WATERMARK

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

MARKUP

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 Increased 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	

MARKUP

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

MARKUP

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 Increased 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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WAIVER UP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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
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	

MARKUP

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

MARKUP

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	

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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

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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	

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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

MARKUP

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 + Slap-Down	Table 2-337
303	30-ft. Cg/Corner Drop	Table 2-338
304	30-ft. Head-On Drop at -40°F, Low Temperature	Table 2-339
305	30-ft. Side Drop + Slap-Down at -40°F, Low Temperature	Table 2-340
306	30-ft. Cg/Corner Drop at -40°F, Low Temperature	Table 2-341
311	4-ft. Drop onto Rod	Table 2-342

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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 Drop Orientation	Table 2-343
302	302, 102, 201, 211	Side Drop Orientation	Table 2-344
303	303, 102, 201, 211	Cg/Corner Drop Orientation	Table 2-345
304	304, 105, 202, 211	Head-On Drop Orientation at -40°F, Cold Environment	Table 2-346
305	305, 105, 202, 211	Side Drop Orientation at -40°F, Cold Environment	Table 2-347
306	306, 105, 202, 211	Cg/Corner Drop Orientation at -40°F, Cold Environment	Table 2-348
310	204, 101, 201, 211	Additional Increased External Pressure (290 psi)	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, Cold Environment	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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

WATERMARK

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

MARKUP

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

MARKUP

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

WATERMARKED

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

MARKUP

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

MARKUP

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

WORKING DRAFT

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

MARKUP

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

MARKUP

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

WAIVER

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

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

MARKUP

Table 2-337. Load Case 302, 30-ft. Side Drop + Slap-Down, 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

WAS PRELIMINARY

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

MARKUP

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

WAPRIVIS

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

MARKUP

Table 2-339. Load Case 304, 30-ft. Head-On Drop at -40°F, Low Temperature, 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

WATERMARK

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

MARKUP

Table 2-340. Load Case 305, 30-ft. Side Drop + Slap-Down at -40°F, Low Temperature, 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

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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

MARKUP

Table 2-341. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Low Temperature, 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

WAS PRELIMINARY

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

MARKUP

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

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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

MARKUP

Table 2-343. Load Combination 301, Head-On Drop 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	

MARKUP

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

MARKUP

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 + Slap-Down
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	

MARKUP

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

MARKUP

Table 2-345. Load Combination 303, Cg/Corner Drop 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	

MARKUP

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

MARKUP

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

Load Cases: 304, 105, 202, 211
30-ft. Head-On Drop at -40°F, Low Temperature
-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	

MARKUP

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

MARKUP

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

Load Cases: 305, 105, 202, 211
30-ft. Side Drop + Slap-Down at -40°F, Low Temperature
-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	

MARKUP

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

MARKUP

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

Load Cases: 306, 105, 202, 211
30-ft. Cg/Corner Drop at -40°F, Low Temperature
-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	

WATERMARK UP

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

MARKUP

Table 2-349. Load Combination 310, Additional Increased External Pressure (290 psi), 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	

WATERMARK UP

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

MARKUP

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	

MARKUP

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

MARKUP

Table 2-351. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Cold Environment, 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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

WATERMARK UP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

MARKUP

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

MARKUP

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	

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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

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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	

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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

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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

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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.

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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 Verification.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.

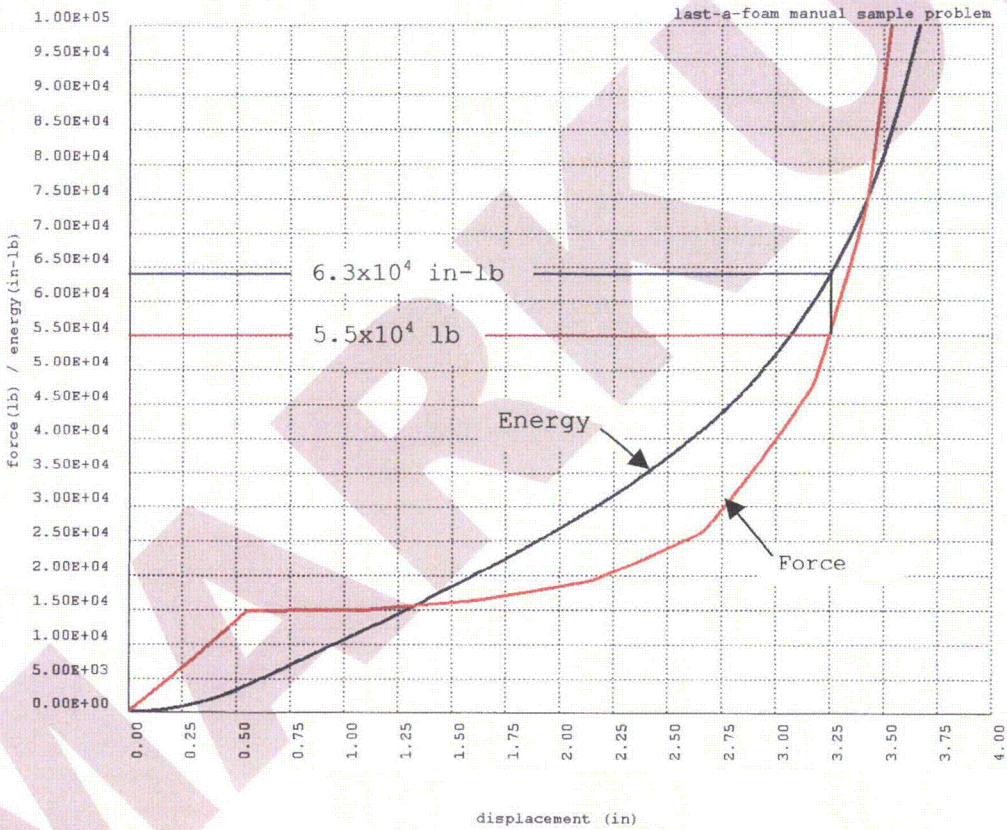
The structure of the Libra program is such that no permanent executable exists. Rather, a new executable is formed whenever the solution or element type changes from the preceding application. To establish the program status, the verification program generates a list of all of Libra subroutines on the 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%

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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.

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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(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 convection at inside of conductor.

Theoretical Solution

The theoretical solution is presented in Reference 1.

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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 thema1 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.

MARKUP

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.

MARKUP

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°

$$h_{water} = 15.0 \text{ Btu/hr/ft}^2/°F$$
$$k_{copper} = 216.0 \text{ Btu/hr-in-°F}$$
$$\rho_{copper} = 0.091 \text{ lb/in}^3$$
$$c_{copper} = 558.0 \text{ Btu/lbm-°F}$$

Description of Model

Axisymmetric model of wire, with convection elements at surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

MARKUP

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°

$$h_{air} = 2.0 \text{ Btu/hr/ft}^2/°F$$
$$k_{copper} = 216.0 \text{ Btu/hr-in-°F}$$
$$\rho_{copper} = 0.091 \text{ lb/in}^3$$
$$c_{copper} = 558.0 \text{ Btu/lbm-°F}$$

Description of Model

Axisymmetric model of wire, with convection elements at surface.

Theoretical Solution

The theoretical solution is presented in Reference 1.

MARKUP

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.

MARKUP

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.

MARKUP

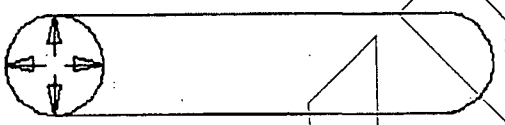
Problem 9

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.

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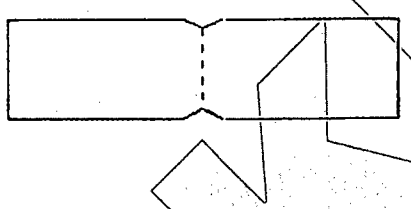
Problem 10

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.

MARKUP

Problem 11

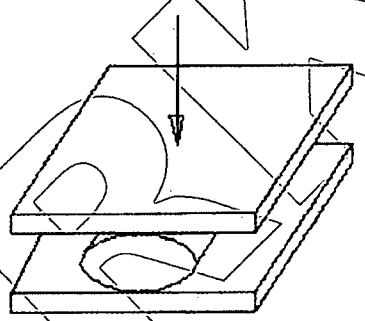
Input Data File: VER_PROB.11

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.

$E = 29.5 \times 10^6$ psi
$E_p = 1.0 \times 10^6$ psi
$v = 0.3$
$\sigma_y = 45000$ 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.

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Problem 12

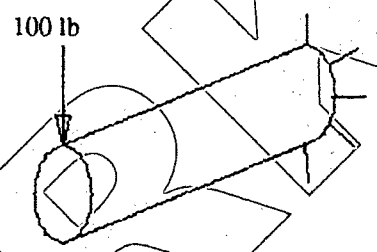
Input Data File: VER_PROB.12

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.

$E = 28.0 \times 10^6$ psi
$r = 10.0$ in
$t = 1.0$ in
$L = 100.0$ 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 $\theta = 0$,

$$P_i = \int_0^{360} Q \cdot \Delta_0 \cdot \cos(n\theta) \cdot r d\theta = Q$$

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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,

$$\delta = (P \cdot L^3 / 3EI) \cdot (1 + 0.98 \cdot D^2/L^2)$$

$$I = \pi \cdot r^3 \cdot t = 3141.59$$

$$P = 1000 \text{ 1b}$$

$$L = 200 \text{ in}$$

$$E = 28.0 \text{ psi}$$

$$r = 10.0 \text{ in}$$

$$\delta = 0.030315 \cdot 1.01 = 0.030618 \text{ in}$$

$$\sigma = M \cdot c / I = 1000 \cdot 197 \cdot 10 / 3141.59 = 627.07 \text{ psi}$$

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Problem 13

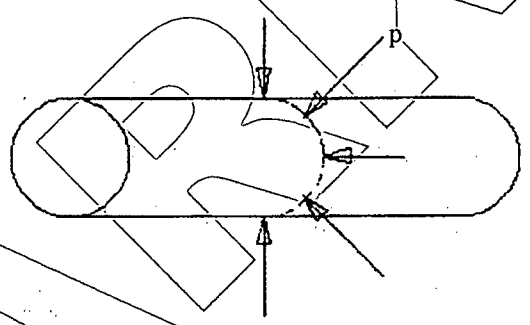
Input Data File: VER_PROB.13

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.

$E = 28.0 \times 10^6$ psi
$\nu = 0.3$
$r = 5.0$
$t = 0.025$
$p = 15.916$ 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.

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Problem 13 – Cont'd

Theoretical Solution

The solution is given in Reference 3, pg.170.

$$\lambda = \sqrt[4]{3(1-\nu^2) / r^2 \cdot t^2} = 3.63538 \text{ in}$$
$$\delta = p \cdot r^2 \cdot \lambda / 2E \cdot t = 0.0010333$$
$$\sigma_H = p \cdot r \cdot \lambda / 2t = 5786.4 \text{ psi}$$

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Problem 14

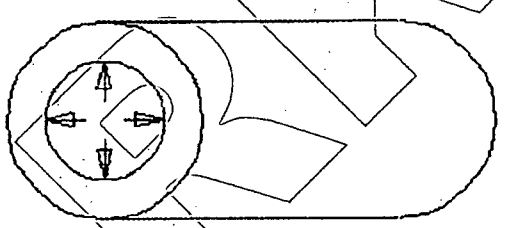
Input Data File: VER_PROB.14

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.

$E = 2.1 \times 10^4$ dN/mm^2
$\nu = 0.3$
$E_p = 0.0$
$\sigma_y = 24.0$ dN/mm^2
r(inside) = 100.0 mm
r(outside) = 200.0 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

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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.

$E = 10.5 \times 10^6$ psi
$\nu = 0.3$
$\rho = 2.45 \times 10^{-4}$ lb-sec^2/in^4
r(inside) = 22.27 in
t = 0.41 in
$\alpha = 26.67°$
p = 600 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

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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,

$$T = 0.55 \times 10^{-3} \text{ sec}$$

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Problem 17

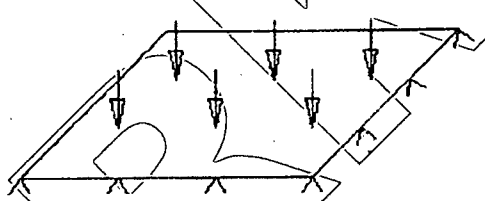
Input Data File: VER_PROB.17

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

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Problem 18

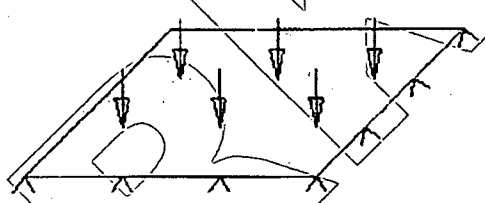
Input Data File: VER_PROB.18

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: $q \cdot L^2/M_p = 22.5$ $q = 0.90$ psi

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Problem 19

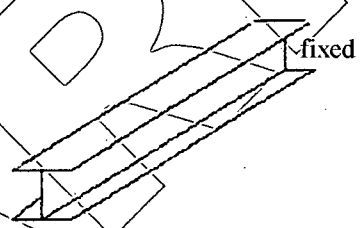
Input Data File: VER_PROB.19

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,

$$\omega_1 = (1.875)^2 \cdot \sqrt{EI / \rho L^4} = 10.899 \text{ rad/sec}$$

$$\omega_2 = (4.694)^2 \cdot \sqrt{EI / \rho L^4} = 68.020 \text{ rad/sec}$$

$$\omega_3 = (7.855)^2 \cdot \sqrt{EI / \rho L^4} = 191.29 \text{ rad/sec}$$

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Problem 20

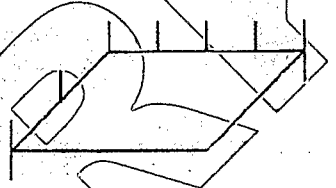
Input Data File: VER_PROB.20

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,

$$\omega_1 = 6.96 \cdot \sqrt{D/\rho L^4} = 16.45 \text{ hz}$$

$$\omega_2 = 24.1 \cdot \sqrt{D/\rho L^4} = 56.65 \text{ hz}$$

$$\omega_3 = 26.8 \cdot \sqrt{D/\rho L^4} = 63.00 \text{ hz}$$

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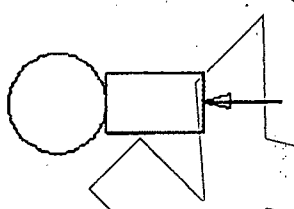
Problem 21

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,

$$\delta = 1.23 \cdot \sqrt[3]{P^2/E^2 \cdot R}, \quad P = E \cdot \sqrt{R \cdot (\delta/1.23)^3}$$

$$E = 28.0 \times 10^{6} \text{ psi}$$
$$R = 0.125 \text{ in},$$
$$\delta = 5.0 \times 10^{-5} \text{ in},$$
$$P = 2.5657 \text{ lb.}$$

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Problem 22

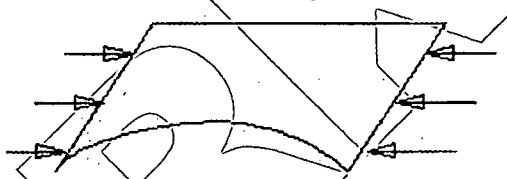
Input Data File: VER_PROB.22

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,

$$\sigma_{cr} = k \cdot \pi^2 \cdot D / b^2 \cdot t$$
$$k = 1.440 \ (a/b = 1)$$
$$D = E \cdot t^3 / (1-\nu^2) = 3.8382 \text{ lb-in}$$
$$b = 10.0 \text{ in}$$
$$t = 0.025 \text{ in}$$
$$\sigma_{cr} = 221.0 \text{ psi}$$

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Problem 23

Input Data Files: VER_PROB.23a, VER_PROB.23

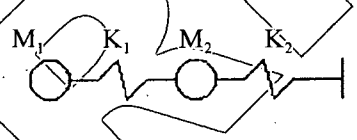
Libra Routines: Solution Types 3 &14, Element 1

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

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Problem 24

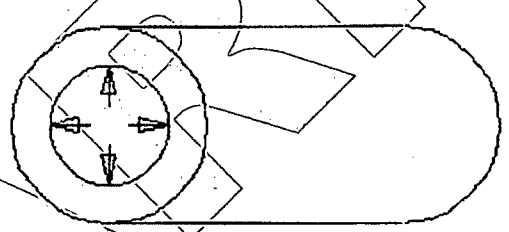
Input Data File: VER_PROB.24

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.

$E = 2.1 \times 10^4$ dN/mm^2
$\nu = 0.3$
$E_p = 0.0$
$\sigma_y = 24.0$ dN/mm^2
$p_0 = 14$ dN/mm^2
r(inside) = 100.0 mm
r(outside) = 200.0 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

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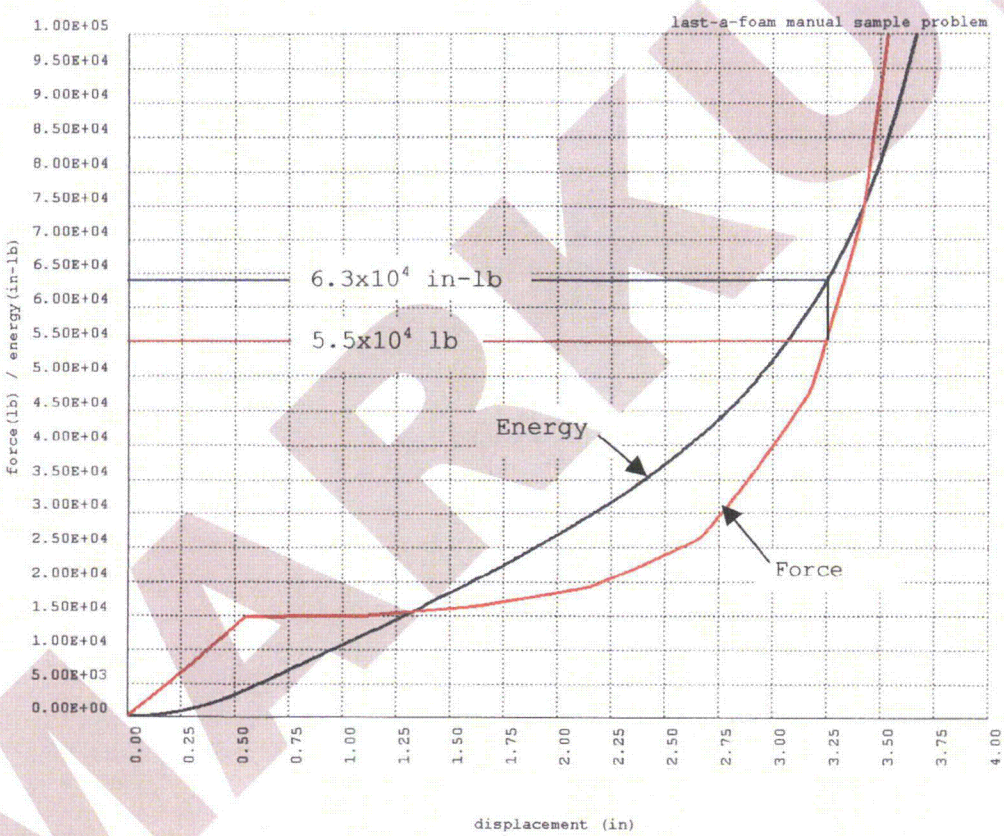
Additional Problem

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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1a. Update of Libra Thermal Verification Problems, GE Nuclear, Vallecitos, June, 2000.

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2.10.6 Description of LIBRA Files and Post-Processors: AOS Safety Analysis Report

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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.

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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.

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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.

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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.

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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.

WARRUP

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.

WORKING

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.

SAMPLE

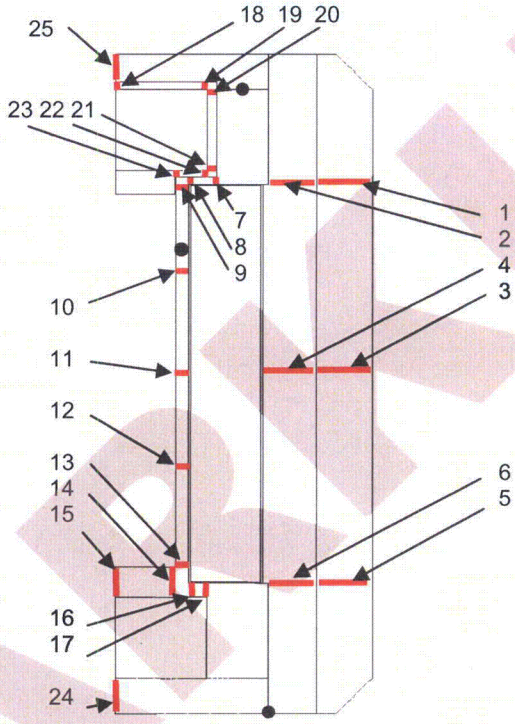

Figure 1. Model 165 PmPb Cross-Sections

MARKUP

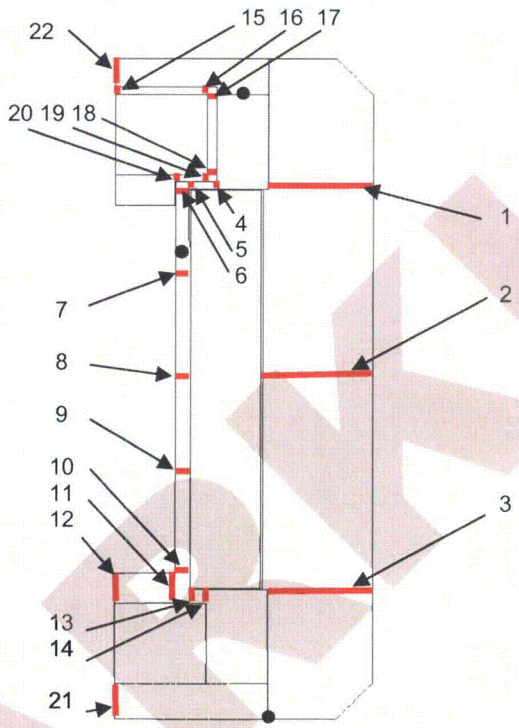

Figure 2. Models 025, 050 and 100 PmPb Cross-Sections

MARKUP

Figure 3. Axisymmetric FEA Model of 165 Cask

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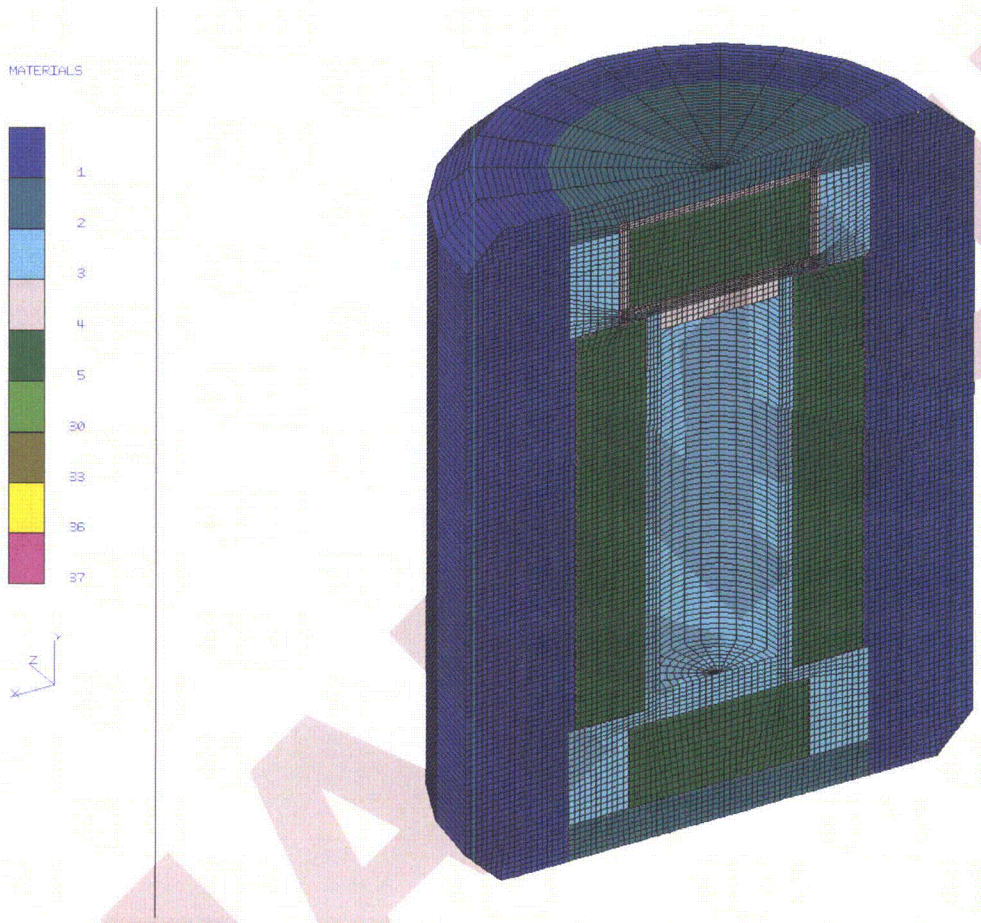

Figure 4. Three Dimensional FEA Model of 165 Cask

MAGUP

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
```

MARKUP

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

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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

MARKUP

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

MARKUP

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
```

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```
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
```

MARKUP

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	

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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

MARKUP

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
```

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2.10.7 Properties of Materials References

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This appendix provides information related to the following 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.

MARKUP

Contact Resistance

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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.

$$1/h_c = 0.003 \frac{\text{hr-ft}^2\,^\circ\text{F}}{\text{Btu}} \qquad h_c = 2.315 \text{ Btu/hr-in}^2\,^\circ\text{F}$$

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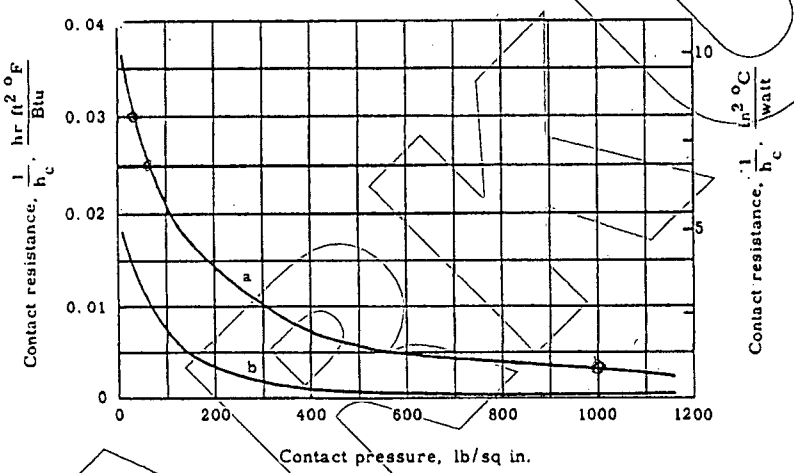
STEEL, BARE SURFACES AT HIGH CONTACT PRESSURES (0 to 1200 psi) - Solid blocks in air at reduced pressure ($p < 0.1$ atm)

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



$\frac{1}{h} = 0.03 \times 144 = 4.32 \rightarrow h = .231$

4-5 See page 24

MAIN CUP

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.

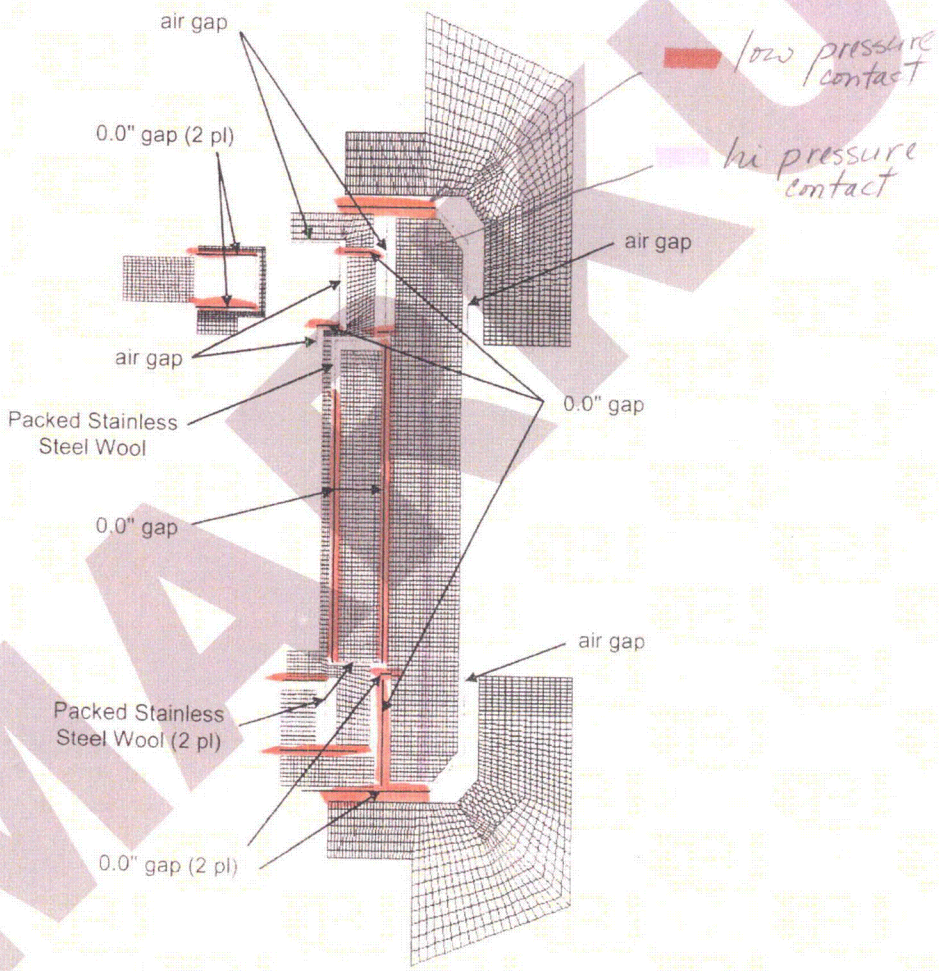


Figure 3-2. Expanded View of Thermal Model Defining Component Interfaces

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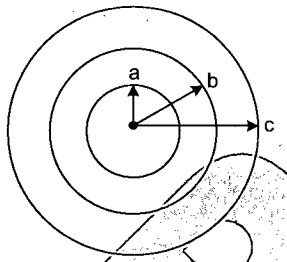
Shrinkfit

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

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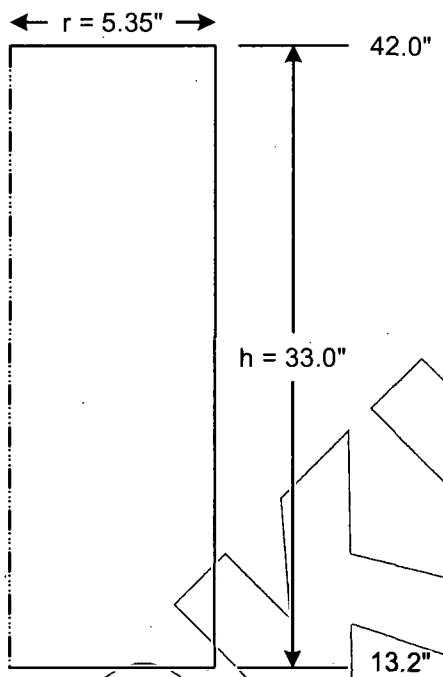
Decay Heat

MARKUP

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

$$q = 23{,}666.3 / 1{,}291.88 = 18.319 \text{ Btu/hr-in}^2$$

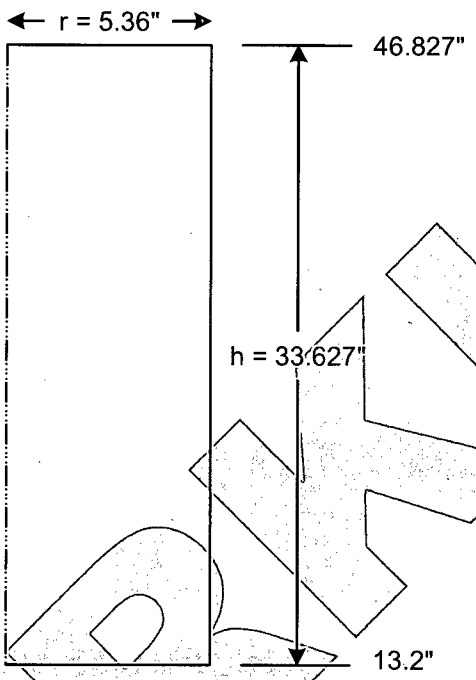
MARKUP

Decay Heat Load

450,000 Curies = 6,936W = 23,666.3 Btu/hr

(64.88c = 1W)

Cask Surface Area – Model AOS-165



$A = 2\pi (5.36)^2 + 2\pi (5.36)(33.627) = 1{,}313.0 \text{ in}^2$

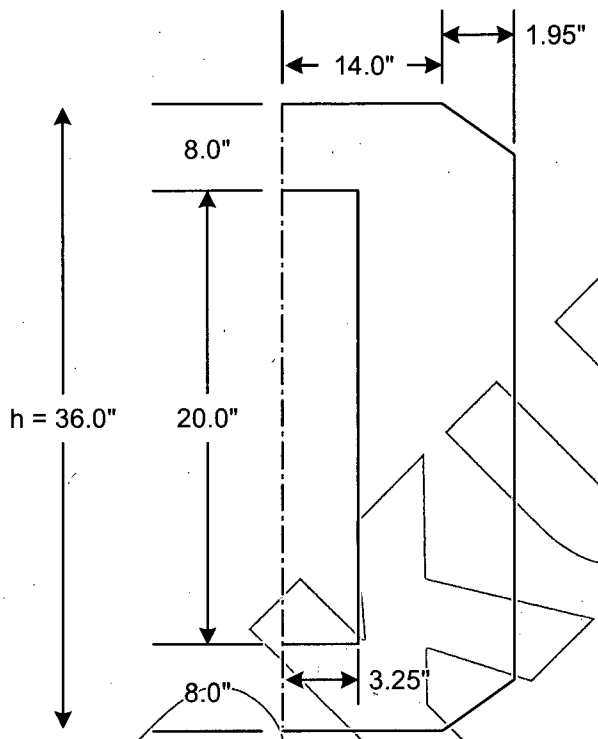
Heat Flux @ Inside Cask Surface

$q = 23{,}666.3 / 1{,}313.0 = 18.02 \text{ Btu/hr-in}^2$

MARKUP

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

$1{,}365 / 474.77\ in^2 = 2.88\ Btu/hr\text{-}in^2$

MARKUP

Model AOS-050 Cask

Decay Heat = 100W

100W = 3.4121 * 100 = 341.21 Btu/hr

Cavity Area

$2\pi\ (1.62424^2 + 1.62424 * (14.0 - 4.0))$

$= 118.63\ in^2$

Heat Flux

$341.21 / 118.63 = 2.876\ Btu/hr\text{-}in^2$

Model AOS-025 Cask

Decay Heat = 10W

Heat Flux

$(3.4121 * 10) / (2\pi)\ (0.812^2 + ((0.812)\ (7.0 - 2.0)))$

$= 1.151\ Btu/hr\text{-}in^2$

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Insolation

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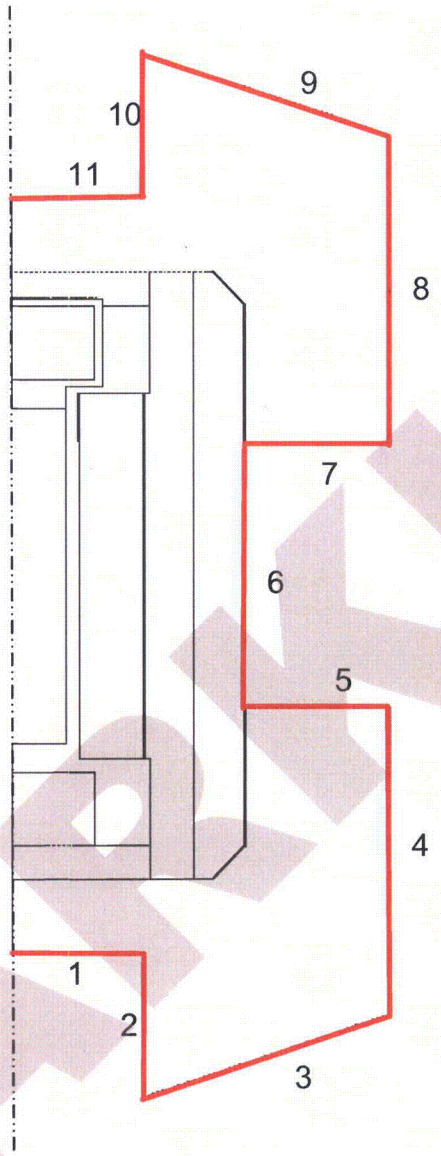
Treat surfaces as follows:

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

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Stainless Steel (SS304)

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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

MARKUP

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.

WATERMARK

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, ρ (lb/in.3)

$$\rho(T) \Big|_{70°F}^{1,000°F} = 0.29$$

Specific Heat, Cp (Btu/lb-°F)

$$Cp(T) = K(T)/\alpha(T)(\rho)$$

$$Cp(T) \Big|_{70°F}^{1,000°F} = K(T)/(6.1219 + 1.953 \times 10^{-3}\ T)$$

MARKUP

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.

10. Kreith, F., Principles of Heat Transfer, International Textbook Company, Pennsylvania, 2nd Ed., 1969, Table 5-2.

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.

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Tungsten Alloy

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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 --

DRAFT

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.

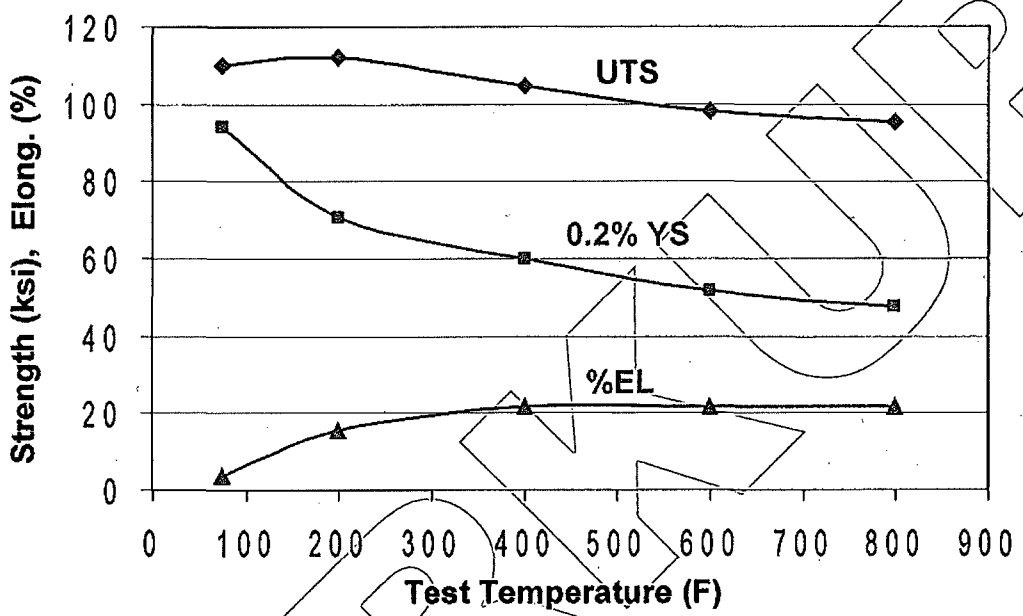


Figure 1. Graphical display of tensile property variation with test temperature.

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 Nom. (F)	Actual (C)	Diffusivity (mm^2/sec)	Specific Heat (J/(g-K))	Conductivity (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.

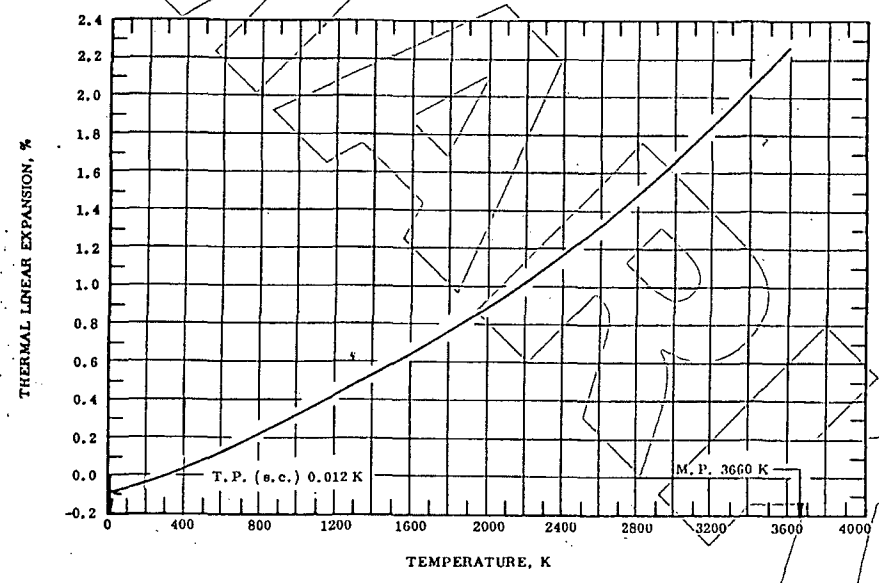
Conclusions

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

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:

$$\Delta L/L_0 = 4.266 \times 10^{-4} (T - 293) + 8.479 \times 10^{-8} (T - 293)^2 - 1.974 \times 10^{-11} (T - 293)^3 \qquad (293 < T < 1395)$$

$$\Delta L/L_0 = 0.548 + 5.416 \times 10^{-4} (T - 1395) + 1.952 \times 10^{-8} (T - 1395)^2 + 4.422 \times 10^{-11} (T - 1395)^3 \qquad (1395 < T < 2495)$$

$$\Delta L/L_0 = 1.226 + 7.451 \times 10^{-4} (T - 2495) + 1.654 \times 10^{-7} (T - 2495)^2 + 7.568 \times 10^{-12} (T - 2495)^3 \qquad (2495 < T < 3600)$$

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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.

MARK

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

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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) – not 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,

Steven G. Caldwell

Steven G. Caldwell, Ph.D.
R&D Director
ATI Firth Sterling
1297 County Line Road
Madison, AL 35756

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.

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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.

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General Plastics LAST-A-FOAM

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DESIGN GUIDE FOR USE OF

LAST-A-FOAM® FR-3700

FOR

CRASH & FIRE PROTECTION

OF

RADIOACTIVE MATERIAL SHIPPING CONTAINERS

MARKUP

GENERAL PLASTICS MANUFACTURING COMPANY
4910 BURLINGTON WAY/ P O BOX 9097 TACOMA, WA 98409
(253) 473-5000, FAX (253) 473-5104, EMAIL: ENGINEERING@GENERALPLASTICS.COM

Product Data

LAST-A-FOAM® FR-3700 is a HCFC-free, rigid, closed-cell, flame-retardant polyurethane foam available in densities ranging from 4 to 40 pounds per cubic foot. It exhibits a high strength-to-weight ratio due to its cellular structure and crosslinked resin. Also, because of its closed-cell structure, LAST-A-FOAM® FR-3700 has great resistance to water absorption, and will not swell, crack, or split on exposure to water. LAST-A-FOAM® is stable, inert, and is resistant to most chemicals and solvents. It is easily worked with common tools, and performs well as a primary or replacement material in a variety of applications.

Basic Properties

Table 1: Basic Physical Properties

Property	English/Metric	Test Method
Closed Cell Content	96.7%	ASTM D-2856 Procedure B
Water Absorption	< 85% by weight	ASTM D-2842
Glass Transition	279°F / 137°C	MDSC
Hardness, Shore-D	1.7812(D) + 0.37	ASTM D-2240
Tumbling Friability - loss %	$41.314 \times 2.7183^{-0.1873(D)}$	ASTM C-421 (20 min. @ 60 rpm)

Table 2: Basic Chemical Properties

Property	English/Metric	Test Method
Chemical Composition	Carbon (C) 50-70% Oxygen (O) 14-34% Nitrogen (N) 4-12% Hydrogen (H) 4-10% Phosphorous (P) 0-2% Silicon (Si) < 1% Chloride (Cl) < 1800 ppm Other < 1%	--
Leachable Chlorides	< 1 ppm	GP-TM9510

Table 3: Thermal Properties

Property	English	Metric	Test Method
Thermal Conductivity	BTU/hr-ft^2-°F/inch	W/m-K	ASTM C177 @75°F (24°C)
FR-3704	0.200	0.029	
FR-3706	0.205	0.030	
FR-3708	0.209	0.030	
FR-3710	0.213	0.031	
FR-3718	0.324	0.047	
FR-3720	0.349	0.050	
FR-3725	0.414	0.060	
Specific Heat @25°C	0.353 BTU/lb-°F	1.477 J/g°C	ASTM E-1269
Heat of Combustion	11,706 BTU/lb	27.17 MJ/Kg	ASTM D-240
Coefficient of Linear Thermal Expansion From -50°F to 200°F	3.5×10^{-5} in/in/°F to 5.0×10^{-5} in/in/°F	6.2×10^{-5} K^{-1} to 9.0×10^{-5} K^{-1}	ASTM C-518

The Federal Aviation Regulation (FAR) 25.853(a) App. F(a)(1)(I) flame test is commonly used to asses the relative burning characteristics of foam plastic materials under controlled laboratory conditions. The results of these tests performed on LAST-A-FOAM® are shown in Table 4.

Table 4: Typical FAR 25.853 flame test results

LAST-A-FOAM® Grade	FAR 25.835 12-second Ignition		FAR 25.835 60-second Ignition	
	Extinguish Time, Seconds	Burn Distance, inches (mm)	Extinguish Time, Seconds	Burn Distance, inches (mm)
FR-3704	0.5	5.7 (144.8)	0.7	5.6 (142.2)
FR-3706	3.0	5.2 (132.0)	0.8	5.4 (137.2)
FR-3710	2.5	3.8 (96.5)	-0-	4.6 (116.8)
FR-3718	6.1	2.7 (68.6)	-0-	4.5 (114.3)
FR-3720	5.5	2.9 (73.7)	-0-	4.7 (119.4)

The results of these test are not to be considered or used as fire hazard classifications, and are not intended or implied to reflect hazards presented by this or any other material in actual fire conditions.

In the above tests, a 0.5 inch x 3.0 inch x 12 inch (12.7 mm x 76.2 mm x 305 mm) long foam sample is mounted in a vertical position. The lower end is exposed to a 1.5 inch (38.1 mm) Bunsen burner flame for the described time. The time to flame extinguishment after removal of the flame and burned length of the sample are recorded.

Chemical Resistance

LAST-A-FOAM® products exhibit very good-to-excellent resistance to a wide range of chemicals and solvents. Common petroleum products such as oil or gasoline have a negligible affect on LAST-A-FOAM®. Exposure to liquid acids and bases, either in dilute or highly-concentrated forms, does not significantly deteriorate foam properties at normal room temperatures. Some chlorinated solvents will cause LAST-A-FOAM® to temporarily swell or soften on exposure, which can be useful in some production situations. If you need specific advice regarding chemical resistance, please contact us.

Bonding, Filling, and Sealing LAST-A-FOAM

LAST-A-FOAM® can be bonded, filled sealed and painted with a wide variety of commercially available finishing products. Our customers report greatest success with automotive and wood finishing materials, but the range of usable products is not limited to those types.

General Plastics Manufacturing Company has prepare a "Guide to Bonding, Filling, and Sealing LAST-A-FOAM® Products", available on request, to help with making appropriate finishing material selections. You should follow manufacturer's safety instructions when using any bonding, filling, or finishing product with LAST-A-FOAM®, and observe their recommended precautions.

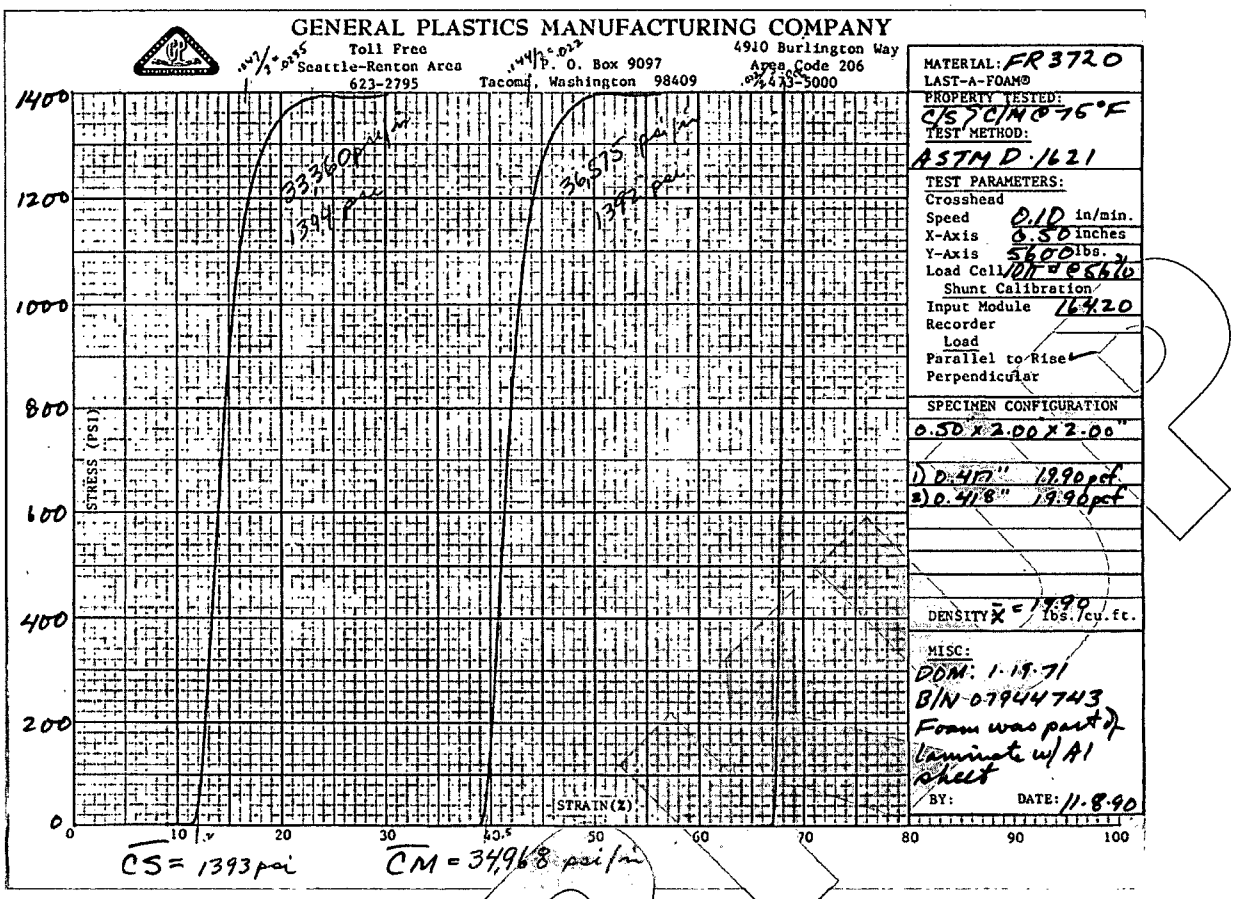

Figure 3: Long-Term Compressive Strength

Effect of Radiation

Cubic specimens (2.5 inch) LAST-A-FOAM® FR-3710 were submitted to the University of Michigan Phoenix Memorial Laboratory. The Specimens were irradiated in a Cobalt-60 Irradiator to a maximum cumulative dose of 2×10^8 rads (gamma). This dosage is representative of approximately 40 years of life in a field of 500 rads per hour. Discoloration was observed to increase with dosage but was not correlated with any change of physical properties. The compressive strength of the specimens was unaffected by the radiation as evidenced by the data shown in Table 5 and Table 6. (Test date: 1994)

Table 5: Average of five specimens at each dosage (results for individual tests available upon request)

Exposure	DENSITY lbs/ft^3	Stress(psi) @ % Crush							
		10%	20%	30%	40%	50%	60%	65%	70%
Control	10.78	352	359	382	426	508	686	851	1,121
2×10^7 rads	10.68	341	348	373	417	499	678	848	1,137
4.2×10^7 rads	10.58	328	336	360	405	488	666	835	1,122
7×10^7 rads	10.64	333	341	366	408	491	666	831	1,106
2×10^8 rads	10.76	347	356	380	422	507	682	844	1,112

Water Immersion

Using the same cubic samples from the radiation testing, LAST-A-FOAM® FR-3710 was shown to remain resistant to significant water absorption. The samples were placed in water at temperature of 125°F (52°C) and a pressure of 17.7 psig (122 kPa). As shown by the results presented in Table 6, water absorption occurs slowly, even considering the affects of radiation exposure. Resistance to water absorption is consistent with the close cell content of LAST-A-FOAM® FR-3700 of greater than 95%.

Table 6: Water Absorption as a function of time and Radiation Exposure

Time and Radiation Exposure	Density, lbs/ft^3	Before Submersion	After Submersion	Weight Gain, grams	% Gain By Volume, *
1 Day Immersion					
Non Irradiated	10.61	44.19	47.29	3.10	1.21
2.0 X 10^7 rads	10.72	44.72	48.47	3.75	1.46
4.2 X 10^7 rads	10.96	45.66	48.88	3.22	1.26
7.0 X 10^7 rads	10.64	44.66	48.67	4.01	1.57
10 Day Immersion				**Average-->**	**1.37**
Non Irradiated	10.80	44.73	50.12	5.39	2.11
2.0 X 10^7 rads	10.61	44.51	51.93	7.42	2.90
4.2 X 10^7 rads	10.62	44.62	52.85	8.23	3.21
7.0 X 10^7 rads	10.65	44.29	53.78	9.49	3.71
100 Day Immersion				**Average-->**	**2.98**
Non Irradiated	10.87	45.35	61.74	16.39	6.40
2.0 X 10^7 rads	10.59	44.3	66.30	22.00	8.59
4.2 X 10^7 rads	10.89	45.35	67.70	22.35	8.73
7.0 X 10^7 rads	10.62	44.44	69.26	24.82	9.69
156 Day Immersion				**Average-->**	**8.35**
Non Irradiated	10.67	44.22	65.12	20.90	8.16
2.0 X 10^7 rads	10.52	43.89	69.70	25.81	10.08
4.2 X 10^7 rads	10.73	44.66	72.06	27.40	10.70
7.0 X 10^7 rads	10.73	44.58	74.59	30.01	11.72
				Average-->	**10.17**

PRELIMINARY

Mechanical Properties

The data below are nominal values and appropriate tolerances should be considered when incorporating foam materials into static structural applications. Datasheet with values calculated may be found by following the link: LAST-A-FOAM® FR-3700 Datasheets.

CAUTION: When using metric units, you must convert the input variable, D (density), to English units (1 lb_m/ft^3 = 16.02 kg/m^3).

Property		Line of Best Fit Where 'D' is the foam density in lb_m/ft^3 (1 lb_m/ft^3 = 16.02 kg/m^3)		Test Method
		English (psi)	Metric (MPa)	
Compressive Strength				
Parallel to Rise				
	@75°F	$= 8.745\ (D)^{1.6154}$	$=0.0603\ (D)^{1.6154}$	ASTM D-1621
	@250°F	$= 4.537\ (D)^{1.6050}$	$=0.0313\ (D)^{1.6154}$	
Perpendicular to Rise				
	@75°F	$= 3.456\ (D)^{1.9178}$	$=0.0238\ (D)^{1.6154}$	ASTM D-1621
	@250°F	$= 2.966\ (D)^{1.7146}$	$=0.0205\ (D)^{1.6154}$	
Compressive Modulus				
Parallel to Rise	@75°F	$= 276.2\ (D)^{1.5413}$	$=1.9043\ (D)^{1.6154}$	ASTM D-1621
	@250°F	$= 144.0\ (D)^{1.6396}$	$=0.9928\ (D)^{1.6154}$	
Perpendicular to Rise	@75°F	$= 74.66\ (D)^{1.9995}$	$=0.5148\ (D)^{1.6154}$	ASTM D-1621
	@250°F	$= 93.03\ (D)^{1.7174}$	$=0.6414\ (D)^{1.6154}$	
Tensile Strength				
Parallel to Rise		$= 29.68\ (D)^{1.1496}$	$=0.2046\ (D)^{1.6154}$	ASTM D-1623 Type "A" Specimens
Perpendicular to Rise		$= 14.74\ (D)^{1.3852}$	$=0.1016\ (D)^{1.6154}$	
Tensile Modulus				
Parallel to Rise		$= 922.4\ (D)^{1.1817}$	$=6.3597\ (D)^{1.6154}$	ASTM D-1623 Type "B" Specimens
Perpendicular to Rise		$= 286.5\ (D)^{1.5324}$	$=1.9753\ (D)^{1.6154}$	
Shear Strength				
Parallel to Rise		$= 7.530\ (D)^{1.5433}$	$=0.0519\ (D)^{1.6154}$	ASTM C-273 Compression Shear
Perpendicular to Rise		$= 11.60\ (D)^{1.3754}$	$=0.0800(D)^{1.6154}$	
Shear Modulus				
Parallel to Rise		$= 40.53\ (D)^{1.8555}$	$=0.2794\ (D)^{1.6154}$	ASTM C-273 Compression Shear
Perpendicular to Rise		$= 133.0\ (D)^{1.4209}$	$=0.9170\ (D)^{1.6154}$	
Flexural Strength				
Parallel to Rise		$= 8.287\ (D)^{1.6660}$	$=0.0571\ (D)^{1.6154}$	ASTM D-790 Method 1-A
Perpendicular to Rise		$= 21.17\ (D)^{1.3614}$	$=0.1456\ (D)^{1.6154}$	
Flexural Modulus				
Parallel to Rise		$= 151.2\ (D)^{1.8084}$	$=1.0425\ (D)^{1.6154}$	ASTM D-790 Method 1-A
Perpendicular to Rise		$= 545.8\ (D)^{1.3628}$	$=3.7631\ (D)^{1.6154}$	

Table 7: Static Nominal Crush Strength, *Parallel* to Direction of Rise (see **Table 8** for *Perpendicular* to Rise)

For 4 to 10 lb_m/ft^3									
Temp	**Correlation Factors**	**Crush Strength, psi, Parallel to Direction of Rise**							
		10%	**20%**	**30%**	**40%**	**50%**	**60%**	**65%**	**70%**
-20°F	C_T	1.29	1.36	1.32	1.29	1.26	1.28	1.29	1.37
75°F	Y_{int}	**7.3058**	**6.7276**	**6.4961**	**6.9137**	**5.6711**	**5.3279**	**5.9871**	**6.2085**
	S	**1.6590**	**1.7021**	**1.7350**	**1.7255**	**1.8877**	**2.0431**	**2.0870**	**2.1868**
100°F	C_T	0.87	0.88	0.89	0.89	0.90	0.91	0.91	0.96
140°F	C_T	0.73	0.75	0.76	0.77	0.78	0.78	0.79	0.84
180°F	C_T	0.65	0.66	0.67	0.68	0.69	0.68	0.68	0.71
220°F	C_T	0.61	0.60	0.60	0.61	0.61	0.59	0.59	0.61
260°F	C_T	0.45	0.44	0.46	0.47	0.48	0.49	0.49	0.52

For 11 to 40 lb_m/ft^3									
Temp	**Correlation Factor**	**Crush Strength, psi, Parallel to Direction of Rise**							
		10%	**20%**	**30%**	**40%**	**50%**	**60%**	**65%**	**70%**
-20°F	C_T	1.35	1.33	1.32	1.31	1.31	1.30	1.28	1.26
75°F	Y_{int}	**4.3422**	**3.8755**	**3.5241**	**3.0307**	**3.0402**	**3.4889**	**5.8935**	**5.6055**
	S	**1.8809**	**1.9321**	**1.9872**	**2.0755**	**2.1451**	**2.2143**	**2.1041**	**2.2368**
100°F	C_T	0.86	0.87	0.88	0.88	0.89	0.90	0.90	0.97
140°F	C_T	0.72	0.74	0.75	0.75	0.75	0.76	0.76	0.81
180°F	C_T	0.62	0.63	0.65	0.65	0.65	0.65	0.64	0.68
220°F	C_T	0.56	0.56	0.57	0.57	0.56	0.54	0.54	0.57
260°F	C_T	0.40	0.40	0.41	0.42	0.41	0.43	0.43	0.47

The room temperature (75°F) foam crush strength is calculated at each %-Crush and is a function of density; $\sigma = Y_{int}(\rho)^S$, where Y_{int} and S are defined above, ρ is the nominal foam density in lb/ft^3, and σ in the resulting crush stress in psi at the indicated strain. The foam crush strength at temperatures other than 75°F is calculated at each %-Crush and is a function of the strength at 75°F; $\sigma = \sigma_{75°F} C_T$. General Plastics Mfg. Co. is re-investigating the correlations factors at temperatures above and below 75°F. Please contact us for more specific and detailed data, as needed.

Table 8: Static Nominal Crush Strength, *Perpendicular* to Direction of Rise (see **Table 7** for *Parallel* to Rise)

For 4 to 10 lb_m/ft^3									
Temp	**Correlation Factors (see below)**	**Crush Strength, psi, Perpendicular to Direction of Rise**							
		10%	**20%**	**30%**	**40%**	**50%**	**60%**	**65%**	**70%**
-20°F	C_T	1.32	1.35	1.34	1.32	1.32	1.33	1.34	1.36
75°F	Y_{int}	**6.3841**	**6.5943**	**6.1154**	**5.7722**	**5.3041**	**5.3181**	**5.7864**	**5.7701**
	S	**1.7182**	**1.6946**	**1.7403**	**1.8023**	**1.9054**	**2.0392**	**2.1002**	**2.2255**
100°F	C_T	0.85	0.87	0.88	0.89	0.90	0.91	0.91	0.92
140°F	C_T	0.75	0.77	0.78	0.79	0.79	0.79	0.79	0.80
180°F	C_T	0.63	0.66	0.68	0.69	0.69	0.70	0.69	0.70
220°F	C_T	0.59	0.59	0.60	0.61	0.60	0.60	0.59	0.60
260°F	C_T	0.45	0.45	0.47	0.48	0.48	0.48	0.48	0.48

For 11 to 40 lb_m/ft^3									
Temp	**Correlation Factors (see below)**	**Crush Strength, psi, Perpendicular to Direction of Rise**							
		10%	**20%**	**30%**	**40%**	**50%**	**60%**	**65%**	**70%**
-20°F	C_T	1.34	1.33	1.32	1.33	1.30	1.28	1.24	1.17
75°F	Y_{int}	**4.1342**	**3.5581**	**3.2664**	**2.8352**	**2.8988**	**3.3972**	**6.5439**	**5.6464**
	S	**1.8957**	**1.9593**	**2.0109**	**2.0955**	**2.1602**	**2.2242**	**2.0660**	**2.2321**
100°F	C_T	0.84	0.85	0.86	0.88	0.87	0.88	0.88	0.90
140°F	C_T	0.72	0.73	0.74	0.76	0.75	0.76	0.76	0.79
180°F	C_T	0.62	0.63	0.64	0.65	0.65	0.65	0.65	0.67
220°F	C_T	0.53	0.53	0.54	0.55	0.54	0.54	0.54	0.56
260°F	C_T	0.39	0.39	0.40	0.41	0.41	0.40	0.40	0.42

The room temperature (75°F) foam crush strength is calculated at each %-Crush and is a function of density; $\sigma = Y_{int}(\rho)^S$, where Y_{int} and S are defined above, ρ is the nominal foam density in lb/ft^3, and σ in the resulting crush stress in psi at the indicated strain. The foam crush strength at temperatures other than 75°F is calculated at each %-Crush and is a function of the strength at 75°F; $\sigma = \sigma_{75^\circ F} C_T$. General Plastics Mfg. Co. is re-investigating the correlations factors at temperatures above and below 75°F. Please contact us for more specific and detailed data, as needed.

Dynamic Crush Strength

The crush strength of LAST-A-FOAM®, like many materials, is modestly sensitive to strain rate. The static to dynamic adjustment shown in Table 9 is based on a significant testing program and included strain rates in the range of 30 sec^{-1} to 100 sec^{-1}. It is expected that the adjustment will provide good predictions of dynamic impact strength of FR-3700 for most Packaging design conditions. This information is intended to be a guide for designers of impact mitigating devices. The constitutive material models may be useful in targeting a foam density or rage for a particular application. However, each design should be thoroughly analyzed or tested to understand the implications of the complete design.

Table 9: Static to Dynamic Crush Strength Adjustment

Strain	10%	20%	30%	40%	50%	60%	65%	70%
Y_{int}	1.2971	1.4397	1.5181	1.3887	1.4419	1.4275	1.3871	1.4660
S	1.0330	1.0069	0.9941	1.0028	0.9912	0.9831	0.9910	0.9586

The dynamic crush strength is calculated at each %-strain and a function of the static crush strength at the same %-strain;

$$\sigma_{Dynamic} = y_{int}\left(\sigma_{Static}\right)^{S}.$$

CAUTION: Use only units of PSI for input σ_{Static} value.

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www.generalplastics.com
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Air Properties

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Air Properties

Properties from Incropera, Frank P., David P. DeWitt, *Fundamentals of Heat and Mass Transfer*, New York: John Wiley & Sons, Incorporated, 4th Ed., 1996.

Used modeling air gaps. Illustrations that follow show the Air gap locations (excerpt from Revision A of this report) and size of gap within the cask (dimensions included, Model AOS-165 provided as an example).

$$Gr = \frac{gS^3}{T\mu^2}\Delta T$$

This part is calculated for different temperatures.

Results shows for large range of ΔT,

$Gr < 2000 \quad \therefore N_u = 1$

$\therefore h_c = k/s \quad k_c = h_c S$

Radiation assuming T1 ~ T2 (temperature across gap)

$h_r = J * F * 4T^3$

F = 0.351 (refer to Paragraph 3.3.1.2, "Enclosed Air Space Property Sets," within this report)

$K_R = h_r S$

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Excerpt, *Fundamentals of Heat and Mass Transfer*, Table a.4, "Thermophysical Properties of Gases at Atmospheric Pressure," Page 839

TABLE A.4 Thermophysical Properties of Gases at Atmospheric Pressure[a]

T (K)	ρ (kg/m³)	c_p (kJ/kg · K)	$\mu \cdot 10^7$ (N · s/m²)	$\nu \cdot 10^6$ (m²/s)	$k \cdot 10^3$ (W/m · K)	$\alpha \cdot 10^6$ (m²/s)	Pr
Air							
100	3.5562	1.032	71.1	2.00	9.34	2.54	0.786
150	2.3364	1.012	103.4	4.426	13.8	5.84	0.758
200	1.7458	1.007	132.5	7.590	18.1	10.3	0.737
250	1.3947	1.006	159.6	11.44	22.3	15.9	0.720
300	1.1614	1.007	184.6	15.89	26.3	22.5	0.707
350	0.9950	1.009	208.2	20.92	30.0	29.9	0.700
400	0.8711	1.014	230.1	26.41	33.8	38.3	0.690
450	0.7740	1.021	250.7	32.39	37.3	47.2	0.686
500	0.6964	1.030	270.1	38.79	40.7	56.7	0.684
550	0.6329	1.040	288.4	45.57	43.9	66.7	0.683
600	0.5804	1.051	305.8	52.69	46.9	76.9	0.685
650	0.5356	1.063	322.5	60.21	49.7	87.3	0.690
700	0.4975	1.075	338.8	68.10	52.4	98.0	0.695
750	0.4643	1.087	354.6	76.37	54.9	109	0.702
800	0.4354	1.099	369.8	84.93	57.3	120	0.709
850	0.4097	1.110	384.3	93.80	59.6	131	0.716
900	0.3868	1.121	398.1	102.9	62.0	143	0.720
950	0.3666	1.131	411.3	112.2	64.3	155	0.723
1000	0.3482	1.141	424.4	121.9	66.7	168	0.726
1100	0.3166	1.159	449.0	141.8	71.5	195	0.728
1200	0.2902	1.175	473.0	162.9	76.3	224	0.728
1300	0.2679	1.189	496.0	185.1	82	238	0.719
1400	0.2488	1.207	530	213	91	303	0.703
1500	0.2322	1.230	557	240	100	350	0.685
1600	0.2177	1.248	584	268	106	390	0.688
1700	0.2049	1.267	611	298	113	435	0.685
1800	0.1935	1.286	637	329	120	482	0.683
1900	0.1833	1.307	663	362	128	534	0.677
2000	0.1741	1.337	689	396	137	589	0.672
2100	0.1658	1.372	715	431	147	646	0.667
2200	0.1582	1.417	740	468	160	714	0.655
2300	0.1513	1.478	766	506	175	783	0.647
2400	0.1448	1.558	792	547	196	869	0.630
2500	0.1389	1.665	818	589	222	960	0.613
3000	0.1135	2.726	955	841	486	1570	0.536
Ammonia (NH_3)							
300	0.6894	2.158	101.5	14.7	24.7	16.6	0.887
320	0.6448	2.170	109	16.9	27.2	19.4	0.870
340	0.6059	2.192	116.5	19.2	29.3	22.1	0.872
360	0.5716	2.221	124	21.7	31.6	24.9	0.872
380	0.5410	2.254	131	24.2	34.0	27.9	0.869

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.

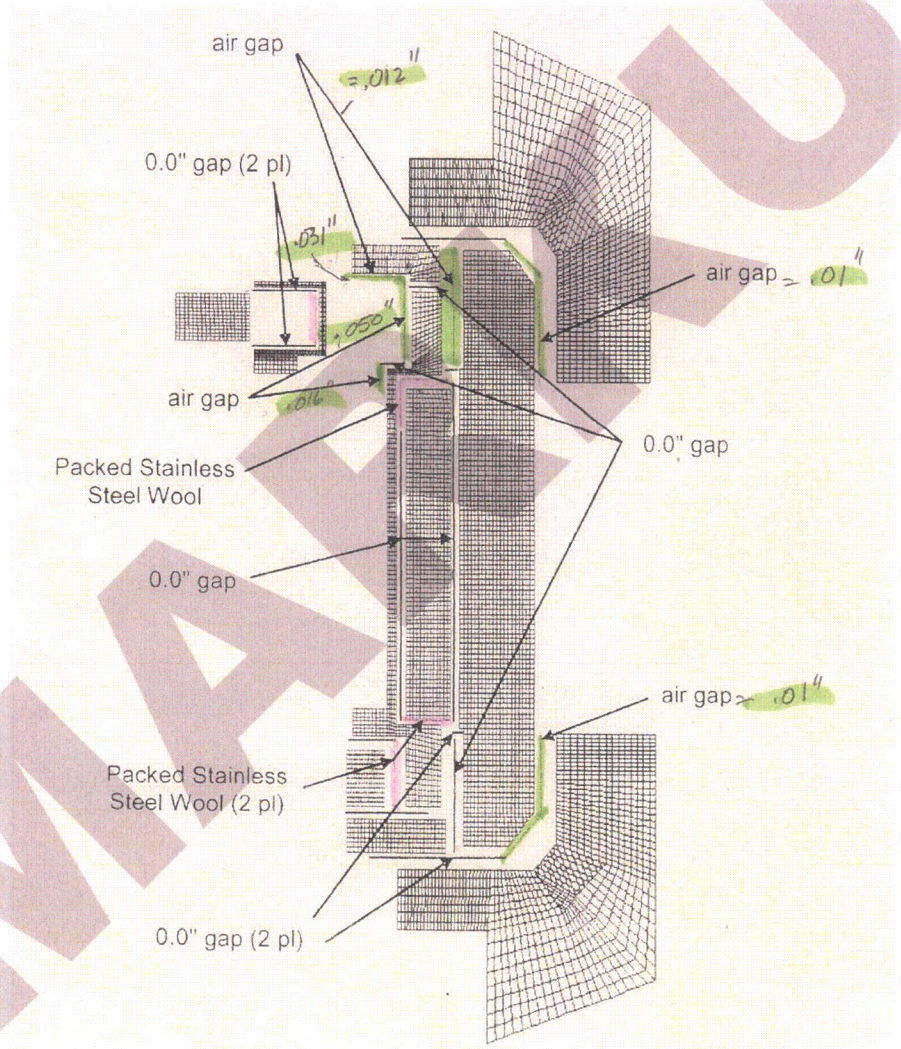

Figure 3-2. Expanded View of Thermal Model Defining Component Interfaces

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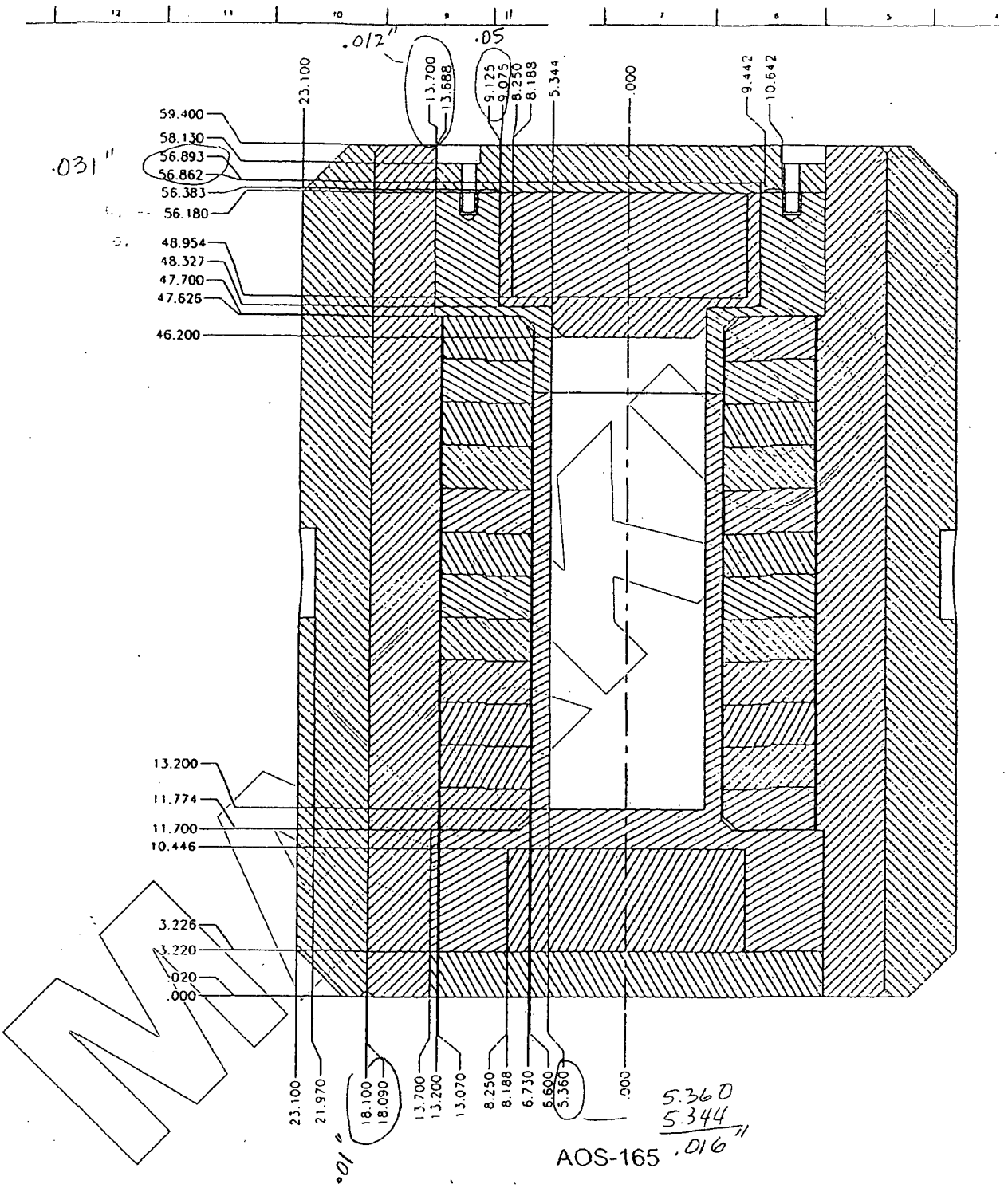
Size of Gap within Cask – Model AOS-165



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Port Seal

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Compound Data Sheet
Parker O-Ring Division United States

MATERIAL REPORT

REPORT NUMBER: KK2206
DATE: 06/19/96

TITLE: Evaluation of Parker Compound S1224-70 to ASTM D2000 7GE705 A19 B37 EA14 EO16 E036 F19 G11

PURPOSE: To determine if S1224-70 meets the callout.

CONCLUSION: Compound S1224-70 meets the ASTM D2000 callout.

Recommended temperature limits: -65^{0}F to 450^{0}F

Recommended For
Dry heat
Some petroleum oils
Moderate water resistance
Fire resistant hydraulic fluids (HFD-R and HFD-S)
Ozone, aging, and weather resistance
Low temperature

Not Recommended For
Ketones
Acids
Silicone oils
Auto and aircraft brake fluid

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Parker O-Ring Division
2360 Palumbo Drive
Lexington, Kentucky 40509
(859) 269-2351

Compound Data Sheet
Parker O-Ring Division United States

REPORT DATA

Report Number:	KK2206

	ASTM D2000 **7GE705 A19 B37 EA14 EO16 E036 F19 G11** Pass / Fail Limits	**S1224-70** Slab Results
Basic Physical Properties		
Hardness	70 +/- 5	69
Tensile Strength, psi min	725	1204
Elongation, % min	150	265
ASTM D573 Heat Aging, 70 HRS @ 225^{0}C		
Hardness Change, pts max	+10	+6
Tensile Change, % max	-25	-14
Elongation Change, % max	-30	-26
Compression Set ASTM D395, 22 HRS @ 347^{0}F, plies		
% of Original Deflection, max	30	23
Fluid Immersion, ASTM #1 Oil, 70 HRS @ 150^{0}C		
Hardness Change, pts	0 to -15	-9
Tensile Change, % max	-20	+10
Elongation Change, % max	-20	+3
Volume Change, %	0 to +15	+4
Fluid Immersion, ASTM #3 Oil, 70 HRS @ 302^{0}F		
Hardness Change, pts max	-40	-19
Volume Change, % max	+60	+35
Fluid Immersion ASTM D471 Water 70 HRS. @ 212^{0}F		
Hardness Change, pts. max.	+/-5	0
Volume Change, % max.	+/-5	0
Tear Resistance, ASTM D624, Die B		
kN/M, min	9	14
Low Temperature BrittlenessTest ASTM D2137, Method A 3 min. @ -55^{0}C	Pass	Pass

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Lid Seal

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HELICOFLEX®
Spring Energized Seals

PERFORMANCE DATA

Dimensions in inches

Jacket Material	HELIUM SEALING							BUBBLE SEALING				
	Cross Section	e_2	e_C	Y_2 lbs/inch	Y_1 lbs/inch	Pu68°F PSI	PuΘ392°F PSI	Y_2 lbs/inch	Y_1 lbs/inch	Pu68°F PSI	PuΘ392°F PSI	Max Temp °F
Aluminum	0.063	0.024	0.028	857	114	7250	N/A	514	114	5075	N/A	302
	0.075	0.028	0.033	914	114	7540	N/A	571	114	5800	N/A	302
	0.087	0.028	0.035	942	114	7685	N/A	600	114	5800	N/A	356
	0.098	0.028	0.035	999	114	7975	725	657	114	6090	725	428
	0.118	0.031	0.039	1056	143	7975	1450	742	114	6525	1450	482
	0.138	0.031	0.039	1085	143	7975	2030	799	114	6815	2030	482
	0.157	0.035	0.043	1142	143	8700	2465	857	114	7250	2465	536
	0.177	0.035	0.047	1199	143	8700	2900	914	114	7540	2900	536
	0.197	0.035	0.055	1256	171	9135	3190	971	143	7975	3190	572
	0.217	0.035	0.063	1313	171	9425	3480	1028	143	8265	3480	608
	0.236	0.039	0.071	1399	200	9715	3625	1113	171	8700	3625	644
	0.276	0.039	0.087	1542	228	10150	4060	1171	200	9425	4060	644
	0.315	0.039	0.102	1656	286	10440	4640	1285	228	9860	4495	680
							PuΘ482°F				PuΘ482°F	
Silver	0.063	0.020	0.024	1142	171	9425	N/A	857	171	5800	N/A	464
	0.075	0.024	0.028	1256	171	9425	N/A	857	171	5800	N/A	464
	0.087	0.024	0.031	1313	200	10150	N/A	914	171	5800	580	536
	0.098	0.028	0.035	1370	257	10875	1160	971	228	6525	725	536
	0.118	0.031	0.039	1485	286	12325	2030	1028	257	7250	1305	572
	0.138	0.031	0.039	1599	286	13775	3190	1085	257	7975	1885	572
	0.157	0.031	0.043	1713	314	15225	3915	1142	286	8700	2320	662
	0.177	0.031	0.043	1827	343	16675	4495	1256	286	10150	2755	698
	0.197	0.031	0.051	1941	343	18125	5220	1313	286	11600	3190	698
	0.217	0.031	0.055	2056	371	19575	5800	1428	343	13050	3625	752
	0.236	0.035	0.067	2284	400	21750	6815	1542	343	15950	4350	842
	0.276	0.035	0.079	2512	457	23200	7830	1713	371	18125	5220	842
	0.315	0.035	0.094	2798	514	24650	8700	1999	400	20300	6090	932
							PuΘ572°F				PuΘ572°F	
Copper, Soft Iron, Mild Steels and Annealed Nickel	0.063	0.020	0.024	1485	228	7250	1450	1085	171	5075	725	662
	0.075	0.024	0.028	1599	286	7250	1595	1142	228	5075	870	662
	0.087	0.024	0.031	1713	343	7975	1885	1256	286	5075	1160	680
	0.098	0.028	0.035	1827	400	8700	2465	1313	343	5800	1450	716
	0.118	0.028	0.039	1999	457	9425	2900	1428	400	5800	1740	716
	0.138	0.028	0.039	2227	457	10150	3335	1542	400	6525	2175	752
	0.157	0.031	0.043	2455	514	10150	3915	1656	457	6525	2465	788
	0.177	0.031	0.043	2684	571	11600	4350	1827	457	6525	2755	842
	0.197	0.031	0.051	2912	628	12325	4785	1884	514	7250	3045	842
	0.217	0.031	0.055	3141	685	13050	5220	2056	571	7250	3335	896
	0.236	0.035	0.067	3597	799	13775	5800	2284	571	7975	3770	968
	0.276	0.035	0.079	4225	914	14500	6525	2627	628	8700	4205	968
	0.315	0.035	0.094	4911	1085	15950	7105	3026	742	9425	4640	1022
							PuΘ662°F				PuΘ662°F	
Nickel, Monel, Tantalum	0.063	0.016	0.020	1827	457	10150	1595	1142	343	5800	1015	716
	0.075	0.020	0.024	1999	457	10440	2320	1256	343	6090	1305	716
	0.087	0.020	0.028	2227	514	11020	3045	1313	400	6380	1740	788
	0.098	0.024	0.031	2512	571	11890	3915	1542	400	6815	2320	842
	0.118	0.024	0.035	2512	628	12615	4930	1713	457	7250	2900	896
	0.138	0.024	0.035	2798	685	13485	5800	1941	514	7830	3335	932
	0.157	0.028	0.039	3312	799	13920	6525	2170	571	8265	3915	1022
	0.177	0.028	0.039	4111	857	15225	7540	2398	628	8700	4350	1112
	0.197	0.028	0.043	4454	1028	15950	8265	2627	628	9425	4785	1202
	0.217	0.028	0.051	4625	1142	16675	8990	2855	685	9715	5365	1202
	0.236	0.031	0.063	N/A	N/A	N/A	N/A	3198	742	10440	5945	1202
	0.276	0.031	0.071	N/A	N/A	N/A	N/A	3712	857	11310	6525	1202
	0.315	0.031	0.083	N/A	N/A	N/A	N/A	4168	914	12035	7250	1202
							PuΘ752°F				PuΘ752°F	
Stainless Steel, Inconel, Titanium	0.063	0.016	0.020	1999	571	13050	3625	1713	457	6815	870	788
	0.075	0.020	0.024	2284	571	13195	3915	1827	457	7250	1160	788
	0.087	0.020	0.028	2570	628	13340	4205	1999	514	7540	1595	896
	0.098	0.024	0.031	2855	685	14065	4640	2170	571	8265	2175	932
	0.118	0.024	0.035	3283	742	14500	5220	2427	628	8990	2900	932
	0.138	0.024	0.035	3769	857	15080	5655	2684	742	9715	3625	1022
	0.157	0.028	0.039	4283	971	15515	6090	2969	857	10440	4350	1112
	0.177	0.028	0.039	4711	1256	15950	6525	3198	1028	11165	4930	1202
	0.197	0.028	0.043	N/A	N/A	N/A	N/A	3426	1085	11890	5365	1292
	0.217	0.028	0.051	N/A	N/A	N/A	N/A	3712	1142	12615	6090	1292
	0.236	0.031	0.063	N/A	N/A	N/A	N/A	4111	1256	13630	6815	1292
	0.276	0.031	0.071	N/A	N/A	N/A	N/A	4568	1485	14790	7540	1292
	0.315	0.031	0.083	N/A	N/A	N/A	N/A	5139	1656	15660	8410	1292

HELICOFLEX®
Spring Energized Seals

SEAL AND GROOVE DIMENSIONS

Dimensions in inches

Jacket Material	SEAL: Free Height	SEAL: Installation Compression e2	SEAL: Seal Diameter Range	GROOVE: Pressure < 300psi Diametrical Clearance X	GROOVE: Pressure ≥ 300psi Diametrical Clearance X	GROOVE: Groove Depth F	GROOVE: Groove Width (Min.) G	GROOVE: Groove Finish RMS
Aluminum	0.063	0.024	0.500 to 4.000	0.024	0.012	0.039 +/- 0.003	0.111	32-125 Contact Applications Engineering for Recommendation
	0.075	0.028	0.625 to 6.000	0.028	0.012	0.047 +/- 0.003	0.131	
	0.087	0.028	0.750 to 10.000	0.028	0.012	0.059 +/- 0.003	0.143	
	0.098	0.028	0.875 to 15.000	0.028	0.012	0.070 +/- 0.003	0.154	
	0.118	0.031	1.000 to 20.000	0.031	0.012	0.087 +/- 0.004	0.180	
	0.138	0.031	1.250 to 25.000	0.031	0.020	0.107 +/- 0.004	0.200	
	0.157	0.035	1.750 to 30.000	0.035	0.020	0.122 +/- 0.004	0.227	
	0.177	0.035	2.000 to 40.000	0.035	0.020	0.142 +/- 0.004	0.247	
	0.197	0.035	3.000 to 50.000	0.035	0.020	0.162 +/- 0.004	0.267	
	0.217	0.035	4.000 to 50.000 +	0.035	0.020	0.182 +/- 0.004	0.287	
	0.236	0.039	5.000 to 50.000 +	0.039	0.020	0.197 +/- 0.005	0.314	
	0.276	0.039	6.000 to 50.000 +	0.039	0.028	0.237 +/- 0.005	0.354	
	0.315	0.039	8.000 to 50.000 +	0.039	0.028	0.276 +/- 0.005	0.393	
Silver	0.063	0.020	0.500 to 4.000	0.020	0.012	0.043 +/- 0.002	0.103	63-125 Contact Applications Engineering for Recommendation
	0.075	0.024	0.625 to 6.000	0.024	0.012	0.051 +/- 0.003	0.123	
	0.087	0.024	0.750 to 10.000	0.024	0.012	0.063 +/- 0.003	0.135	
	0.098	0.028	0.875 to 15.000	0.028	0.012	0.070 +/- 0.003	0.154	
	0.118	0.031	1.000 to 20.000	0.031	0.012	0.087 +/- 0.004	0.180	
	0.138	0.031	1.250 to 25.000	0.031	0.020	0.107 +/- 0.004	0.200	
	0.157	0.031	1.750 to 30.000	0.031	0.020	0.126 +/- 0.004	0.219	
	0.177	0.031	2.000 to 40.000	0.031	0.020	0.146 +/- 0.004	0.239	
	0.197	0.031	3.000 to 50.000	0.031	0.020	0.166 +/- 0.004	0.259	
	0.217	0.031	4.000 to 50.000 +	0.031	0.020	0.186 +/- 0.004	0.279	
	0.236	0.035	5.000 to 50.000 +	0.035	0.020	0.201 +/- 0.004	0.306	
	0.276	0.035	6.000 to 50.000 +	0.035	0.028	0.241 +/- 0.004	0.346	
	0.315	0.035	8.000 to 50.000 +	0.035	0.028	0.280 +/- 0.004	0.385	
Copper, Soft Iron, Mild Steels and Annealed Nickel	0.063	0.020	0.500 to 4.000	0.020	0.012	0.043 +/- 0.002	0.103	63-125 Contact Applications Engineering for Recommendation
	0.075	0.024	0.625 to 6.000	0.024	0.012	0.051 +/- 0.003	0.123	
	0.087	0.024	0.750 to 10.000	0.024	0.012	0.063 +/- 0.003	0.135	
	0.098	0.028	0.875 to 15.000	0.028	0.012	0.070 +/- 0.003	0.154	
	0.118	0.028	1.000 to 20.000	0.028	0.012	0.090 +/- 0.003	0.174	
	0.138	0.028	1.250 to 25.000	0.028	0.020	0.110 +/- 0.003	0.194	
	0.157	0.031	1.750 to 30.000	0.031	0.020	0.126 +/- 0.004	0.219	
	0.177	0.031	2.000 to 40.000	0.031	0.020	0.146 +/- 0.004	0.239	
	0.197	0.031	3.000 to 50.000	0.031	0.020	0.166 +/- 0.004	0.259	
	0.217	0.031	4.000 to 50.000 +	0.031	0.020	0.186 +/- 0.004	0.279	
	0.236	0.035	5.000 to 50.000 +	0.035	0.020	0.201 +/- 0.004	0.306	
	0.276	0.035	6.000 to 50.000 +	0.035	0.028	0.241 +/- 0.004	0.346	
	0.315	0.035	8.000 to 50.000 +	0.035	0.028	0.280 +/- 0.004	0.385	
Nickel, Monel, Tantalum	0.063	0.016	0.500 to 4.000	0.016	0.012	0.047 +/- 0.002	0.095	32-63 Contact Applications Engineering for Recommendation
	0.075	0.020	0.625 to 6.000	0.020	0.012	0.055 +/- 0.002	0.115	
	0.087	0.020	0.750 to 10.000	0.020	0.012	0.067 +/- 0.002	0.127	
	0.098	0.024	0.875 to 15.000	0.024	0.012	0.074 +/- 0.003	0.146	
	0.118	0.024	1.000 to 20.000	0.024	0.012	0.094 +/- 0.003	0.166	
	0.138	0.024	1.250 to 25.000	0.024	0.020	0.114 +/- 0.003	0.186	
	0.157	0.028	1.750 to 30.000	0.028	0.020	0.129 +/- 0.003	0.213	
	0.177	0.028	2.000 to 40.000	0.028	0.020	0.149 +/- 0.003	0.233	
	0.197	0.028	3.000 to 50.000	0.028	0.020	0.169 +/- 0.003	0.253	
	0.217	0.028	4.000 to 50.000 +	0.028	0.020	0.189 +/- 0.003	0.273	
	0.236	0.031	5.000 to 50.000 +	0.031	0.020	0.205 +/- 0.004	0.298	
	0.276	0.031	6.000 to 50.000 +	0.031	0.028	0.245 +/- 0.004	0.338	
	0.315	0.031	8.000 to 50.000 +	0.031	0.028	0.284 +/- 0.004	0.377	
Stainless Steel, Inconel, Titanium	0.063	0.016	0.500 to 4.000	0.016	0.012	0.047 +/- 0.002	0.095	32-63 Contact Applications Engineering for Recommendation
	0.075	0.020	0.625 to 6.000	0.020	0.012	0.055 +/- 0.002	0.115	
	0.087	0.020	0.750 to 10.000	0.020	0.012	0.067 +/- 0.002	0.127	
	0.098	0.024	0.875 to 15.000	0.024	0.012	0.074 +/- 0.003	0.146	
	0.118	0.024	1.000 to 20.000	0.024	0.012	0.094 +/- 0.003	0.166	
	0.138	0.024	1.250 to 25.000	0.024	0.020	0.114 +/- 0.003	0.186	
	0.157	0.028	1.750 to 30.000	0.028	0.020	0.129 +/- 0.003	0.213	
	0.177	0.028	2.000 to 40.000	0.028	0.020	0.149 +/- 0.003	0.233	
	0.197	0.028	3.000 to 50.000	0.028	0.020	0.169 +/- 0.003	0.253	
	0.217	0.028	4.000 to 50.000 +	0.028	0.020	0.189 +/- 0.003	0.273	
	0.236	0.031	5.000 to 50.000 +	0.031	0.020	0.205 +/- 0.004	0.298	
	0.276	0.031	6.000 to 50.000 +	0.031	0.028	0.245 +/- 0.004	0.338	
	0.315	0.031	8.000 to 50.000 +	0.031	0.028	0.284 +/- 0.004	0.377	

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2.10.8 Data CDs

All thermal input/output files, as well as all Autodesk Inventor files, are attached on the Compact Discs (CDs), as listed below:

- **CDs 1, 2, and 3** – All analytical files, including the LIBRA FE program
- **CD 4** – Autodesk Inventor files

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