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AOS Radioactive Material Transport Packaging System

Safety Analysis Report

for Model AOS-025, AOS-050, AOS-100, and AOS-165 Transport Packages

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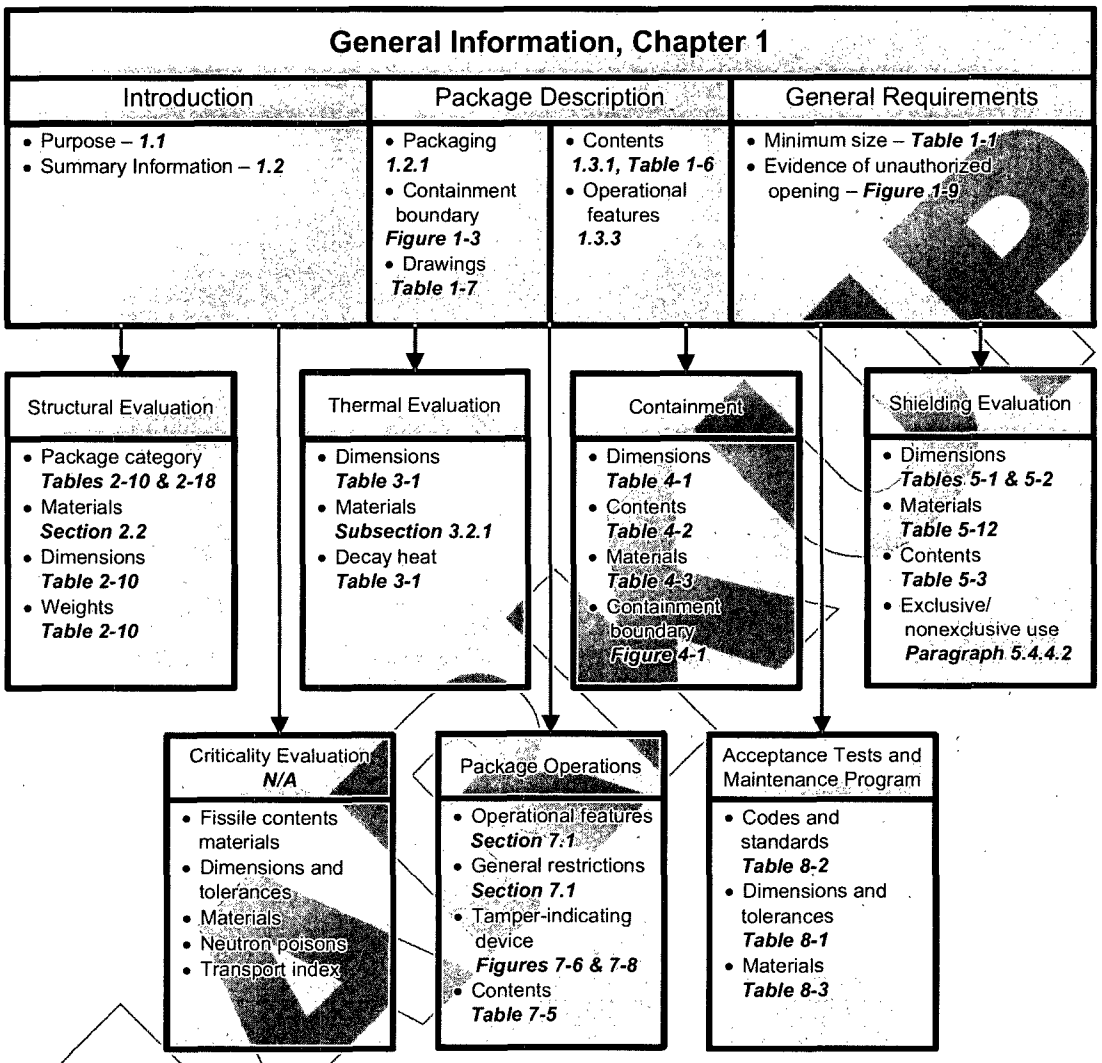
1 GENERAL INFORMATION



1.1 INTRODUCTION

Note: *Unless indicated otherwise, all information related to the Model AOS-100A is also applicable to the Model AOS-100A-S.*

This Safety Analysis Report (SAR) describes and evaluates the Alpha-Omega Services, Inc. (AOS), Radioactive Material Transport System (AOS Transport Packaging System). This SAR supports the AOS application for licensing a new packaging design for the transportation of radioactive activated materials, in solid form, in "Normal" or "Special" form encapsulation, in quantities based upon the decay heat of the material or package shielding characteristics.

AOS contracted with General Electric (GE) Hitachi Nuclear Energy, to develop and license a family of radioactive material transport packaging to convey in "Normal" and "Special" forms, Type B quantities of activated materials. The product family encompasses a group of transport packaging that is scaled up or down from a basic design, the Model AOS-100 transport package. Figure 1-1 presents an isometric view of the Model AOS-100A/AOS-100A-S packaging. In addition, there are variations, such as shielding materials, size and number of bolts, foam density, and seal materials. Only the cask structure is a true scale of the basic design, with minor variations to accommodate the standard size of components or features in the different scaled versions.

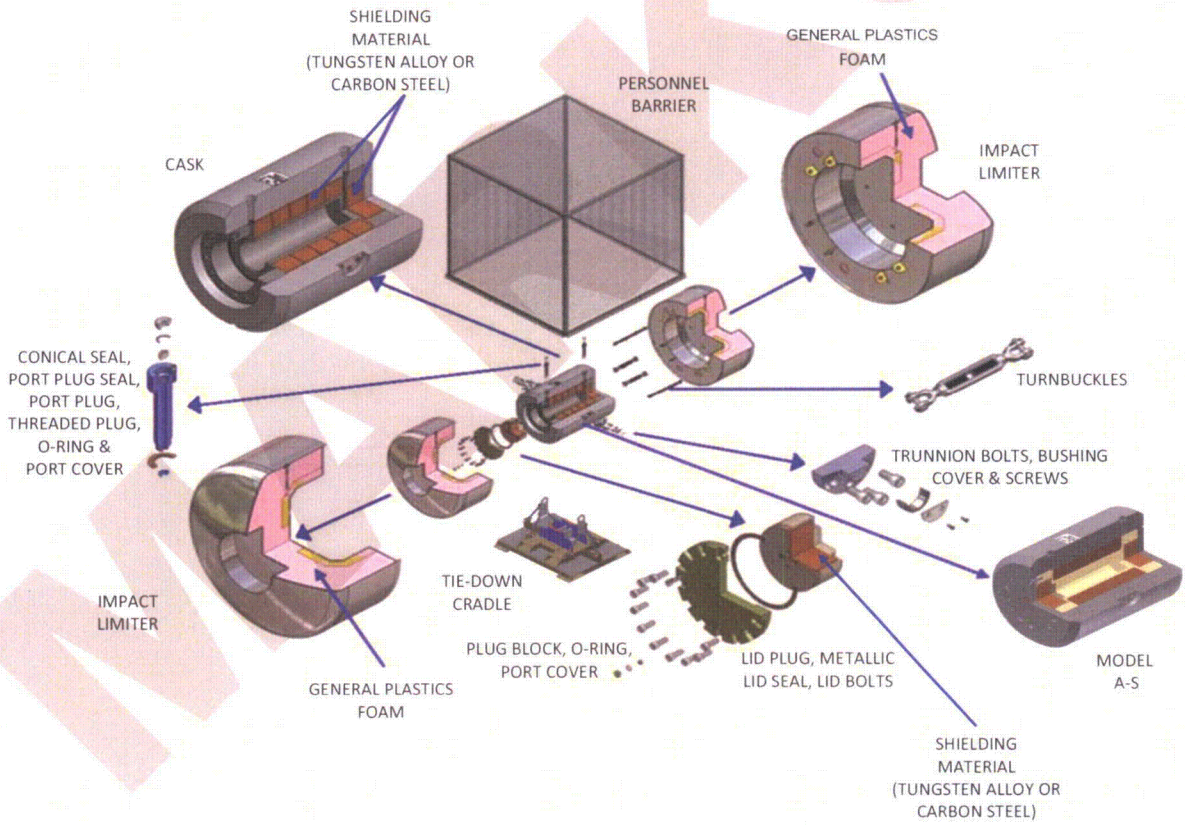


Figure 1-1. Transport Package, Isometric View – Models AOS-100A and AOS-100A-S

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This SAR documents four (4) model sizes – 025, 050, 100, and 165 – with variations of shielding materials (tungsten alloy or carbon steel) and a double-ended feature (access to the cavity area from both ends) on the Model AOS-100A-S. Another variation is that the Model AOS-025 transport package's cask is entirely enclosed by the impact limiter structure, while in all other models, the impact limiter only partially covers the cask.

Table 1-1 presents a summary of the AOS Transport Packaging System. The model nomenclature is as follows:

AOS-XXXY-Z

where:

XXX represents the scaled value from the basic design, Model AOS-100:

- Model AOS-025 is 25% of the size of the Model AOS-100
- Model AOS-050 is 50% of the size of the Model AOS-100
- Model AOS-165 is 65% greater in size than the Model AOS-100

Y is either "A" for tungsten alloy, or "B" for carbon steel, shielding (B applies only to Models AOS-100B and AOS-165B)

Z is "S" to identify the particular packaging as double-ended and that there is a lid on each end of the cask (S applies only to the Model AOS-100A-S)

Calculations, engineering logic, and all related documents, which demonstrate compliance with *10 CFR 71* **[1.1]** and *IAEA TS-R-1* **[1.2]** regulations, are presented in subsequent chapters of this report.

The AOS Transport Packaging System's design, fabrication, and operation conform to the *AOS Quality Assurance Program, PR9000* **[1.3]**. The U.S. Nuclear Regulatory Commission (NRC), in compliance with Reference **[1.3]**, Subpart H, has approved *AOS PR9000*, under Docket No. 71-0086.

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Table 1-1. AOS Transport Packaging System Dimensions and Cg Location – All Models

Model	Category	Dimensions (cm / in.)						Packaging Weight[a] (kg / lbs.)	Cg Location[b]		
		Packaging		Cask		Cavity					
		OD	Height	OD	Height	OD	Height		X	Y	Z
AOS-025A	III	28.96	39.62	17.78	22.86	4.14	12.70	71.4	19.05	19.05	26.34
		11.40	15.60	7.00	9.00	1.63	5.00	157	7.50	7.51	10.37
AOS-050A	III	57.96	79.25	35.56	45.72	8.26	25.40	511	41.91	41.91	46.28
		22.82	31.20	14.00	18.00	3.25	10.00	1,126	16.50	16.50	18.22
AOS-100A	II	115.93	158.50	71.12	91.44	16.51	50.80	3,950	91.44	89.15	80.03
		45.64	62.40	28.00	36.00	6.50	20.00	8,700	36.00	35.10	31.51
AOS-100B	III	115.93	158.50	71.12	91.44	16.51	50.80	3,232	91.44	89.15	80.03
		45.64	62.40	28.00	36.00	6.50	20.00	7,125	36.00	35.10	31.51
AOS-100A-S	II	115.93	158.50	71.12	91.44	16.51	50.80	3,901	91.44	89.15	80.03
		45.64	62.40	28.00	36.00	6.50	20.00	8,600	36.00	35.10	31.51
AOS-165A	I	191.26	264.16	117.35	150.88	27.23	83.82	18,234	152.40	121.41	121.92
		75.30	104.00	46.20	59.40	10.72	33.00	40,200	60.00	47.80	48.00
AOS-165B	I	191.26	264.16	117.35	150.88	27.23	83.82	15,535	152.40	121.41	121.92
		75.30	104.00	46.20	59.40	10.72	33.00	34,250	60.00	47.80	48.00

a. All AOS Transport Packaging System models have dimensions greater than 10 cm (4 in.).

b. Refer to Figure 1-2.

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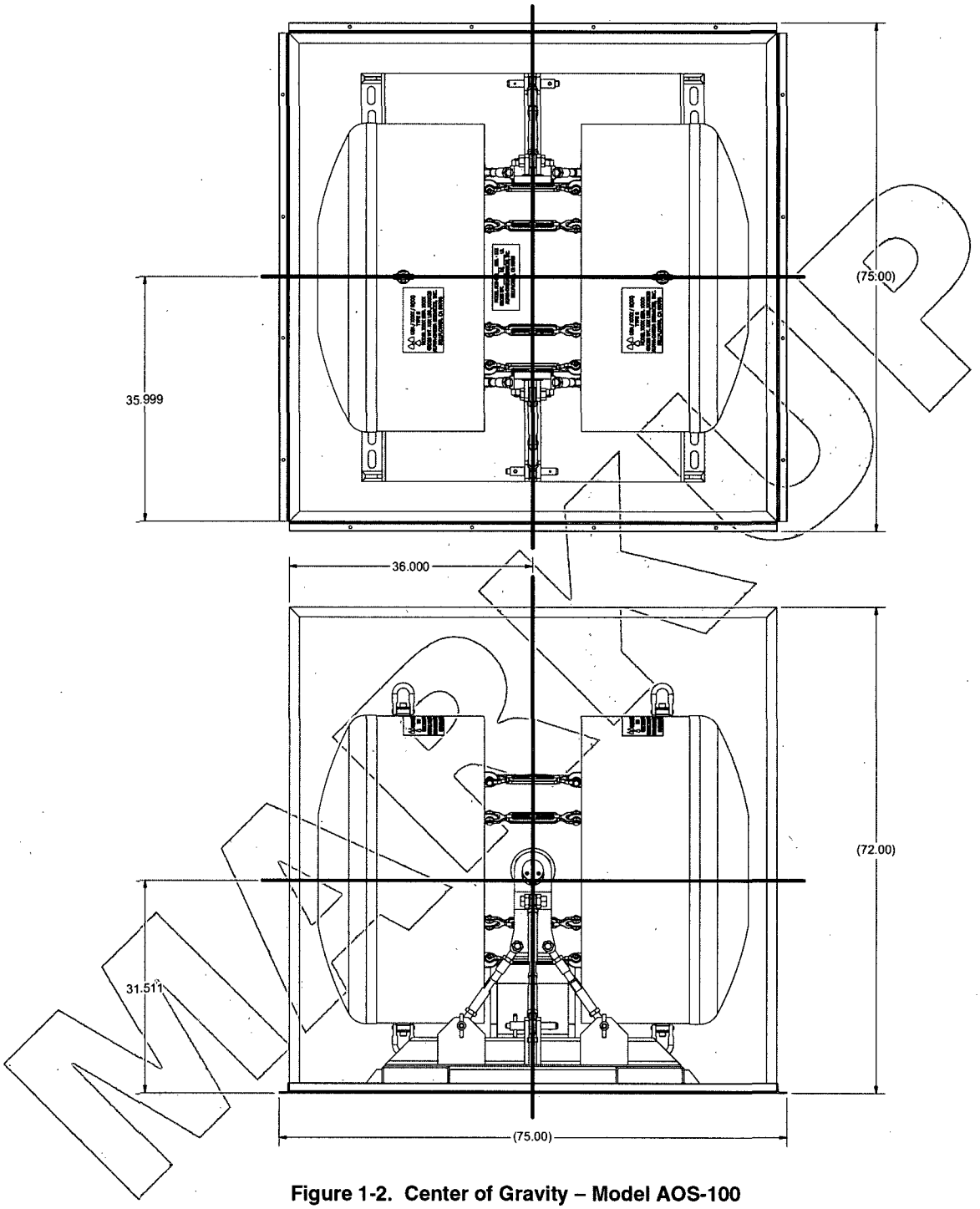

Figure 1-2. Center of Gravity – Model AOS-100

Note: *The dimensions (in inches) shown are for the Model AOS-100; however, the Cg locations are the same for all transport packaging system models.*

1.2 PACKAGE DESCRIPTION

1.2.1 Packaging

Each AOS transport package consists of three (3) main components:

- Cask
- Overpack (Impact Limiter)
- Lid Seal

The cask component is made of 300 series stainless steel (SS300) material. Tungsten alloy or carbon steel materials are embedded within the cask body and lid plug cask components, to enhance the cask assembly's shielding capability. Aided by the seal, the cask also provides containment to the radioactive material content. The impact limiters attach to one another by eight (8) turnbuckles, covering each end of the cask. These packaging components, constructed of 300 series stainless steel (SS300) thin shell filled with polyurethane foam, mitigate the mechanical and thermal loads generated during Normal and Hypothetical Accident conditions of transport.

All transport package models use a metallic, double "C" cross-section seal in the lid joint.

The Transport Packaging System is designed such that the content heat will be dissipated throughout the system, in a natural manner. There is no other means of cooling (such as a liquid tank) in the design.

Each main component is described, in detail, in the following paragraphs.

In addition to these three main components, other components are also used, to enhance or support operational design functions (refer to Section 1.2.1.4):

- Liners and plates, to add shielding capability;
- Shipping cradle or pallet, to support the package during transportation;
- Tie-down devices, either straps or turnbuckles, are used to tie down the packages during transport; and
- Personnel barriers, which enclose the package during transportation, to provide a barrier between the public and the package.

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1.2.1.1 Cask

The cask is a cylindrical structure with a cavity to contain its payload. The cask structure is composed of seven (7) major components:

- Outside shell
- Cavity cylinder
- Shielding cylinder
- Shielding plugs
- Cask bottom plate
- Lid
- Lid plug

The outside shell and cavity cylinder interlock to encase the shielding cylinder, which is a component made of tungsten alloy or carbon steel. A weldment attaches the upper portion of the cavity cylinder, with its lower portion encasing the shielding cylinder.

The function of the shielding cylinder and plugs is to enhance the shielding characteristics of the cask. To provide shielding in the axial direction, the lid plug is placed in the open end of the cavity. At the cavity's closed end, the shielding plug is encased between the cavity bottom wall and cask bottom plate. The shielding plug encased on the lid plug is of the same size and material (tungsten-alloy or carbon steel) as the one encased at the bottom of the cask.

The lid consists of a flat disk, with recessed areas concentric with the bolt holes on the top surface. This feature is to protect the bolts from impact loads. The groove on the bottom surface of the lid houses the seal, as well as a central recess to accommodate the lid plug component.

Additional cask assembly components are lid bolts and port plugs with their threaded pipe plugs, O-Ring seals, and port plug covers.

Both the lid and the cask bottom plate are located below the surface of the cask's outside shell, for protection during impact events. Figure 1-3 presents an isometric view of the Model AOS-100A cask.

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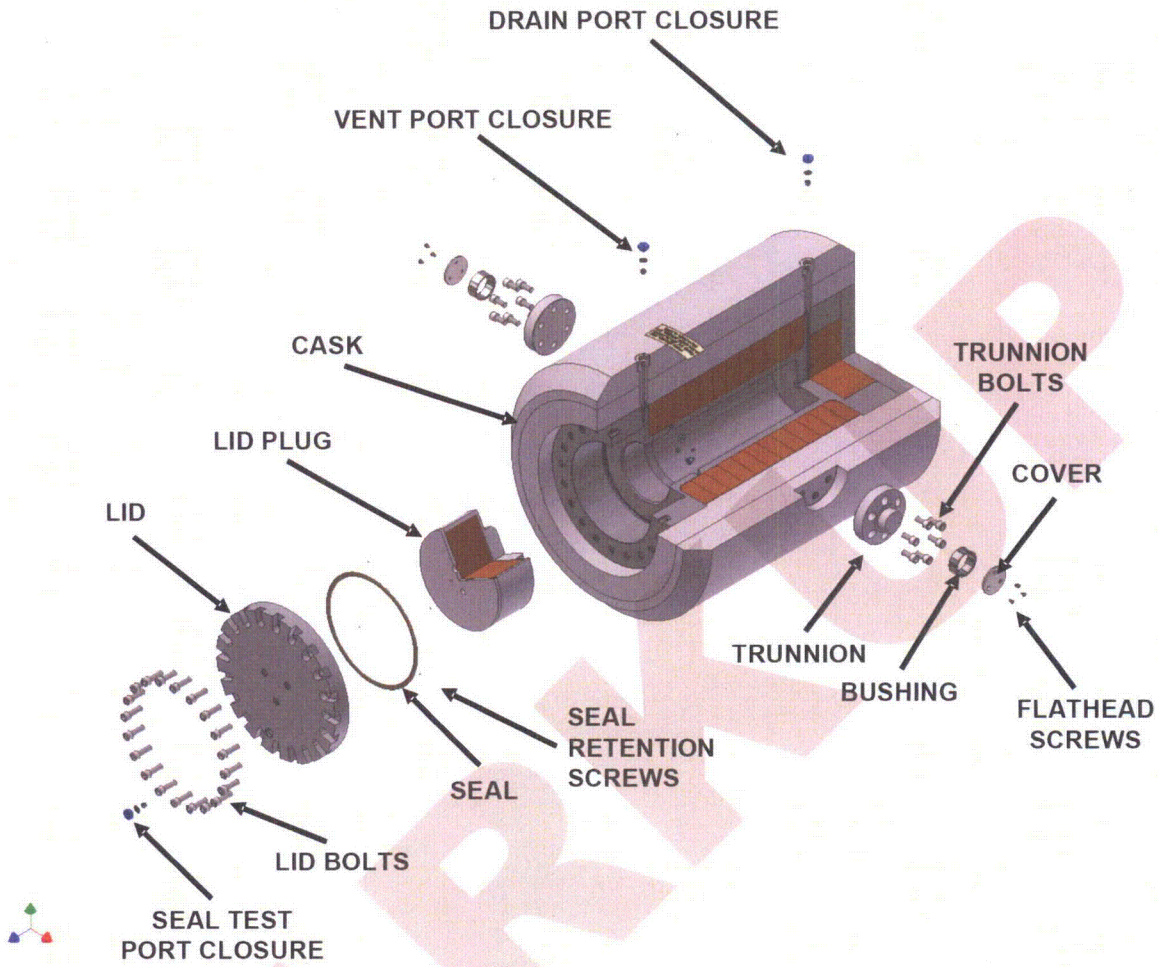

Figure 1-3. Typical Cask, Isometric View – Model AOS-100A

MARKUP

Containment for the AOS Transport Packaging System (containment boundary) is provided within the cask component. The dashed lines in Figure 1-4 illustrate the containment boundary, typical to all models. (For further details, refer to Chapter 4, "Containment.")

There are two (2) penetrations into the cask cavity, located in the cask's top and bottom regions of the side surface. These cavity penetrations are used to drain and vent the cavity. The third penetration, located in the lid, is used for testing the seal's leak tightness.

To augment the shielding characteristics of the AOS Transport Packaging System, Models AOS-025A, AOS-100A, AOS-100A-S, and AOS-165B require the use of a liner or plate, to convey certain quantities of radioactive materials. Illustrations of these liners/plates are provided in Appendix 1.4. To meet temperature and dose rate regulation requirements, a personnel barrier structure (refer to Section 1.2.1.4) can be added to the package assembly for certain types of shipments. Figure 1-5 through Figure 1-8 provide isometric views of each model's packaging (Model AOS-025A, AOS-050A, AOS-100A/AOS-100A-S, and AOS-165A, respectively).

The AOS Transport Packaging System design does not require specific arrangement of the contents, other than those previously discussed, within the cavity for thermal, shielding, and/or criticality performance. However, baskets or racks can be used to shore the payload. These baskets or racks are typically made of aluminum or stainless steel material, and designed for the payload geometry.

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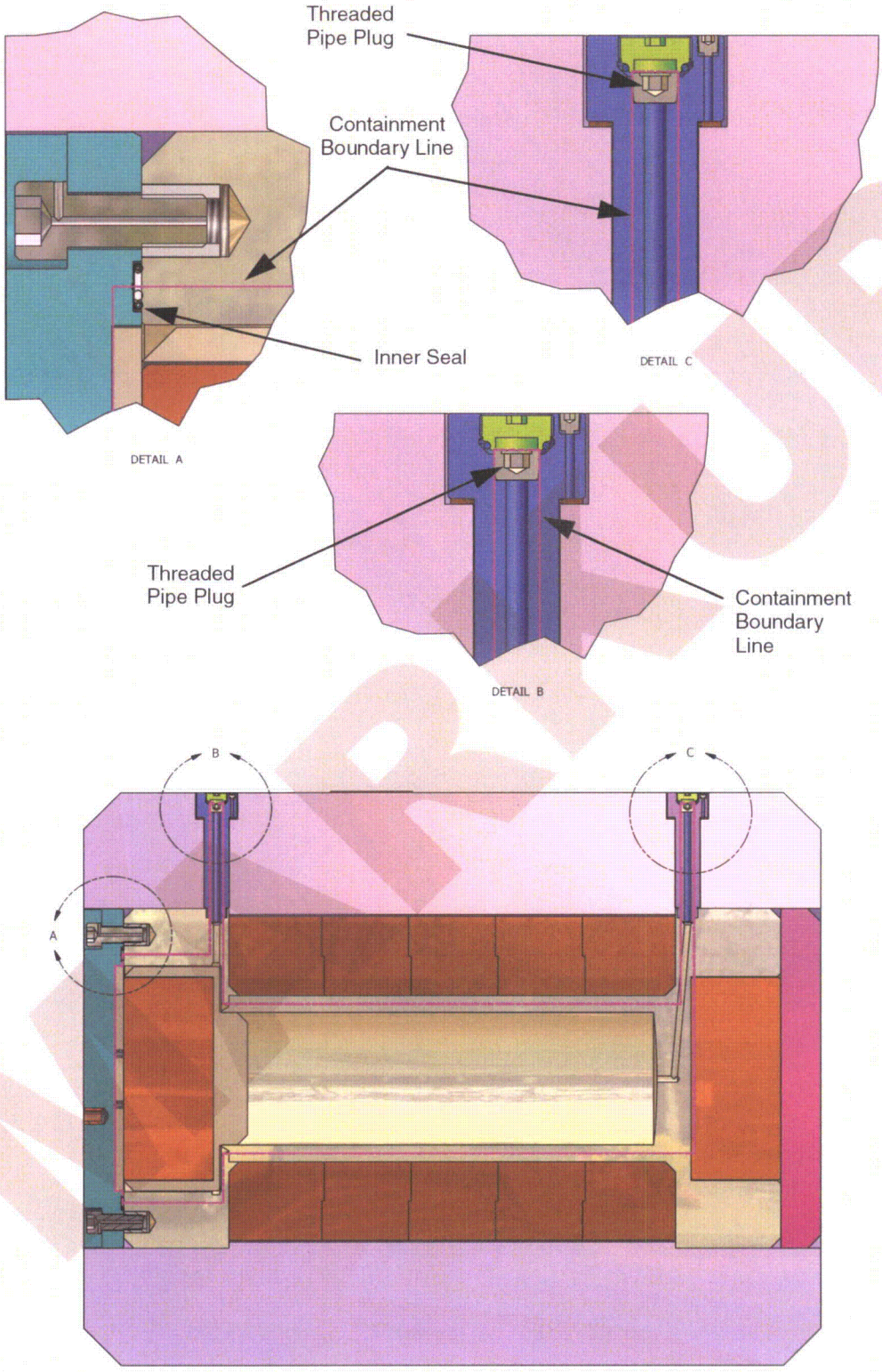

Figure 1-4. Containment Boundary

The lid component is connected to the cask body socket cap bolts. Table 1-2 presents the pertinent information of each set of bolts, for each AOS Transport Packaging System model.

Table 1-2. Bolt Evaluation – All Models

Item	Model and Ambient Temperatures							
	AOS-025		AOS-050		AOS-100		AOS-165	
	100°F	-40°F	100°F	-40°F	100°F	-40°F	100°F	-40°F
Bolt size (in.)	3/8		1/2		7/8		1 1/4	
Number of threads per in.	16		13		9		7	
Number of Bolts	8		10		14		20	
Torque, ft-lb	30		62.5		500		1,000	
Normal Conditions of Transport								
Axial Stress/S_m	0.08	0.07	0.17	0.15	0.40	0.36	0.30	0.27
Shear Stress/$0.6S_m$	0.26	0.25	0.22	0.21	0.30	0.28	0.20	0.20
$Rt^2 + Rs^2$	0.07	0.07	0.08	0.06	0.25	0.21	0.13	0.12
$Se/1.35S_m$	0.46	0.44	0.42	0.39	0.67	0.62	0.46	0.44
Accumulated Fatigue Usage	0.07	0.06	0.15	0.13	0.37	0.34	0.27	0.25
Hypothetical Accident Conditions of Transport								
Head-On Drop								
Axial Stress/$0.7S_u$	0.48	0.62	0.60	0.74	0.76	0.82	0.87	0.96
Shear Stress/$0.42S_u$	0.20	0.19	0.17	0.16	0.23	0.22	0.16	0.16
$Rt^2 + Rs^2$	0.27	0.42	0.39	0.58	0.63	0.72	0.78	0.94
Side Drop								
Axial Stress/$0.7S_u$	0.06	0.05	0.13	0.11	0.30	0.28	0.23	0.21
Shear Stress/$0.42S_u$	0.20	0.19	0.17	0.16	0.23	0.22	0.16	0.16
$Rt^2 + Rs^2$	0.04	0.04	0.04	0.04	0.14	0.12	0.08	0.07
Corner Drop								
Axial Stress/$0.7S_u$	0.27	0.34	0.37	0.43	0.55	0.58	0.50	0.53
Shear Stress/$0.42S_u$	0.20	0.19	0.17	0.16	0.23	0.22	0.16	0.16
$Rt^2 + Rs^2$	0.11	0.15	0.16	0.21	0.36	0.38	0.28	0.31

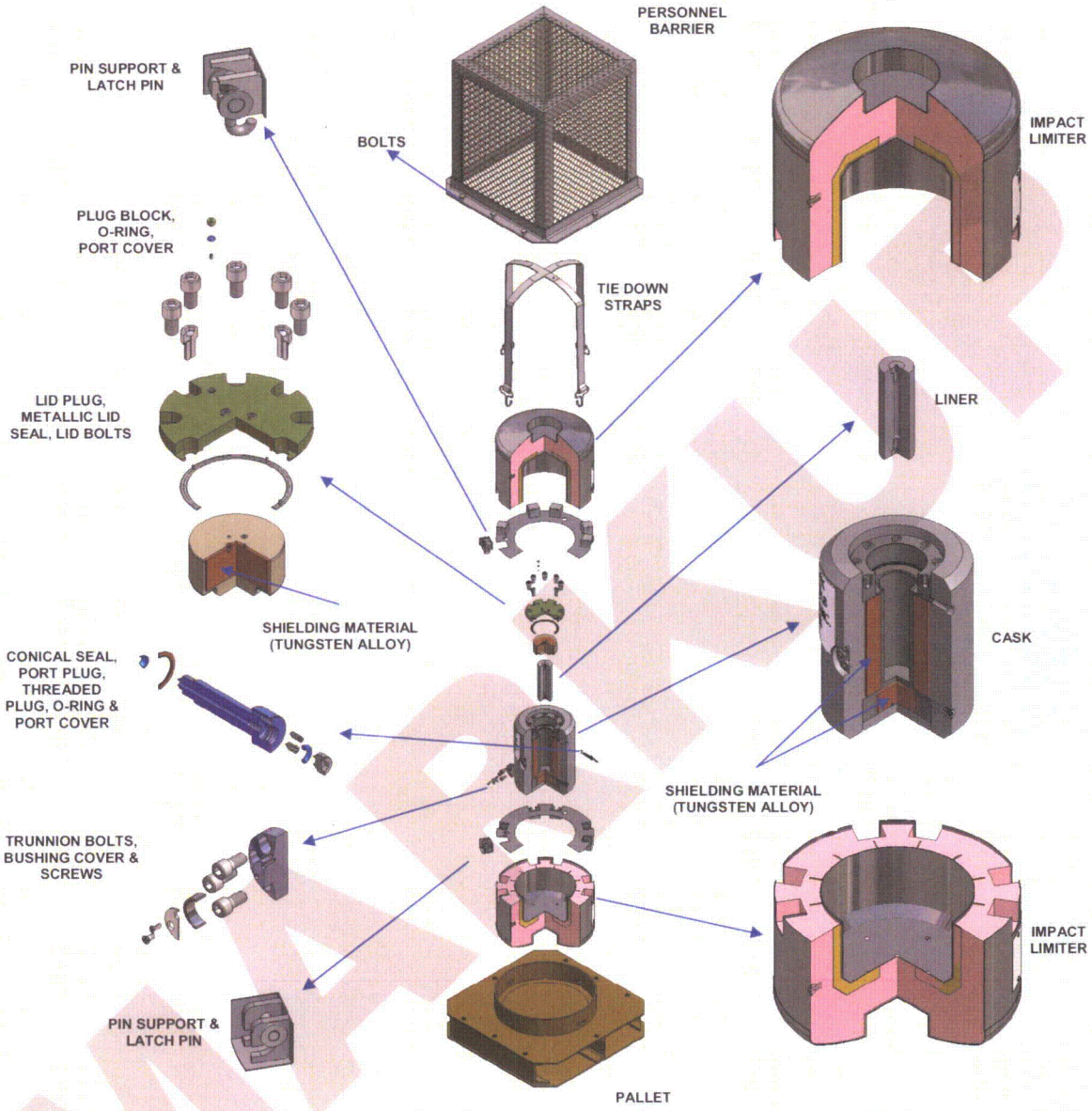

Figure 1-5. Transport Package, Isometric View – Model AOS-025A

MARKUP

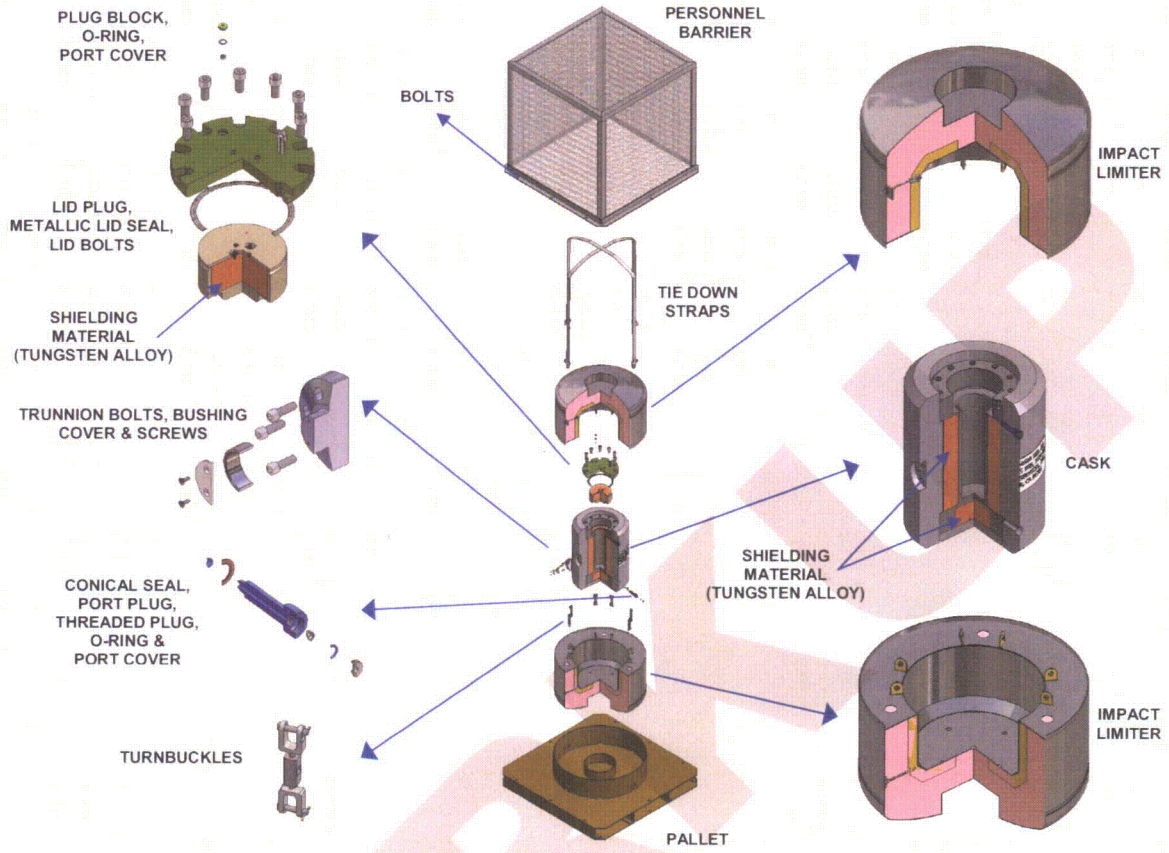

Figure 1-6. Transport Package, Isometric View – Model AOS-050A

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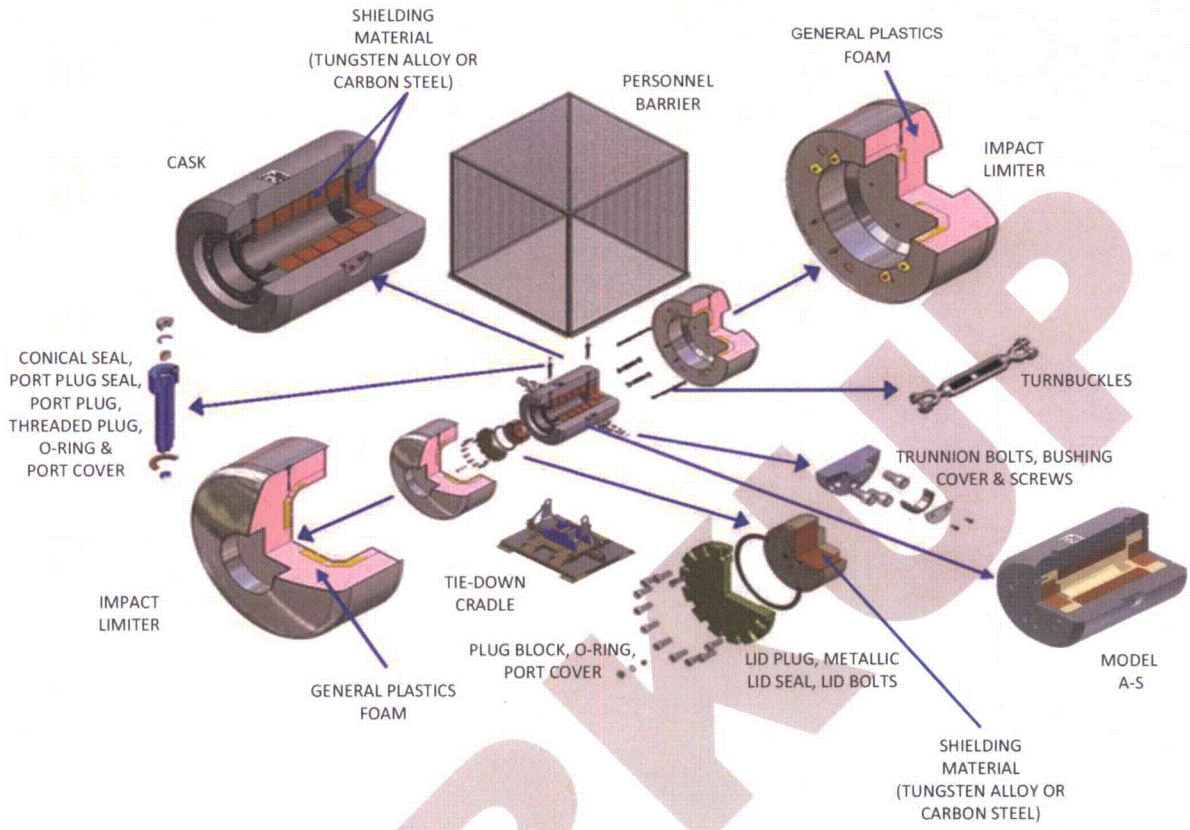

Figure 1-7. Transport Package, Isometric View – Model AOS-100A/AOS-100A-S

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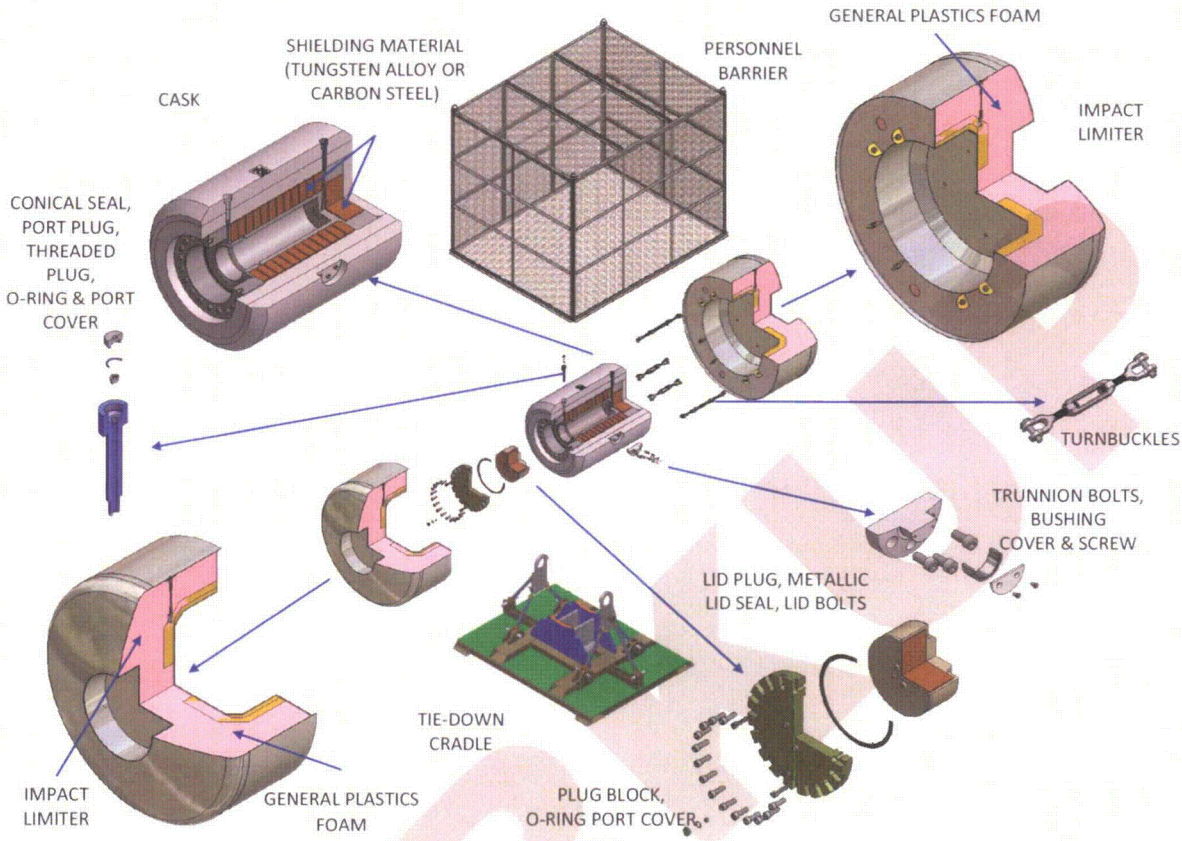

Figure 1-8. Transport Package, Isometric View – Model AOS-165A

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1.2.1.2 Overpack (Impact Limiter)

The overpack (impact limiter) is a major component consisting of a thin-walled cylindrical shell, with a dish head at one end and a flat disk at the other end. At the flat-disk end, there is a cylindrical recess, with an internal profile identical to that of the cask end profile. This cavity accommodates the cask in the transport configuration. Figure 1-9 presents an isometric view of the impact limiter.

Twelve (12) squared ribs are attached to the inside wall of the cylindrical recess section. Eight (8) of these ribs extend beyond the flat disk plate, to be used as turnbuckle attachment points. The turnbuckles are used to join each impact limiter, to partially enclose the cask component. For the Model AOS-025, the two (2) impact limiters entirely cover the cask, and the turnbuckles are replaced with "J" hooks. A security seal is placed across either the turnbuckles or "J" hooks, to provide visual proof of any unauthorized opening of the package. Figure 1-10 illustrates the security seal installation across these devices.

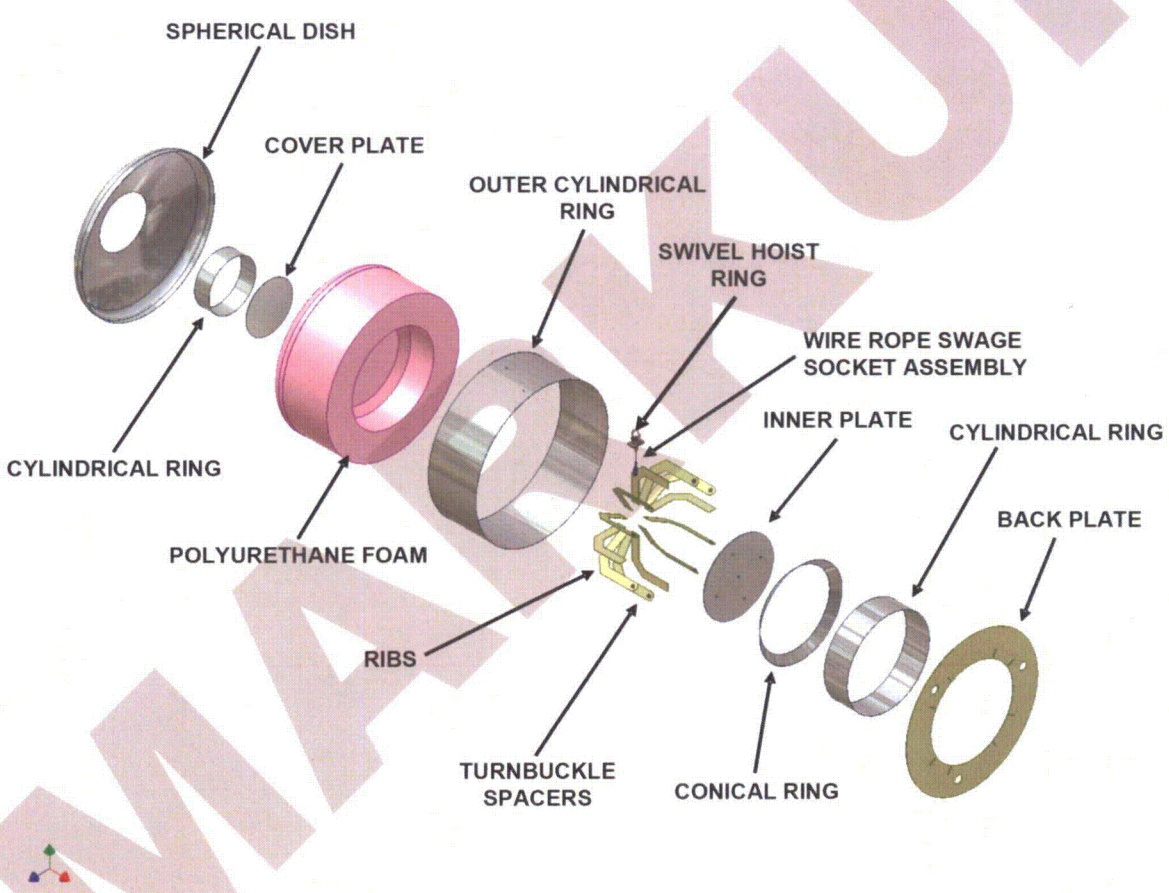

Figure 1-9. Typical Overpack (Impact Limiter) – Isometric View

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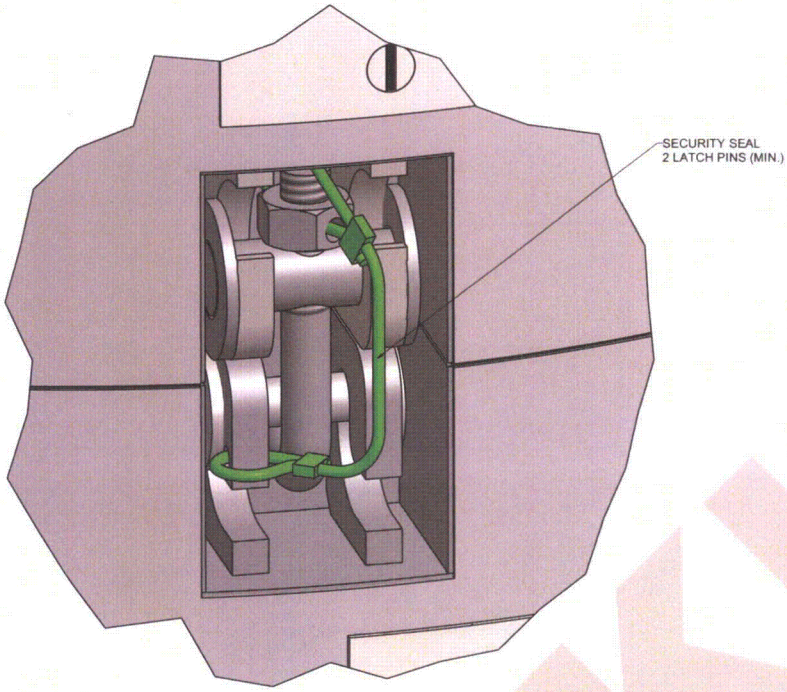
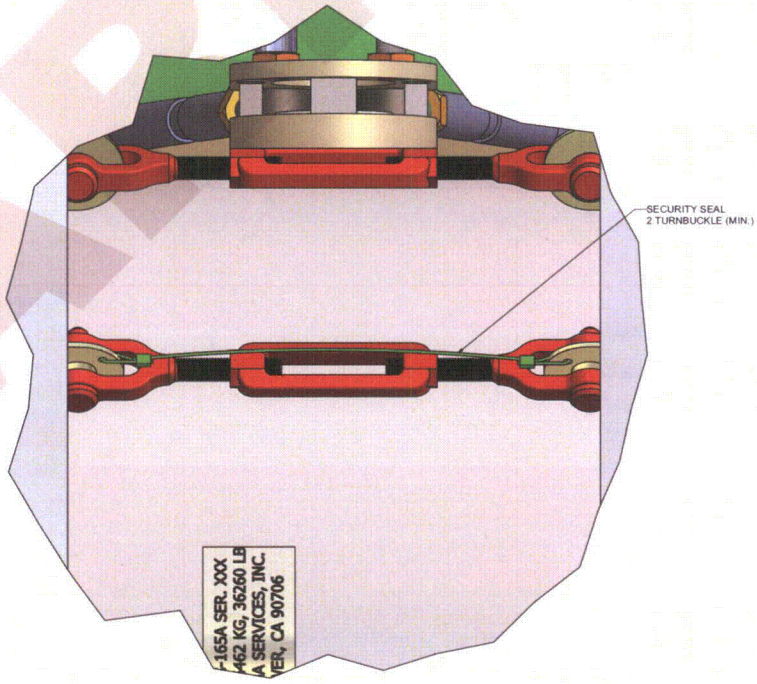


SAFETY WIRE



SECURITY SEAL

Figure 1-10. Security Seal Installation – Model AOS-165

MARKUP

1.2.1.3 Lid Seal

The lid seal used in the design is a stainless steel and silver (metallic) double "C" cross-section arrangement. (Refer to Figure 1-11.) The seal design provides a means for leak testing between the two "C" cross-sections, by way of the cask lid's Test port feature.

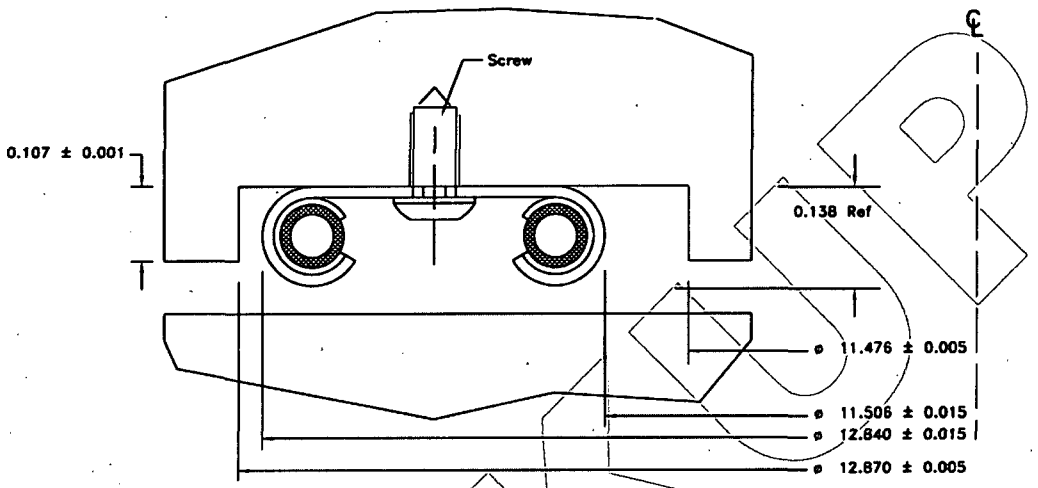


Figure 1-11. Lid Seal – Metallic (Stainless Steel and Silver), Double "C" Cross-Section Arrangement

Notes: *The spring's compression resistance maintains the contact between the seal surface and surfaces being sealed.*

The dimensions provided in Figure 1-11 are those of the Model AOS-100A transport package.

All dimensions are in inches.

MARKUP

1.2.1.4 Other Components

In addition to the major components, the AOS Transport Packaging System uses others components or structures, in support of its operations. A series of liners and shielding plates enhances the shielding characteristics in some of the Transport Packaging System models for the shipment of specific content. Refer to Table 1-6, "Activity Limits – All Models," for the requirements of when to use these shielding devices.

A transport pallet or shipping cradle is used to provide a base to the package, for tying down the package during transport:

- Models AOS-025 and AOS-050 – Pallet straps to the truck bed
- Models AOS-100 and AOS-165 – Shipping cradle attaches to the truck bed

The personnel barrier is a structural steel-form weldment, five-sided frame, with each panel covered with a mesh or screen material. Its function is to keep unauthorized persons away from the transport package surfaces during transport, and provides a means to meet temperature and dose rate regulation requirements. The personnel barrier attaches to either the transport pallet (Models AOS-025 and AOS-050) or truck bed (Models AOS-100 and AOS-165).

Tie-down devices, either straps or turnbuckles, are used to tie down the packages during transport.

These referenced components are illustrated in Figure 1-5 through Figure 1-8, for the Model AOS-025A, AOS-050A, AOS-100A, and AOS-165A transport packages, respectively.

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1.2.2 Fabrication Codes and Standards and Acceptance Tests

The AOS Transport Packaging System fabrication is controlled by the Codes, Engineering Specifications, and Standards listed in Table 1-3. In addition, Table 1-3 lists the Safety Classification of all major system components, per Reference **[1.4]** guidelines.

Table 1-4 presents a summary of the acceptance tests imposed on each AOS Transport Packaging System model.

MARKUP

Table 1-3. Codes and Standards for Design, Fabrication, and Testing

Package Components or Features	Component Safety Group										
	Containment		Criticality	Other Safety							
	Primary Vessel, Bolts, Piping, Fittings and Closure Bolts	Primary Seal	Support Structure/ Neutron Absorber	Gamma Shielding	Structural Shell, Bolts, and Closure	Secondary Seal	Neutron Shielding, Piping and Fittings	Lifting Lugs	Heat Transfer Devices	Tie-Down Devices	Impact Limiters
Safety Classification	A	A	A	B	B	B	B	B	A	B	A
B&PV Code Section	Sec. III, Division 3		Sec. III, Division 1, Subsection NG	Sec. III, Division 1, Subsections NG and NF							Sec VIII, Division 1
Material Requirements	WB-2000		NG-2000	SAE-AMS-T-21014, Class 3	NF-2000		NF-2000	NF-2000	NG-2000	NF-2000	UG
Forming, Fitting, and Aligning	WB-4200		NG-4200		NF-4200		NF-4200	NF-4200	NG-4200	NF-4200	UG
Welding	WB-4400		NG-4400		NF-4400		NF-4400	NF-4400	NG-4400	NF-4400	UW
Qualification of Weld Procedure and Personnel	WB-4300		NG-4300		NF-4300		NF-4300	NF-4300	NG-4300	NF-4300	UW
Weld Heat Treatment	WB-4600		NG-4600		NF-4600		NF-4600	NF-4600	NG-4600	NF-4600	UW
Examination	WB-5000		NG-5000		NF-5000		NF-5000	NF-5000	NG-5000	NF-5000	UW/UG
Acceptance Testing	WB-6000	ANSI N14.5	Gamma Scan Test	Guidelines ASTM B311-2002	Per Applicable Code Standards	ANSI N14.5	–	ANSI N14.6	Per Paragraph 8.1.7	ANSI N14.6	Per Table 8.4

Table 1-4. Examination Summary

Test Category	Test Type	Reference	Test Description
Materials			
Stainless Steel	Certified Material Test Report	ASME Code	Series of chemical and mechanical tests to determine conformance with material specification.
Tungsten Alloy	Density verification	Engineering Specification	Calculating the resulting component density by weighing and dimensional inspecting component, to calculate volume.
Foam	Formulation verification	Engineering Specification	Series of tests to establish the material characteristics baseline.
Fabrication			
Component	Adherence to drawing	Engineering Specification	Visual and dimensional inspections.
Sub-assembly	Adherence to drawing	Engineering Specification	Visual and dimensional inspections.
Assembly	Pressure and containment	ASME Code	Hydrostatic and He leak test.
Weldment	NDE	ASME Code	Visual, Penetrant, and Ultrasonic tests (VT, PT, and UT, respectively).
Design			
1. Containment	Leak test	ANSI N14.5 - 1997	MSLD – Evacuated envelope with back pressurization.
2. Thermal	Thermal transmission properties	Engineering Specification	7-kW heat source in cask cavity with axial, radial, and ambient temperature monitoring to steady state and cool down.
3. Containment	Leak test	ASME WB-6200	Hydrostatic Test at 150% design pressure.
4. Impact	9m (30 ft.) Free drop test – three (3) orientations	Engineering Specification	Free drops on head-on, side, and Cg/Corner orientations.
5. Containment	Leak test	ANSI N14.5 - 1997	MSLD – Evacuated envelope with back pressurization.
6. Shielding	Dose rate mapping	Engineering Specification	Dose rate mapping of cask external surfaces, due to an internal gamma source.

WORKING DRAFT

1.3 AOS TRANSPORT PACKAGING SYSTEM EVALUATION

The evaluation of the AOS Transport Packaging System, to show compliance with the regulations (References **[1.1]** and **[1.2]**), was performed by analyses, using the Finite Element Method (LIBRA Code) for all structural and thermal requirements. Shielding and criticality requirements were evaluated, primarily using the Monte Carlo Neutron Production (MCNP) Code.

Table 1-5 presents a summary of the engineering evaluation analyses performed on each AOS Transport Packaging System model.

Table 1-5. AOS Transport Packaging System Analyses Summary – All Models

Item	10 CFR 71 [1.1]	IAEA TS-R-1 [1.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Package Category			III	III	II	III	II	I	I	
Packaging Weight			71.4 kg (157 lbs)	71.4 kg (157 lbs)	3,950 kg (8,700 lbs)	3,232 kg (7,125 lbs)	3,901 kg (8,600 lbs)	18,234 kg (40,200 lbs)	15,535 kg (34,250 lbs)	
Content[a]			Activated	Activated	Activated	Activated	Activated	Activated	Activated	
Physical Form (Normal or Special)			Solid[b]	Solid[2]	Solid	Solid	Solid	Solid	Solid	
Decay Heat										
Activated Materials			10W	100W Isotope	400W Isotope	400W Isotope	400W Isotope	7,000W (7 kW) Isotope	2,500W (2.5 kW) Isotope	
Fissile Material			–	–	–	–	–	–	–	
General	71.33	606 – 616	✔	✔	✔	✔	✔	✔	✔	
Design Pressure			207 kPa (30 psia)	414 kPa (60 psia)	1,931 kPa (280 psia)[c]	1,931 kPa (280 psia)	1,931 kPa (280 psia)	1,517 kPa (220 psia)[c]	1,517 kPa (220 psia)	

Table 1-5. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [1.1]	IAEA TS-R-1 [1.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Structural										
Weight and Cg			✔	✔	✔	✔	✔	✔	✔	
Lifting Devices	71.45(a)	7607, 7608	✔	✔	✔			✔		
Tie-Down Devices	71.45(b)	612, 636	✔	✔	✔			✔		
Containment Shell Buckling			✔	✔	✔	✔	✔	✔	✔	
Normal Conditions of Transport	71.71(c)	651								
Heat	71.71(c)(1)	653, 654, 664, 676	✔	✔	✔			✔		38°C (100°F) shade < 50°C (122°F)
Differential Thermal Expansion			✔	✔	✔			✔		
Cold	71.71(c)(2)	664, 676	✔	✔	✔			✔		
Reduced External Pressure	71.71(c)(3)	643	✔	✔	✔			✔		
Increased External Pressure	71.71(c)(4)		✔	✔	✔			✔		
Vibration	71.71(c)(5)	612	✔	✔	✔			✔		(5, 5 and 10 g's) ANSI N14.23 Draft
Water Spray	71.71(c)(6)	719, 721	✔	✔	✔			✔		

SUPERSEDED

Table 1-5. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [1.1]	IAEA TS-R-1 [1.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Free Drop	71.71(c)(7)	720, 722	1.2m (4 ft.)	1.2m (4 ft.)	1.2m (4 ft.)			0.3m (1 ft.)		Solid: 0.3m (1 ft.) and 1.2m (4 ft.) Liquid[d]: 9m (30 ft.)
Corner Drop	71.71(c)(8)	722(b)&(c)	–	–	–	–	–	–	–	
Compression (Stacking)	71.71(c)(9)	723(a)	✔	✔	✔			–	–	5x Weight or 13 kPa (2 psi) * Projected Area
Penetration	71.71(c)(10)	724(b)	✔	✔	✔			✔		3.2 cm (1.25 in.) and 6 kg (13 lbs.) dropped 1.7m (67 in.)

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Table 1-5. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [1.1]	IAEA TS-R-1 [1.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100AS	AOS-165A	AOS-165B	
Hypothetical Accident Conditions of Transport	71.73(a)&(b)	726								
Free Drop	71.73(c)(1)	727(a)	✔	✔	✔			✔		
Crush	71.73(c)(2)	727(c)	–	–	–	–	–	–	–	
Puncture	71.73(c)(3)	727(b)	✔	✔	✔			✔		15 cm (6 in.) diameter 20 cm (8 in.) long Distance of 1.0m (40 in.)
Thermal	71.73(c)(4)	728	✔	✔	✔			✔		
Immersion (Fissile Material)	71.73(c)(5)	731	–	–	–	–		–	–	
Immersion	71.73(c)(6)	729	✔	✔	✔			✔		150 kPa (21.7 psi)
Deep Water Immersion	71.61	730	✔	✔	✔			✔		2 MPa (290 psi)

WORKING DRAFT

Table 1-5. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [1.1]	IAEA TS-R-1 [1.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Thermal										
Normal Conditions of Transport										
38°C (100°F) Ambient + Decay Heat + Solar			✔	✔	✔			✔		
38°C (100°F) Ambient + Decay Heat			✔	✔	✔			✔		
-29°C (-20°F) Ambient + Decay Heat			✔	✔	✔			✔		
-29°C (-20°F) Ambient			✔	✔	✔			✔		
-40°C (-40°F) Ambient + Decay Heat			✔	✔	✔			✔		
-40°C (-40°F) Ambient			✔	✔	✔			✔		
Hypothetical Accident Conditions of Transport										
Fire			✔	✔	✔			✔		
Containment										
Internal Pressure (Fission Gases)			–	–	–	–	–	–	–	
Lid Joint			✔	✔	✔			✔		

Table 1-5. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [1.1]	IAEA TS-R-1 [1.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Shielding										
Source Term		✔	✔	✔	✔	✔	✔	✔	✔	
Decay Heat			✔	✔	✔	✔	✔	✔	✔	
Gamma Dose			✔	✔	✔	✔	✔	✔	✔	
Neutron Dose					✔			✔		
Transportation Index			✔	✔	✔	✔	✔	✔	✔	
Criticality										
Criticality Safety Index (CSI)					✔			✔		
Normal Conditions of Transport					✔			✔		
Hypothetical Accident Conditions of Transport					✔			✔		

a. *Encapsulated solid material or solid metal meeting Normal or Special form criteria.*

b. *The Model AOS-025A and AOS-050A transport packages were analyzed to the requirement of transporting liquid, Reference* **[1.2]**, *Paragraph 725(a). In a future submittal, the transportation of liquid form will be requested for these models.*

c. *The Model AOS-100A and AOS-165A transport packages were analyzed for future fission gases of future fuel materials.*

d. *Analyzed for future request for liquids.*

1.3.1 Contents

The AOS Transport Packaging System can be used for transporting up to Type B quantities of radioactive material. These may include, but are not limited to by-product, source, and special nuclear materials. These contents are limited to the quantities and types listed in Table 1-6.

Samples of typical content are provided in Appendix 1.4.2.

Table 1-6. Activity Limits – All Models

		Model											
		AOS-025		AOS-050		AOS-100				AOS-165			
		A (10W)		A (100W)		A, A-S (400W)		B (400W)		A (7 kW)		B (2.5 kW)	
Isotope[a]	Ci/Watt[b]	TBq	Ci	TBq	Ci	TBq	Ci	TBq	Ci	TBq	Ci	TBq	Ci
Co-60	6.49E+01	8.73E-03	2.36E-01	1.05E-01	2.84E+00	7.47E+02	2.02E+04	5.99E+00	1.62E+02	1.68E+04	4.54E+05	6.01E+03	1.62E+05
Cs-137	1.99E+02	1.28E+00	3.45E+01	1.28E+01	3.46E+02	2.94E+03	7.95E+04	1.84E+01	4.97E+02	5.16E+04	1.39E+06	1.84E+04	4.98E+05
Hf-181	2.28E+02	–		6.25E+01	1.69E+03	3.38E+03	9.13E+04	9.25E+01	2.50E+03	5.91E+04	1.60E+06	2.11E+04	5.70E+05
Ir-192	1.63E+02	5.48E+00	1.48E+02	3.63E+01	9.81E+02	2.41E+03	6.53E+04	5.77E+01	1.56E+03	4.23E+04	1.14E+06	1.51E+04	4.08E+05
Zr/Nb-95	6.02E+01	–		2.09E+00	5.66E+01	8.92E+02	2.41E+04	3.74E+00	1.01E+02	1.56E+04	4.21E+05	5.57E+03	1.51E+05
C-14	3.41E+03	1.26E+03	3.41E+04	1.26E+04	3.41E+05	–		–		–		–	
Fe-59	1.29E+02	2.16E-02	5.85E-01	2.02E-01	5.46E+00	–		–		–		–	
Ho-166	2.33E+02	1.01E+00	2.74E+01	3.89E-01	1.05E+01	–		–		–		–	
Na-24	3.61E+01	2.58E-03	6.97E-02	1.55E-02	4.19E-01	–		–		–		–	
P-32	2.43E+02	8.98E+01	2.43E+03	8.98E+02	2.43E+04	–		–		–		–	
P-33	2.20E+03	8.15E+02	2.20E+04	8.15E+03	2.20E+05	–		–		–		–	
Sb-124	7.52E+01	1.16E-02	3.13E-01	1.62E-02	4.38E-01	–		–		–		–	
Sc-46	7.94E+01	2.05E-02	5.55E-01	1.05E-01	2.84E+00	–		–		–		–	
Se-75	4.15E+02	1.54E+02	4.15E+03	1.05E+02	2.84E+03	–		–		–		–	
Sm-153	5.15E+02	1.91E+02	5.15E+03	8.73E+02	2.36E+04	–		–		–		–	
Sr/Y-90	1.49E+02	5.52E+01	1.49E+03	5.52E+02	1.49E+04	–		–		–		–	
Sr-89	2.89E+02	1.07E+02	2.89E+03	1.07E+03	2.89E+04	–		–		–		–	
Yb-169	3.98E+02	1.47E+02	3.98E+03	2.10E+02	5.67E+03	–		–		–		–	
Yb-175	1.00E+03	3.70E+02	1.00E+04	2.67E+03	7.21E+04	–		–		–		–	

Table 1-6. Activity Limits – All Models (Continued)

		Model											
		AOS-025		AOS-050		AOS-100				AOS-165			
		A (10W)		A (100W)		A, A-S (400W)		B (400W)		A (7 kW)		B (2.5 kW)	
Isotope[a]	Ci/Watt[b]	TBq	Ci	TBq	Ci	TBq	Ci	TBq	Ci	TBq	Ci	TBq	Ci
Shipping Configuration		Use of Liner 183C8485 is required		No additional shielding is required		Use of Axial Shielding Plates 183C8491 may be needed for large-quantity shipments of Co-60		Use of Axial Shielding Plates 183C8491 may be needed for large-quantity shipments of Co-60		No additional shielding is required.		Use of Liner 183C8499 is required	

a. Encapsulated solid material or solid metal that meets Normal or Special form criteria.

b. For detailed calculations of these values, refer to Chapter 5, Appendix 5.5.1, "AOS Cask Isotopic Heat Load for Numerous Isotopes Report."

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1.3.2 Special Requirement for Plutonium

Note: *Not applicable. Plutonium is not an authorized content for the AOS Transport Packaging System.*

1.3.3 Operational Features

Throughout this report, the AOS Transport Packaging System description indicates that the packaging is not a complex system. There are no items, such as valves, that require specialized knowledge for proper operation. Cooling is provided by way of natural convection and radiation. The seal is installed on the cask lid; therefore, there is no alignment issue, and only normal practices for seal handling (such as, cleanliness, scratch prevention, and proper installation) are required.

MARKUP

1.4 APPENDIX

1.4.1 AOS Transport Packaging System, Certification Drawings

Table 1-7 lists the AOS Transport Packaging System certification drawings, for each model.

Table 1-7. AOS Transport Packaging System Certification Drawing List – All Models

Model	Assembly	Rev.	Impact Limiter	Rev.	Cask	Rev.	Liner/Plates	Rev.
AOS-025A	166D8142	A	105E9722	A, "Markup"	166D8143	A, "Markup"	183C8485	A
AOS-050A	105E9718	A	166D8138	A, "Markup"	166D8137	A, "Markup"	–	–
AOS-100A	105E9711	A	105E9713	A, "Markup"	105E9712G001	A, "Markup"	183C8491	A
AOS-100B	105E9711	A	105E9713	A, "Markup"	105E9712G002	A, "Markup"	–	–
AOS-100A-S	105E9711	A	105E9713	A, "Markup"	105E9719	A, "Markup"	183C8491	–
AOS-165A	105E9707	A	105E9709	A	105E9708G001	A	–	–
AOS-165B	105E9707	A	105E9709	A	105E9708G002	A	183C8499	A

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1.4.1.1 AOS Transport Packaging System Drawings – Model AOS-025A

MARKUP

AOS Drawing No. 166D8142

Model AOS-025A Assembly

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MARKUP

AOS Drawing No. 105E9722

Model AOS-025A Impact Limiter

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MARKUP

AOS Drawing No. 166D8143

Model AOS-025A Cask

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MARKUP

AOS Drawing No. 183C8485

Model AOS-025A Liner/Plates

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1.4.1.2 AOS Transport Packaging System Drawings – Model AOS-050A

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AOS Drawing No. 105E9718

Model AOS-050A Assembly

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AOS Drawing No. 166D8138

Model AOS-050A Impact Limiter

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AOS Drawing No. 166D8137

Model AOS-050A Cask

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1.4.1.3 AOS Transport Packaging System Drawings – Model AOS-100A, AOS-100B, and AOS-100A-S

MARKUP

AOS Drawing No. 105E9711

Model AOS-100A / AOS-100B / AOS-100A-S Assembly

(Left Blank)

MARKUP

AOS Drawing No. 105E9713

Model AOS-100A / AOS-100B / AOS-100A-S Impact Limiter

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MARKUP

AOS Drawing No. 105E9712G001

Model AOS-100A Cask

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MARKUP

AOS Drawing No. 105E9712G002

Model AOS-100B Cask

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MARKUP

AOS Drawing No. 105E9719

Model AOS-100A-S Cask

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AOS Drawing No. 183C8491

Model AOS-100A Liner/Plates

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1.4.1.4 AOS Transport Packaging System Drawings – Model AOS-165A and AOS-165B

MARKUP

AOS Drawing No. 105E9707

Model AOS-165A / AOS-165B Assembly

(Left Blank)

MARKUP

AOS Drawing No. 105E9709

Model AOS-165A / AOS-165B Impact Limiter

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MARKUP

AOS Drawing No. 105E9708G001

Model AOS-165A Cask

(Left Blank)

MARKUP

AOS Drawing No. 105E9708G002

Model AOS-165B Cask

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MARKUP

AOS Drawing No. 183C8499

Model AOS-165B Liner/Plates

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MARKUP

1.4.2 Samples of Proposed Typical Content

The AOS Transport Packaging System is a multi-purpose, multi-user package. The content is defined for all Models as – Solid, activation product material in metallic form, meeting "Normal" or "Special" definitions. The content can be shaped as a rod, pellet, or disk, or as powder (Special form only). The quantity of material is limited by either the assigned decay heat or shielding characteristic of the design, which could be augmented by the use of removable shielding devices. Because these shielding devices perform a "safety function," they are defined in the SAR, which also describes their usage. Typically, the content is placed into the cask cavity, in a basket or rack device. This device provides shoring to the content, to ensure that its loading arrangement is maintained during transportation. Selection of the type of material for fabrication of this device is based upon the temperature environment within the cask cavity. A cavity temperature of less than 204.44°C (400°F) allows the use of aluminum. For temperatures of 204.44°C (400°F) or greater, the choice is stainless steel material, although this material could be used in either case.

The cavity temperature within all AOS Transport Packaging System models is less than 148.89°C (300°F) under Normal conditions of transport; therefore, the use of either material is acceptable.

The following documents show some of the proposed content for the AOS Transport Packaging System.

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Special Form Example

The Elekta Models 43047, 43685, and 1000029 are doubly encapsulated welded sealed sources. The inner and outer capsules are fabricated from 300-series stainless steel and have identical dimensions as detailed in Table 1-8. The only differences between the two models are that (1) the models use a different series of stainless steel, and (2) the shape of the bottom of the inner capsules and tubes has been modified to facilitate manufacturing improvements. When in use, the sealed source is retained in a source holder consisting of an aluminum bushing and a stainless steel threaded lid. The assembled source in its source holder is illustrated in "Elekta Model 43047, 43685, and 1000029 Sealed Sources Assembled Source Capsule and Source Holder (Bushing)," on the next page.

The active volume of the sealed source contains Cobalt-60, normally in pellet form, nominally 1 mm (0.039 in.) in diameter, with a length of 1 mm (0.039 in.). **Other forms of Cobalt-60 ranging from powder (Special form only) to solid rod can also be used.**

Table 1-8. Critical Source Component Dimensions

	Attribute	Nominal Dimension (mm)	Nominal Dimension (inches)
Inner Capsule	Outer Diameter	4.9910	0.1965
	Spacer Inner Diameter **(Models 43047 and 43685)**	1.1810	0.0465
	Length	24.0000	0.9450
	Minimum Material Thickness, at Weld	0.4200	0.0160
Outer Capsule	Outer Diameter	7.9910	0.3146
	Inner Diameter	5.0160	0.1975
	Length	27.2000	1.0700
	Minimum Material Thickness		
	At End Cap	0.4575	0.0180
	Body, at Counterbore of Cap	0.4960	0.0190
	At Weld	0.4200	0.0160

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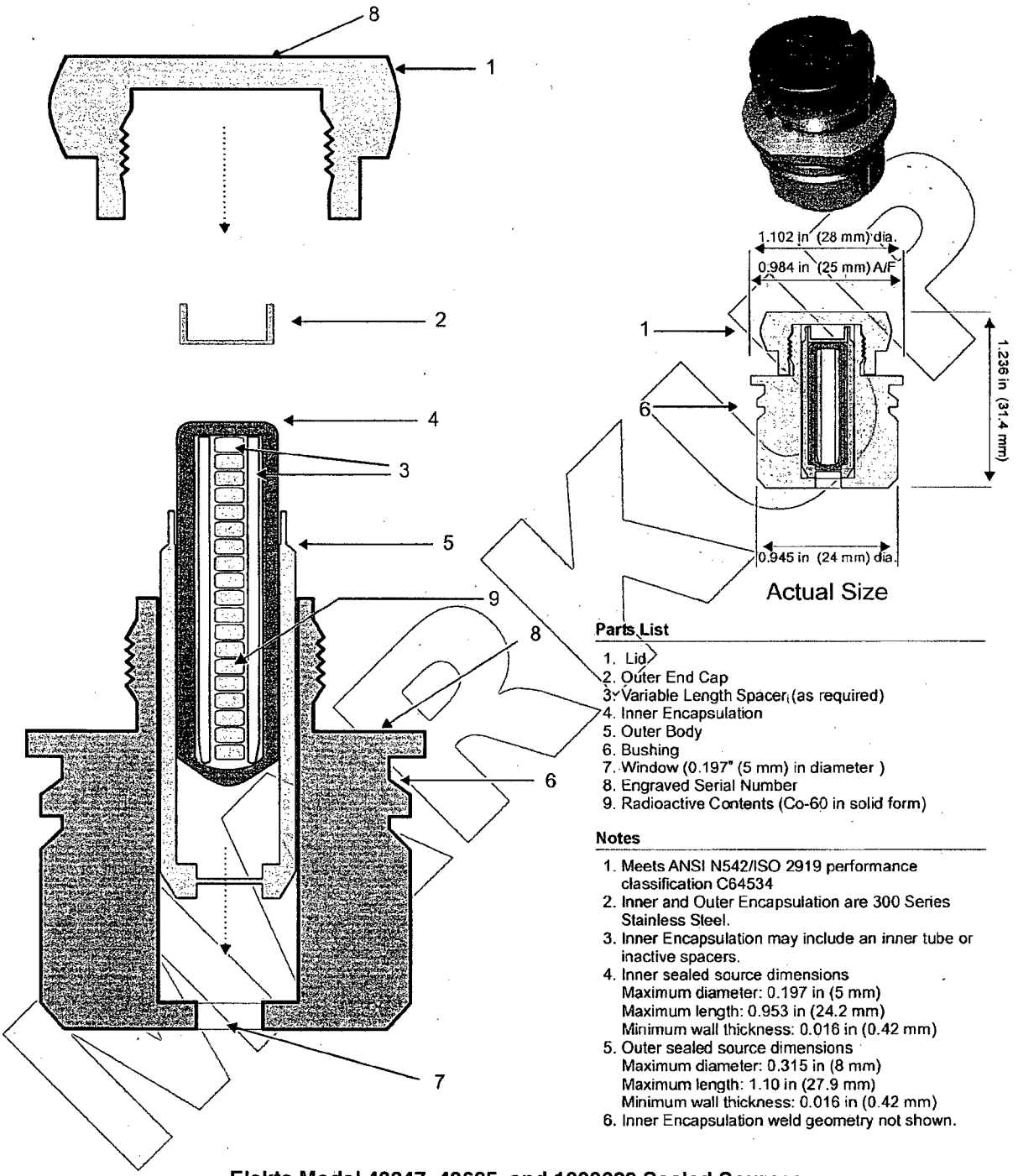

Parts List

1. Lid
2. Outer End Cap
3. Variable Length Spacer (as required)
4. Inner Encapsulation
5. Outer Body
6. Bushing
7. Window (0.197" (5 mm) in diameter)
8. Engraved Serial Number
9. Radioactive Contents (Co-60 in solid form)

Notes

1. Meets ANSI N542/ISO 2919 performance classification C64534
2. Inner and Outer Encapsulation are 300 Series Stainless Steel.
3. Inner Encapsulation may include an inner tube or inactive spacers.
4. Inner sealed source dimensions
   Maximum diameter: 0.197 in (5 mm)
   Maximum length: 0.953 in (24.2 mm)
   Minimum wall thickness: 0.016 in (0.42 mm)
5. Outer sealed source dimensions
   Maximum diameter: 0.315 in (8 mm)
   Maximum length: 1.10 in (27.9 mm)
   Minimum wall thickness: 0.016 in (0.42 mm)
6. Inner Encapsulation weld geometry not shown.

Elekta Model 43047, 43685, and 1000029 Sealed Sources Assembled Source Capsule and Source Holder (Bushing)

Typical Shipments

192 to 201 Sources In-bushing

Approximately 244.2 TBq/shipment

OR

192 to 201 Sources without bushing

Approximately 244.2 TBq/shipment

Normal Form Iridium-192 Example

Pre-Irradiated Material

Iridium 191 range	37 to 88%
Iridium 193 range	12 to 63%

Ir-192, Solid Metal Rod

Range Activity per rods:	0.037 to 1.0 TBq
Dimensional Range:	
Diameter	0.3 to 1.0 mm
Length	1.0 to 4.0 mm

Sealed Quartz Tubing

Number of rods per Tube:	1 to 6, stacked
Dimensional Range:	
Outer Diameter	1.0 to 1.8 mm
Inner Diameter	0.5 to 1.4 mm
Length	12 to 25 mm

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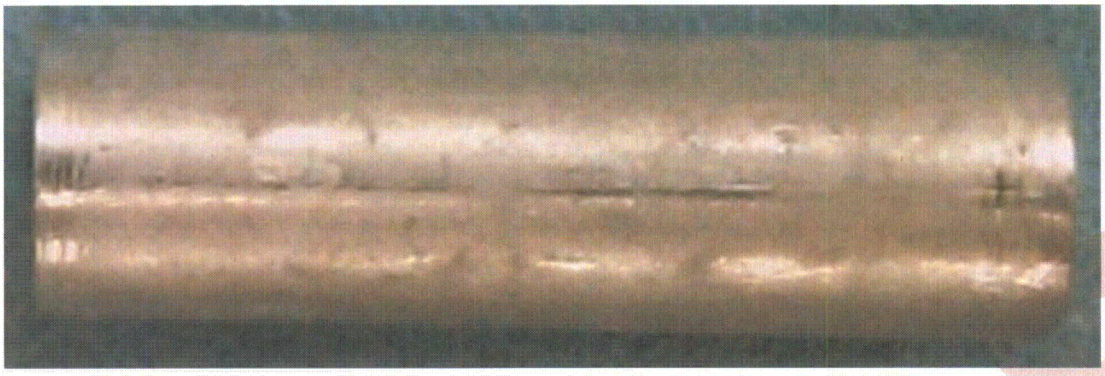

Holder:	1100 Series Aluminum Can
Holds 1 to 30 Quartz Tubes	
Inside Packed with Glass Wool	
Dimensional Range:	
Outer Diameter	6 to 25 mm
Inner Diameter	3 to 20 mm
Length	15 to 40 mm

Prior to irradiation, Iridium rods are sealed in quartz tubes. Upon irradiation completion, the Iridium rods in quartz tubes are placed in an aluminum can with glass wool, then placed in the shipping cask with shoring, as required.

Normal Form Cobalt-60 Example

Co-60, Solid Metal, Pellets	
Dimensions:	1 mm diameter by 1 mm in height
Activity Range:	250 to 350 Ci/g
Co-60 Mass per Target	
1/2" Diameter Target Holder:	29.5 to 32.5 grams
5/8" Diameter Target Holder:	38.5 to 40.5 grams

Target Holders:	5/8" diameter and 1/2" diameter

Both target holders are 16 inches in length, and consist of two aluminum tubes. The inner tube contains dimples that are just over 1 mm in diameter and 1 mm in depth. The Co-60 pellets are placed in the dimples and the second aluminum tube slides over the inner tube, acting as a sheath. The ends are then seal-welded and leak-tested.

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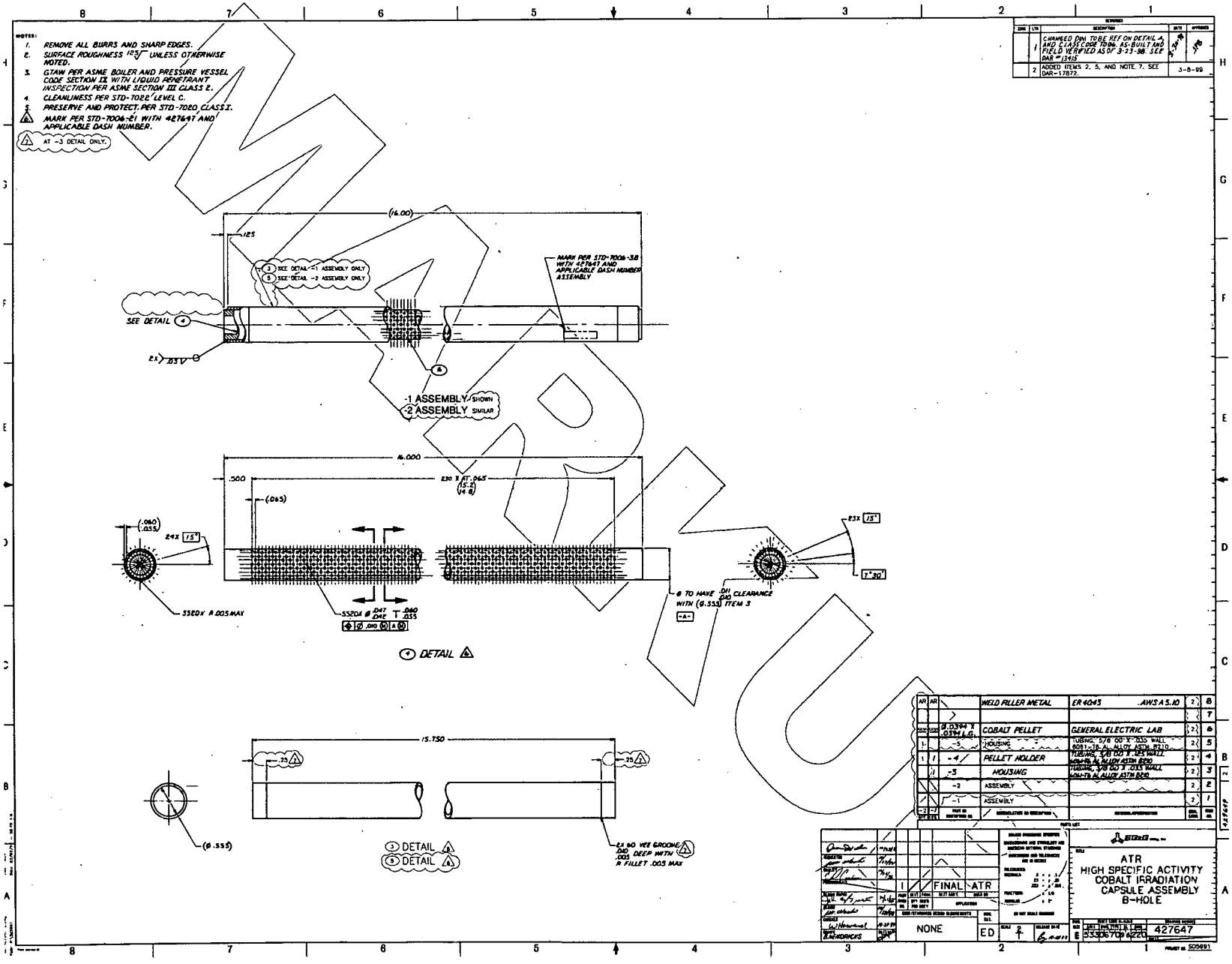
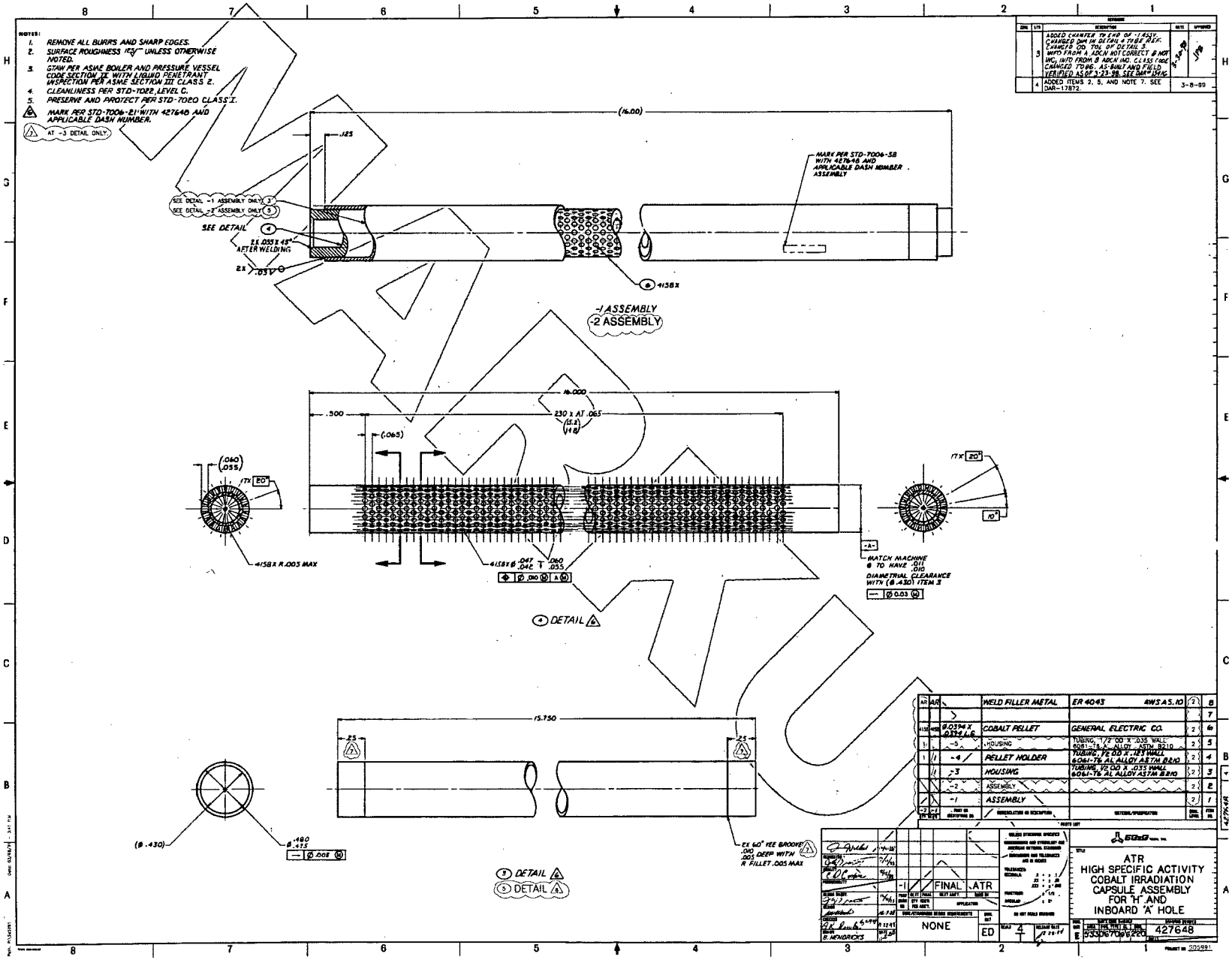

NOTES:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. SURFACE ROUGHNESS 125 UNLESS OTHERWISE NOTED.
3. GTAW PER ASME BOILER AND PRESSURE VESSEL CODE SECTION IX WITH LIQUID PENETRANT INSPECTION PER ASME SECTION III CLASS 2.
4. CLEANLINESS PER STD-7022 LEVEL C.
5. PRESERVE AND PROTECT PER STD-7020, CLASS I.
6. MARK PER STD-7006-21 WITH 427647 AND APPLICABLE DASH NUMBER.
AT -3 DETAIL ONLY.
REVISED
1 CHANGED DIM TO BE REF ON DETAIL A AND CLASS CODE TO 06. AS-BUILT AND FIELD VERIFIED AS OF 3-23-98. SEE DAR # 13415
2 ADDED ITEMS 2, 5, AND NOTE 7. SEE DAR-17872. 3-8-99
(16.00)
.125
SEE DETAIL 3 SEE DETAIL -1 ASSEMBLY ONLY
5 SEE DETAIL -2 ASSEMBLY ONLY
MARK PER STD-7006-38 WITH 427647 AND APPLICABLE DASH NUMBER ASSEMBLY
SEE DETAIL 4
2X .03 V
6
-1 ASSEMBLY SHOWN
-2 ASSEMBLY SIMILAR
16.000
.500
230 X .065 (15.2) (4.8)
(.065)
(.060 .055)
24X 15°
23X 15°
7°30'
3520X R.005 MAX
3520X Ø .047 .046 T .040 .035
Ø .010 M A M
Ø TO HAVE .011 .010 CLEARANCE WITH (6.355) ITEM 3
-A-
DETAIL A
15.750
.25
(6.355)
3 DETAIL A
5 DETAIL A
2X 60 VEE GROOVE .005 DEEP WITH R FILLET .005 MAX
WELD FILLER METAL ER 4043 AWS A 5.10
COBALT PELLET GENERAL ELECTRIC LAB
HOUSING TUBING, 5/8 OD X .035 WALL 6061-T6 AL ALOY ASTM B210
PELLET HOLDER TUBING, 5/8 OD X .065 WALL 6061-T6 AL ALOY ASTM B210
HOUSING TUBING, 5/8 OD X .035 WALL 6061-T6 AL ALOY ASTM B210
-2 ASSEMBLY
-1 ASSEMBLY
PARTS LIST
FINAL ATR
NONE
ED
ATR
HIGH SPECIFIC ACTIVITY
COBALT IRRADIATION
CAPSULE ASSEMBLY
B-HOLE
427647
E 5330670P4220
SCALE 2
SHEET 1 OF 1
SCALE 1:1
SIZE E
DRAWING NUMBER 427647
REV 1
PROJECT NO 505691


NOTES:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. SURFACE ROUGHNESS 125 UNLESS OTHERWISE NOTED.
3. GTAW PER ASME BOILER AND PRESSURE VESSEL CODE SECTION IX WITH LIQUID PENETRANT INSPECTION PER ASME SECTION III CLASS 2.
4. CLEANLINESS PER STD-T022, LEVEL C.
5. PRESERVE AND PROTECT PER STD-T020 CLASS I.
6. MARK PER STD-T006-21 WITH 427648 AND APPLICABLE DASH NUMBER.
7. AT -3 DETAIL ONLY
(16.00)
.125
MARK PER STD-T006-58 WITH 427648 AND APPLICABLE DASH NUMBER ASSEMBLY
SEE DETAIL -1 ASSEMBLY ONLY 3
SEE DETAIL -2 ASSEMBLY ONLY 5
SEE DETAIL 4
2X .055 X 45° AFTER WELDING
2X .031
4158X
-1 ASSEMBLY
-2 ASSEMBLY
16.000
.500
230 X AT .065
(5.8)
(14)
(.065)
(.060)
.055
17X 20°
4158X R.005 MAX
4158X Ø .047 .042 T .060 .055
Ø .010 M A
MATCH MACHINE Ø TO HAVE .011 .010 DIAMETRIAL CLEARANCE WITH (Ø.430) ITEM 3
Ø 0.03 M
17X 20°
10°
4 DETAIL 4
15.750
.25
(Ø .430)
.490 Ø .475
Ø .008 M
EX 60° VEE GROOVE .010 .005 DEEP WITH R FILLET .005 MAX
3 DETAIL 3
5 DETAIL 5
WELD FILLER METAL
ER 4043
AWS A5.10
Ø.0394 X 0.394 L.6
COBALT PELLET
GENERAL ELECTRIC CO.
-5 HOUSING
TUBING, 1/2 OD X .035 WALL 6061-T6 AL ALLOY ASTM B210
-4 PELLET HOLDER
TUBING, 1/2 OD X .123 WALL 6061-T6 AL ALLOY ASTM B210
-3 HOUSING
TUBING, 1/2 OD X .035 WALL 6061-T6 AL ALLOY ASTM B210
-2 ASSEMBLY
-1 ASSEMBLY
PARTS LIST
FINAL
ATR
NONE
ED
B. MENDRICKS
ATR
HIGH SPECIFIC ACTIVITY
COBALT IRRADIATION
CAPSULE ASSEMBLY
FOR "H" AND
INBOARD "A" HOLE
427648
933067096220
305891

AGR-1 Compacts [Exemption from Classification as Fissile Material, 10CFR 71.15 (a) or (b)]

Description: A typical Advanced Gas Reactor (AGR) compact is shown in Figure 1. Currently, each fuel compact is a right circular cylinder nominally 25 mm in length and 12.3 mm in diameter and weighs approximately 5.5 grams, per compact. Each compact contains approximately 4,200 coated fuel particles that are slightly less than 1 mm in diameter. These particles are bound together with a carbonaceous (graphite) matrix material. Each particle consists of a uranium oxycarbide (approximately 75% UO_2, and the remainder UC and UC_2) fuel kernel, surrounded by the following layers (as depicted in Figure 2):

- Porous carbon buffer layer
- Inner pyrolytic carbon (PyC) layer
- Silicon Carbide (SiC) barrier coating
- Outer PyC layer

Note: *Some future compacts will be up to 51 mm in length, with a 12.3-mm diameter.*

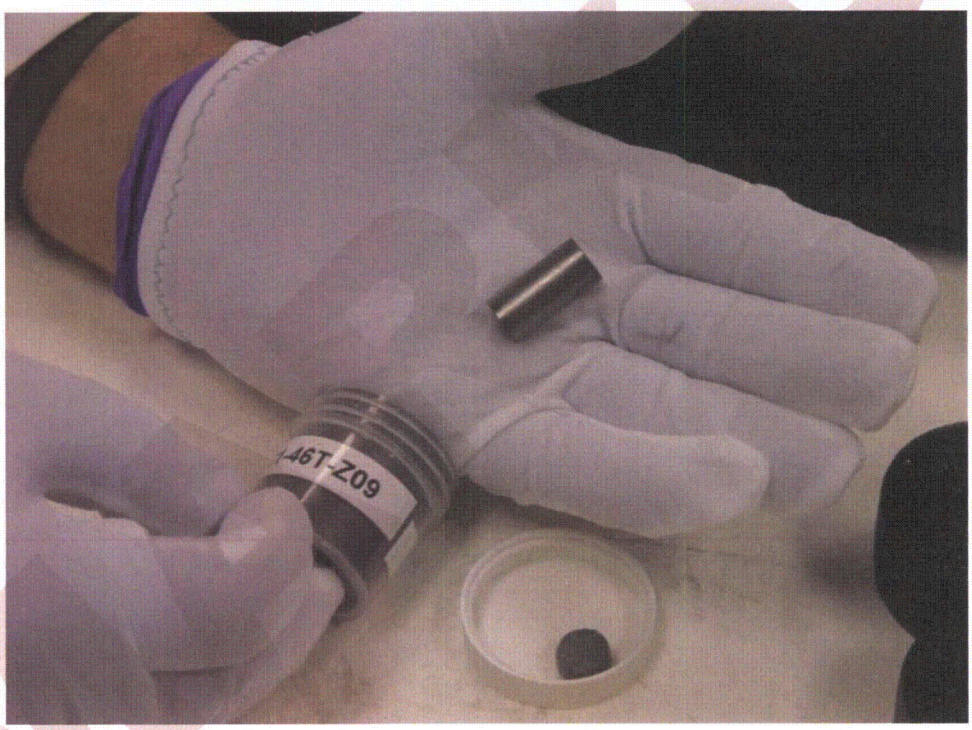


Figure 1. Typical AGR-1 Fuel Compact and its Storage Bottle

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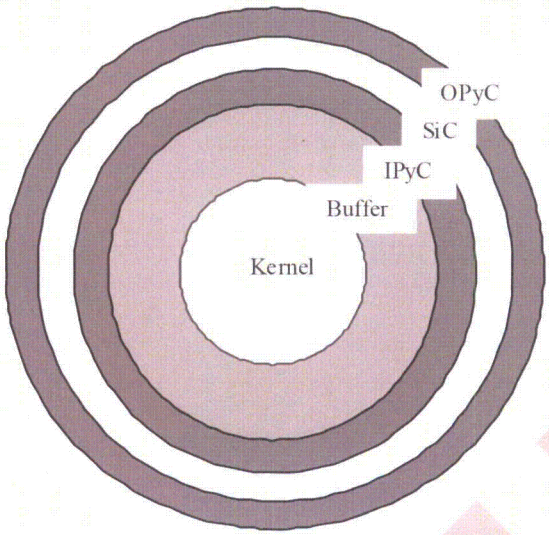

Figure 2. Schematic of a Typical AGR-1 Coated Fuel Particle

The compacts are not encapsulated during irradiation, but are placed into a modified Swagelok container in the hot cell after irradiation. A picture of the compact and container is provided in Figure 3. The compacts are approximately 0.5" in diameter x 1" long, and the container is approximately 1" diameter x 3" long. The container is an aluminum Swagelok bulkhead fitting, with the threads and center hex nut turned off. In future tests, some compacts will have a 0.5" diameter and be 2" long. A similar container will be used for the longer compacts, but adjusted dimensionally, to accommodate the longer length.

Figure 3. Compact and Container (Shown with Pencil, for Size Aspect/Visualization)

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1.5 REFERENCES

[1.1] U.S. Nuclear Regulatory Commission (NRC), *Title 10, Code of Federal Regulations, Part 71 (10 CFR 71)*, "Packaging and Transportation of Radioactive Material," January 26, 2004.

[1.2] *International Atomic Energy Agency (IAEA) Safety Standards Series No. TS-R-1* (*IAEA TS-R-1*), "Regulations for the Safe Transport of Radioactive Material," 1996 Edition (as amended 2003).

[1.3] Alpha-Omega Services, Inc. (AOS), *PR9000*, "Quality Assurance Program Radioactive Material Packaging," Revision A.

[1.4] *NUREG/CR-6407*, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety," February, 1996.

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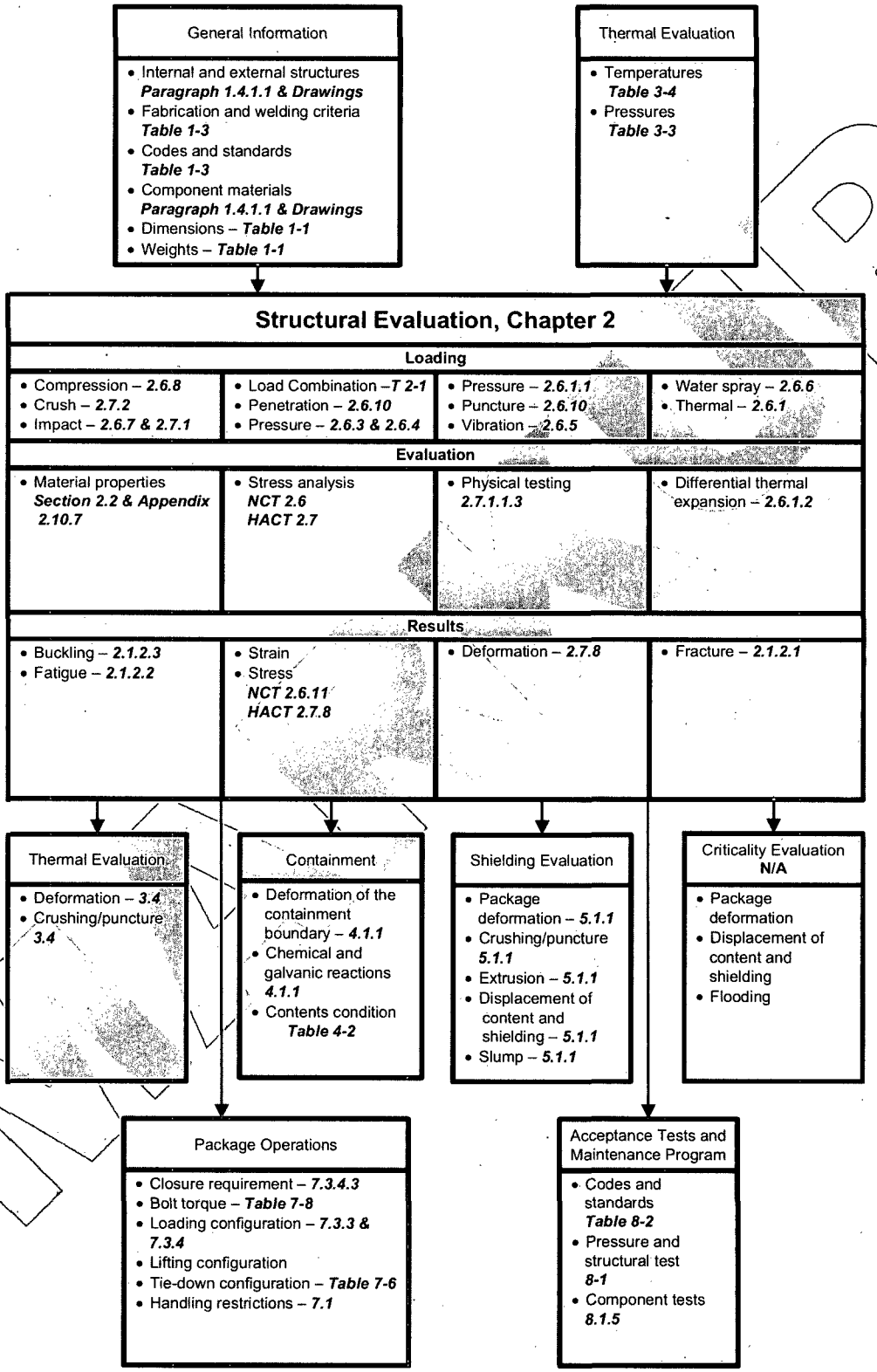
2 STRUCTURAL EVALUATION



Note: *Unless indicated otherwise, all information related to the Model AOS-100A is also applicable to the Model AOS-100A-S.*

This chapter presents the structural evaluation of the AOS Radioactive Material Transport Packaging System (AOS Transport Packaging System), to demonstrate that the design meets all applicable structure criteria. All Transport Packaging components are evaluated to their specific regulatory requirements. Normal and Hypothetical Accident conditions of transport were applied, in accordance with *10 CFR 71* **[2.1]** and *IAEA TS-R-1* **[2.2]** requirements. Analytic demonstration techniques comply with the methodology presented in *Regulatory Guide 7.6* **[2.3]** when the different loadings are combined, as provided in *Regulatory Guide 7.8* **[2.4]**.

- **Engineering Analyses** – Most of the engineering analyses were performed using finite element methods. The computer program used LIBRA, a multipurpose finite element program applicable to static and dynamic analyses of linear and nonlinear structural systems. A detailed description of the LIBRA program and a summary of the verification and qualification studies conducted in support of this evaluation are provided in Appendix 2.10.5, "LIBRA Finite Element Analysis Program and Verification Problems." The finite element analytical evaluation is primarily concentrated on the cask structure, due to its containment functions. For the evaluated conditions, finite element analyses and material properties relationship were used. For all drop conditions, the deceleration forces and their distribution onto the cask were applied using finite element methods. Load distributions were obtained for the drop test results. The analyses results demonstrated that all AOS Transport Packaging System models have the capability to meet regulatory requirements.
- **Free-Drop Test** – This test was performed to verify the analytical procedure used by identifying the deceleration forces applied by the impact limiter components on the cask structure, at different drop orientations. It was also performed to identify the distribution of these forces onto the cask structure by way of pressure-sensitive film, installed at the cask/impact limiter interface.
- **Component Tests** – Performance of these tests enhanced and/or verified understanding of materials and AOS Transport Packaging System components' behavior under design conditions.

Table 2-1 presents a summary of the engineering evaluation analyses performed on each AOS Transport Packaging System model.

MAIN

Table 2-1. AOS Transport Packaging System Analyses Summary – All Models

Item	10 CFR 71 [2.1]	IAEA TS-R-1 [2.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Package Category			III	III	II	III	II	I	I	
Packaging Weight			71.4 kg (157 lbs)	71.4 kg (157 lbs)	3,950 kg (8,700 lbs)	3,232 kg (7,125 lbs)	3,901 kg (8,600 lbs)	18,234 kg (40,200 lbs)	15,535 kg (34,250 lbs)	
Content[a]			Activated	Activated	Activated	Activated	Activated	Activated	Activated	
Physical Form (Normal or Special)			Solid[b]	Solid[2]	Solid	Solid	Solid	Solid	Solid	
Decay Heat										
Activated Materials			10W	100W Isotope	400W Isotope	400W Isotope	400W Isotope	7,000W (7 kW) Isotope	2,500W (2.5 kW) Isotope	
Fissile Material			–	–	–	–	–	–	–	
General	71.33	606 – 616	✔	✔	✔	✔	✔	✔	✔	
Design Pressure			207 kPa (30 psia)	414 kPa (60 psia)	1,931 kPa (280 psia)[c]	1,931 kPa (280 psia)	1,931 kPa (280 psia)	1,517 kPa (220 psia)[c]	1,517 kPa (220 psia)	
Structural										
Weight and Cg			✔	✔	✔	✔	✔	✔	✔	
Lifting Devices	71.45(a)	7607, 7608	✔	✔	✔			✔		
Tie-Down Devices	71.45(b)	612, 636	✔	✔	✔			✔		
Containment Shell Buckling			✔	✔	✔	✔	✔	✔	✔	

Table 2-1. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [2.1]	IAEA TS-R-1 [2.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Normal Conditions of Transport	71.71(c)	651								
Heat	71.71(c)(1)	653, 654, 664, 676	✔	✔	✔			✔		38°C (100°F) shade < 50°C (122°F)
Differential Thermal Expansion			✔	✔	✔			✔		
Cold	71.71(c)(2)	664, 676	✔	✔	✔			✔		
Reduced External Pressure	71.71(c)(3)	643	✔	✔	✔			✔		
Increased External Pressure	71.71(c)(4)		✔	✔	✔			✔		
Vibration	71.71(c)(5)	612	✔	✔	✔			✔		(5, 5 and 10 g's) ANSI N14.23 Draft
Water Spray	71.71(c)(6)	719, 721	✔	✔	✔			✔		
Free Drop	71.71(c)(7)	720, 722	1.2m (4 ft.)	1.2m (4 ft.)	1.2m (4 ft.)			0.3m (1 ft.)		Solid: 0.3m (1 ft.) and 1.2m (4 ft.) Liquid[d]: 9m (30 ft.)

Superseded

Table 2-1. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [2.1]	IAEA TS-R-1 [2.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Corner Drop	71.71(c)(8)	722(b)&(c)	–	–	–	–	–	–	–	
Compression (Stacking)	71.71(c)(9)	723(a)	✔	✔	✔			–	–	5x Weight or 13 kPa (2 psi) * Projected Area
Penetration	71.71(c)(10)	724(b)	✔	✔	✔			✔		3.2 cm (1.25 in.) and 6 kg (13 lbs.) dropped 1.7m (67 in.)
Hypothetical Accident Conditions of Transport	71.73(a)&(b)	726								
Free Drop	71.73(c)(1)	727(a)	✔	✔	✔			✔		
Crush	71.73(c)(2)	727(c)	–	–	–	–	–	–	–	
Puncture	71.73(c)(3)	727(b)	✔	✔	✔			✔		15 cm (6 in.) diameter 20 cm (8 in.) long Distance of 1.0m (40 in.)
Thermal	71.73(c)(4)	728	✔	✔	✔			✔		
Immersion (Fissile Material)	71.73(c)(5)	731	–	–	–	–	–	–	–	

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Table 2-1. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [2.1]	IAEA TS-R-1 [2.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Immersion	71.73(c)(6)	729	✔	✔	✔			✔		150 kPa (21.7 psi)
Deep Water Immersion	71.61	730	✔	✔	✔			✔		2 MPa (290 psi)
Thermal										
Normal Conditions of Transport										
38°C (100°F) Ambient + Decay Heat + Solar			✔	✔	✔			✔		
38°C (100°F) Ambient + Decay Heat			✔	✔	✔			✔		
-29°C (-20°F) Ambient + Decay Heat			✔	✔	✔			✔		
-29°C (-20°F) Ambient			✔	✔	✔			✔		
-40°C (-40°F) Ambient + Decay Heat			✔	✔	✔			✔		
-40°C (-40°F) Ambient			✔	✔	✔			✔		
Hypothetical Accident Conditions of Transport										
Fire			✔	✔	✔			✔		

Superseded

Table 2-1. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [2.1]	IAEA TS-R-1 [2.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Containment										
Internal Pressure (Fission Gases)			–	–	–	–	–	–	–	
Lid Joint			✔	✔	✔			✔		
Shielding										
Source Term			✔	✔	✔	✔	✔	✔	✔	
Decay Heat			✔	✔	✔	✔	✔	✔	✔	
Gamma Dose			✔	✔	✔	✔	✔	✔	✔	
Neutron Dose					✔			✔		
Transportation Index			✔	✔	✔	✔	✔	✔	✔	

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Table 2-1. AOS Transport Packaging System Analyses Summary – All Models (Continued)

Item	10 CFR 71 [2.1]	IAEA TS-R-1 [2.2]	Model							Applied Conditions/ Criteria
			AOS-025A	AOS-050A	AOS-100A	AOS-100B	AOS-100A-S	AOS-165A	AOS-165B	
Criticality										
Criticality Safety Index (CSI)					✔			✔		
Normal Conditions of Transport					✔			✔		
Hypothetical Accident Conditions of Transport					✔			✔		

a. *Encapsulated solid material or solid metal meeting Normal or Special form criteria.*

b. *The Model AOS-025A and AOS-050A transport packages were analyzed to the requirement of transporting liquid, Reference* **[2.2]**, *Paragraph 725(a). In a future submittal, the transportation of liquid form will be requested for these models.*

c. *The Model AOS-100A and AOS-165A transport packages were analyzed for future fission gases of future fuel materials.*

d. *Analyzed for future request for liquids.*

REVIEW UP

2.1 STRUCTURAL DESIGN DESCRIPTION

2.1.1 Discussion

The AOS Transport Packaging System encompasses a group of transport packaging, scaled up or down from a basic design, the Model AOS-100 transport package. Figure 2-1 through Figure 2-4 provide isometric views of each model (Models AOS-025A, AOS-050A, AOS-100A/AOS-100A-S, and AOS-165A, respectively). Figure 2-5 and Figure 2-6 present an isometric view of the cask and impact limiter components, respectively. There are some variations within the packaging system models, such as shielding materials, sizes and number of bolts, foam density, and so forth. Only the cask structure is a true scale of the basic design, with minor variation to accommodate standard size components or features in the various scaled versions.

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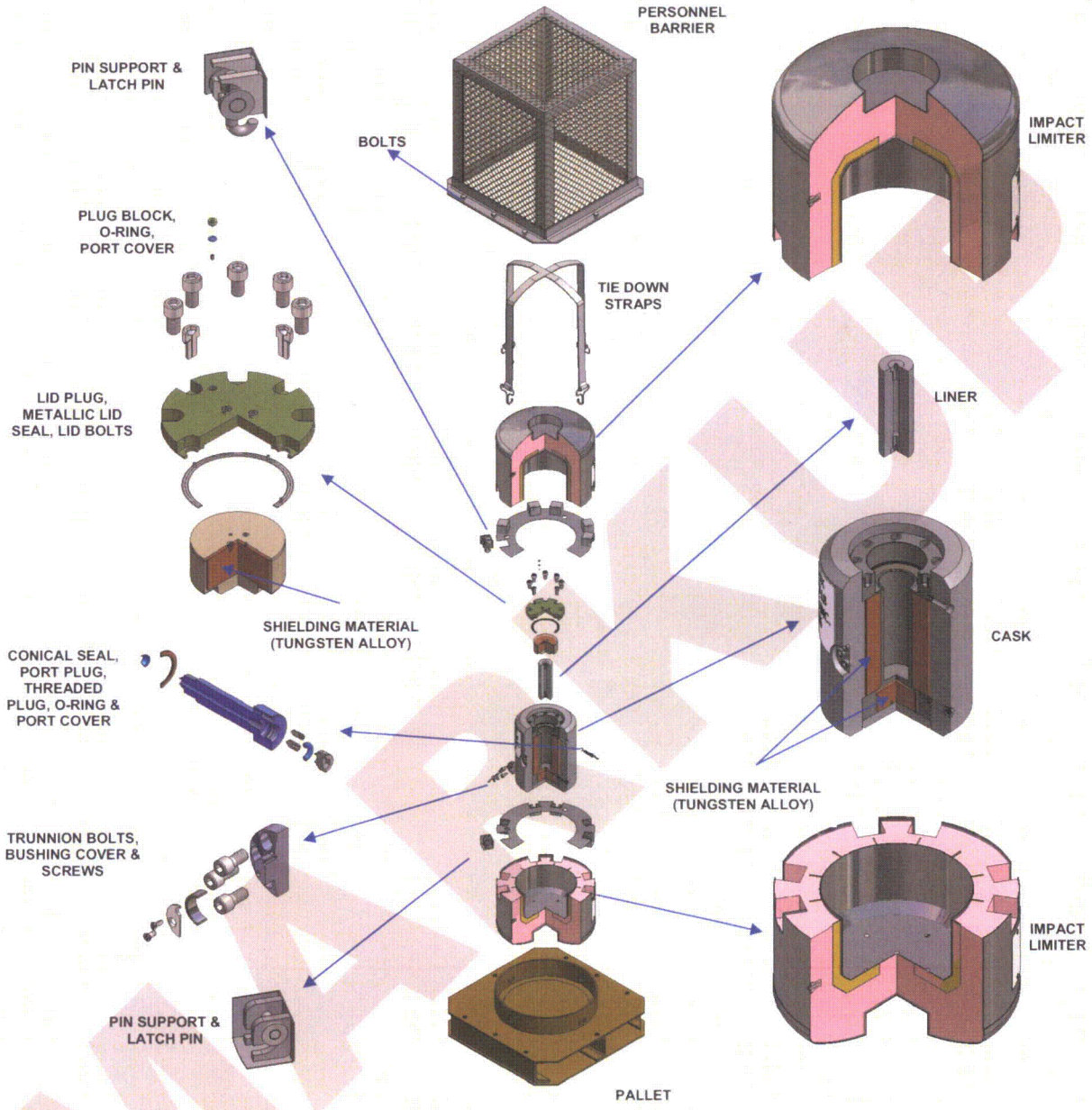

Figure 2-1. Transport Package, Isometric View – Model AOS-025A

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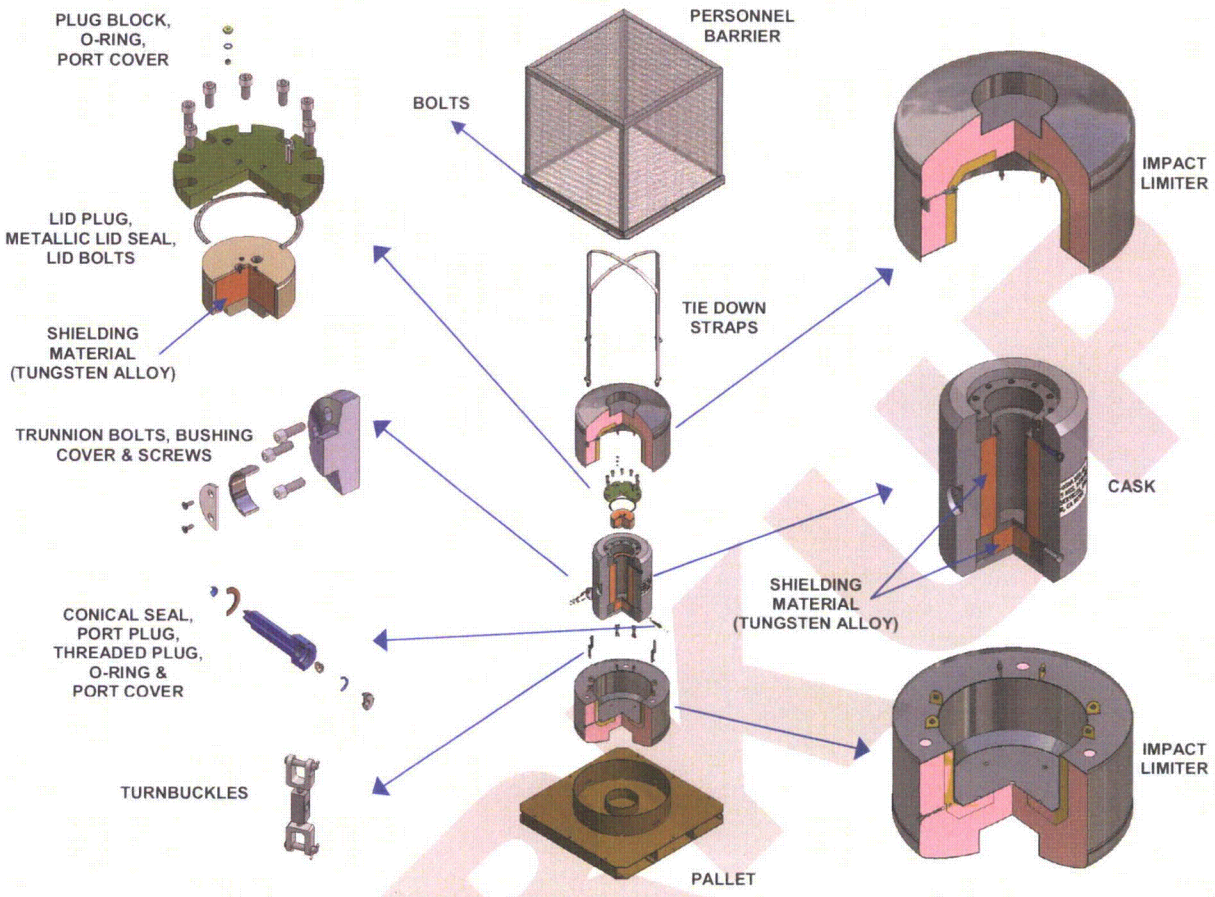

Figure 2-2. Transport Package, Isometric View – Model AOS-050A

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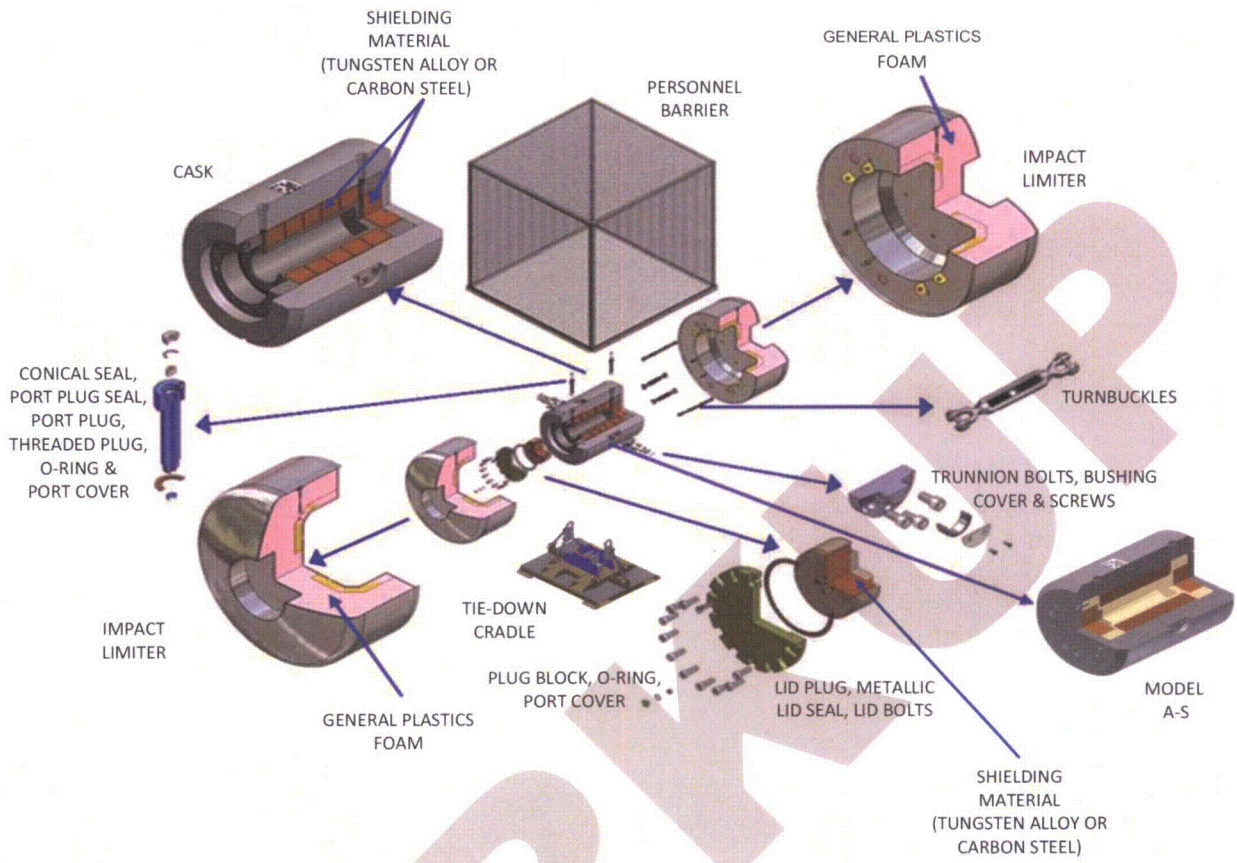

Figure 2-3. Transport Package, Isometric View – Model AOS-100A/AOS-100A-S

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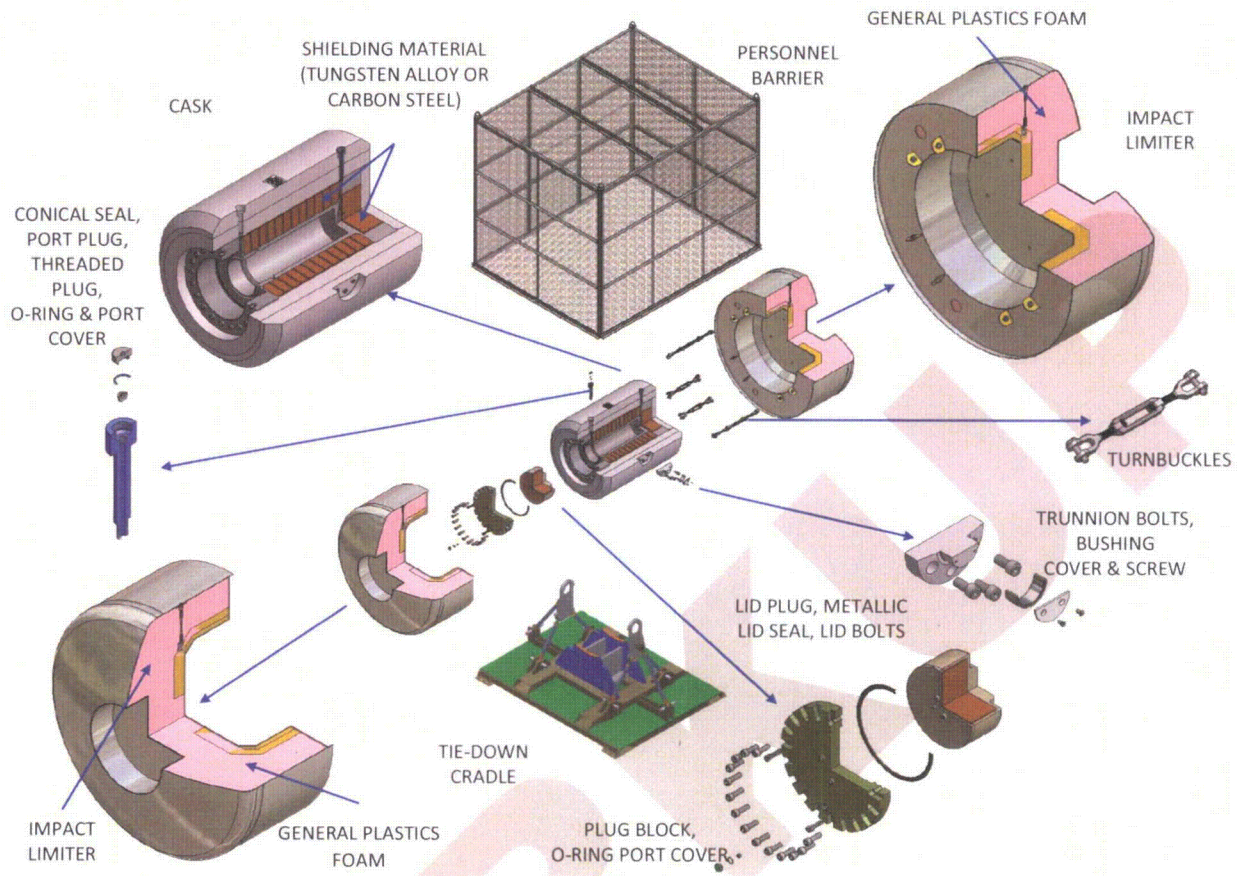

Figure 2-4. Transport Package, Isometric View – Model AOS-165A

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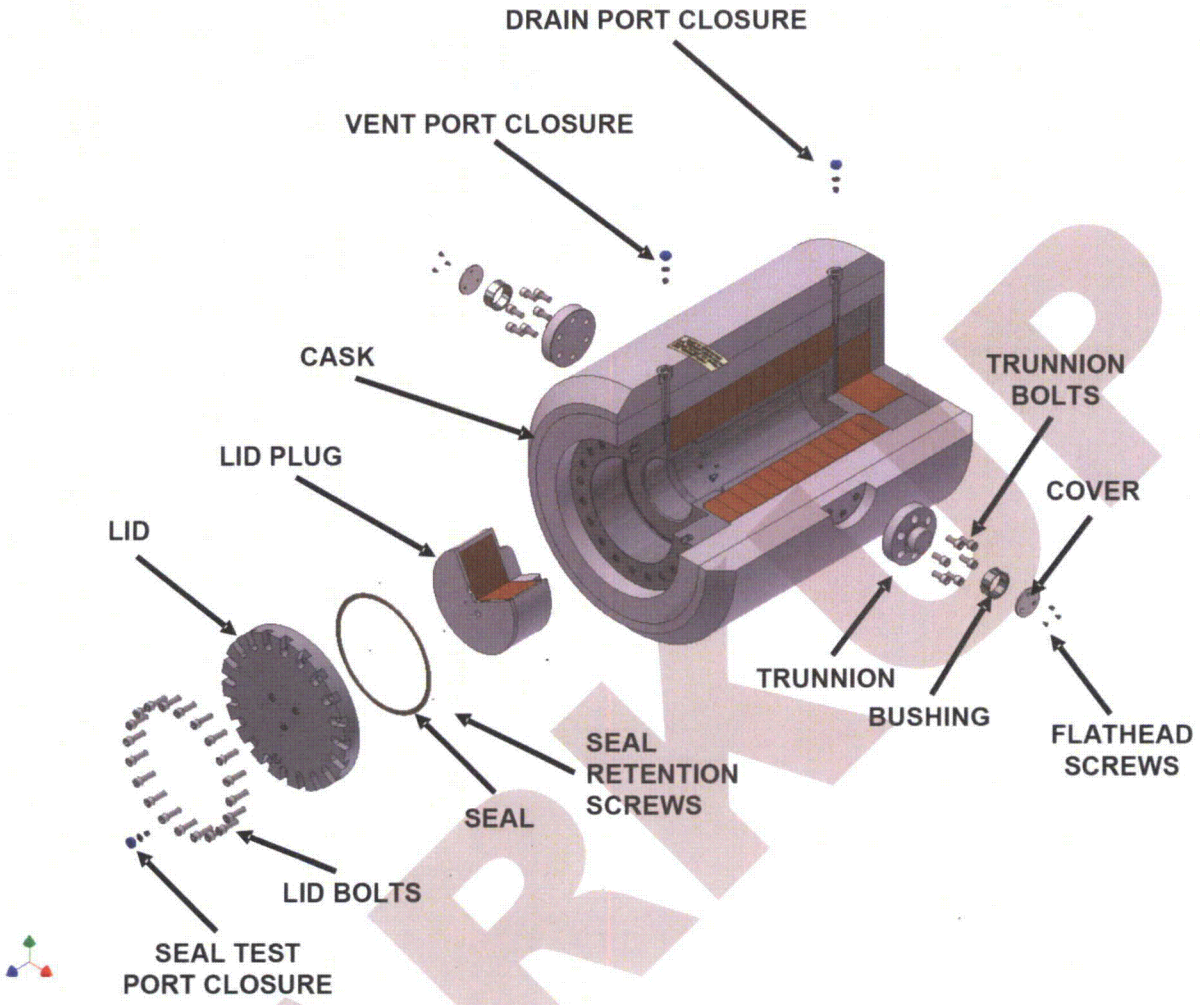

Figure 2-5. Typical Cask – Isometric View

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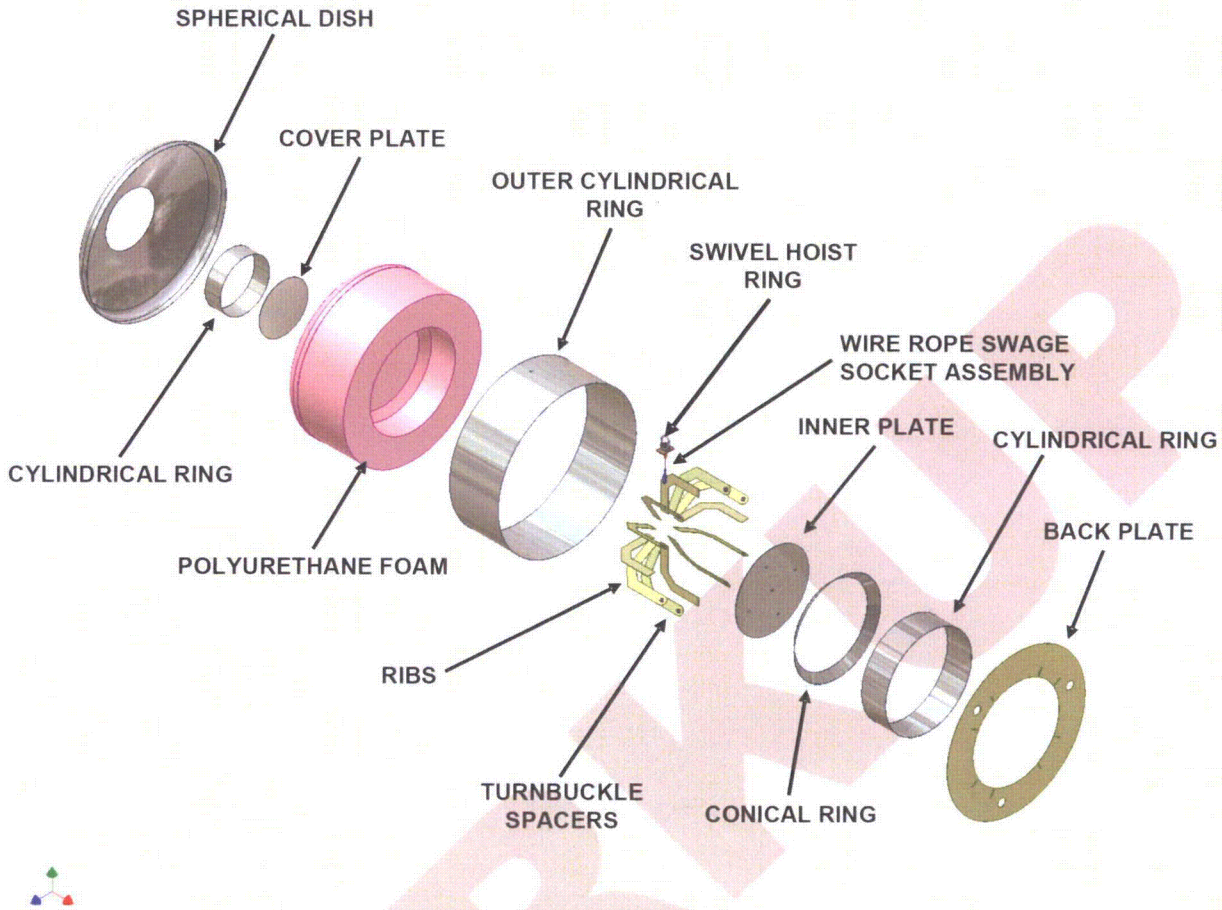

Figure 2-6. Typical Overpack (Impact Limiter) – Isometric View

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The AOS Transport Packaging System consists of three (3) main components:

- Cask
- Impact limiters
- Lid seal

The cask component is constructed of 300 series stainless steel (SS300) material. Tungsten alloy or carbon steel materials are embedded within the cask body and lid plug cask components, to enhance the cask assembly's shielding capability. Aided by the seal, the cask also provides containment to the radioactive material content. The impact limiters attach to one another, typically by eight (8) turnbuckles, covering each end of the cask. These packaging components, constructed of 300 series stainless steel (SS300) thin shell, filled with polyurethane foam, mitigate mechanical and thermal loads generated during Normal and Hypothetical Accident conditions of transport.

All transport package models use a metallic, double "C" cross-section seal. For further details, refer to Subsection 4.1.3, "Lid Seal."

The evaluation presented herein covers four (4) model sizes – AOS-025, AOS-050, AOS-100, and AOS 165 – with variation on shielding materials, impact limiter design, and so forth. Note that the Model AOS-100A-S – is double-ended – it has a lid/lid plug combination at both ends.

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2.1.2 Design Criteria

This subsection defines the allowable stresses for all Load Combinations defined in Reference **[2.3]**. Table 2-2 presents a summary of the Load Combinations for Normal and Hypothetical Accident conditions of transport, and introduces the Finite Element Analysis (FEA) models used in the evaluation. The Load Combinations presented in Table 2-6 were adapted from Reference **[2.3]**, with some additions to reflect current regulatory requirements. Normal and Hypothetical Accident conditions of transport design criteria for stress are obtained from Reference **[2.2]**.

Under Normal conditions of transport, the following design criteria apply:

$P_m < S_m$

$P_m + P_b < 1.5\ S_m$

$P_m + P_b + Q < 3.0\ S_m$

Under Hypothetical Accident conditions of transport, the following design criteria apply:

P_m lesser of $2.4\ S_m$, or $0.7\ S_u$

$P_m + P_b$ lesser of $3.6\ S_m$, or S_u

where:

S_m	=	Algebraic difference of any two of the Principal Stresses
P_m	=	Primary Membrane Stress
P_b	=	Primary Bending Stress
Q	=	Secondary Thermal Stress
S_u	=	Ultimate Stress

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Table 2-2. Summary of Load Combinations for Normal and Hypothetical Accident Conditions of Transport – All Models

Evaluation Conditions	Load Combinations									
	Ambient Temperature			Decay Heat		Insolation		Internal Pressure		Fabrication Stresses
	38°C (100°F)	- 29°C (-20°F)	-40°C (-40°F)	Max.	Zero	Max.[a]	Zero	Max.	Min.	
Normal Conditions of Transport (Analyze Individually)										
Hot Environment	101			101			101		101	211
	102			102		102		201	102	211
Cold Environment		103			103		103		103	211
			104		104		104		104	211
			105	105					105	211
		106		106					106	211
Internal Design Pressure (varies by model)	102			102		102		201		211
Reduced External Pressure – 24.5 kPa (3.5 psia)	102			102		102		202		211
Increased External Pressure – 140 kPa (20 psia)		103			103		103	203	103	211
Compression Load (5x weight)	215			101			101	201	201	211
Rod Drop onto Cask	216			101			101	201		211
	216		104		104			201		211
Vibration, Forward Load	221			102		102		201		211
	221	103			103		103		103	211
Vibration, Lateral Load	222			102		102		201		211
	222	103			103		103		103	211
Vibration, Vertical Load	223			102		102		201		211
	223	103			103		103		103	211
4-ft. Head-On Drop	231	102		102		102		201	201	211
Impact Test	232			102		102		201		211

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Table 2-2. Summary of Load Combinations for Normal and Hypothetical Accident Conditions of Transport – All Models (Continued)

Evaluation Conditions	Load Combinations									
	Ambient Temperature			Decay Heat		Insolation		Internal Pressure		Fabrication Stresses
	38°C (100°F)	-29°C (-20°F)	-40°C (-40°F)	Max.	Zero	Max.[a]	Zero	Max.	Min.	
Hypothetical Accident Conditions of Transport (Apply Sequentially)										
Free Drop										
Head-On Orientation	301			102		102		201		211
Side Orientation + Slap Down	302			102		102		201		211
			305		104		104		104	211
Cg/Corner Orientation	303			102		102		201		211
			306		104		104		104	211
Puncture	311			101			101	201		211
Thermal										211
Fire at 30 minutes	111			102		102		201		211
Fire at 60 minutes	112			102		102		201		211
Fire at 90 minutes	113			102		102		201		211
Fire at 120 minutes	114			102		102		201		211
Fire at 150 minutes	115			102		102		201		211
Fire at 180 minutes	116			102		102		201		211
Deep Water Immersion	204			101		101		201		211

a. Numbers refer to a specific load condition (case). For example, Load Case 101 refers to a condition where the environment conditions are 38°C (100°F) ambient temperature, zero (0) insolation, maximum decay heat, and zero (0) internal pressure.

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Thermal design criteria (refer to Table 2-3) are specified for regions throughout the cask (such as the cask cavity and outside overpack wall). The metallic lid seal material and the elastomeric port seal material have different temperature limits, establishing the thermal criteria for the region associated with the seal areas. Each AOS Transport Packaging System model design's pressure is based upon the cavity geometry and the model's proposed payload.

In addition to the design criteria presented in Table 2-3, allowable stresses for the following failure modes are provided:

- Brittle Fracture
- Fatigue
- Buckling

Each is described in the subsections that follow.

Table 2-3. Metallic and Elastomeric Seal Thermal Design Criteria – All Models

Load Condition	Seal Type	Temperature						Structural Material Allowable Stress (ksi)		
		Stress Section		Seal Area		Package Outside Boundary[a]				
		°C	°F	°C	°F	°C	°F			
Normal	Metallic (Lid)	400	752	300	572	85	185	S_m	$1.5S_m$	$3.0S_m$
	Elastomeric (Port)			232	450	50	122	20.0	30.0	60.0
Hypothetical Accident	Metallic (Lid)	400	752	427	800	–	–	$2.4S_m$	–	$3.6S_m$
	Elastomeric (Port)			232	450	–	–	48.0	–	70.0

a. Exclusive/Non-exclusive use.

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2.1.2.1 Brittle Fracture

Brittle fracture is not considered in this evaluation because all containment and non-containment structural components are fabricated of 300 series stainless steel (SS300). Because this material does not undergo a ductile-to-brittle transition in the temperature range of interest [down to -40°C (-40°F)], it is safe from brittle fracture.

The bolts are fabricated to conform with ASME SB-637 UNS N07750 Type 3; however, they are excluded from brittle fracture consideration because *NUREG/CR-1815* **[2.5]**, Section 5, states that, "bolts are generally not considered as fracture-critical components because multiple load paths exist and because bolted systems are designed to be redundant." However, these bolts are required to be impact tested at -40°C (-40°F).

2.1.2.2 Fatigue

The fatigue evaluation is limited to fatigue on the bolts that is caused by applying the required pre-load and by the shock and vibration loading during transportation of the package. Pressurization and thermal loads do not significantly contribute to fatigue loading, because of their magnitude and long period.

The allowable life of the package component is the number of cycles given on the design fatigue curve in Reference **[2.5]**, Section 5, Figure 1-9.2, corresponding to the maximum corrected value of the fatigue stress (S_{alt}). The value of S_{alt} is corrected by the ratio of the modulus of elasticity given on the design fatigue curve to the modules of elasticity of the component material used in the analysis.

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2.1.2.3 Buckling

The AOS Transport Packaging System cask shells are not likely to experience buckling instability, based upon their R/t ration due to forces generated under Normal and Hypothetical Accident conditions of transport. However, because buckling is an unacceptable failure mode for the containment boundary (located within the cask component of the transport package), per Reference **[2.3]**, the buckling critical force F_{cr} is calculated below, for each packaging system model.

Cask buckling under external loading requires the outside shell to buckle. Buckling of the outside shell, under compressive loading, is conservatively evaluated using the formula provided in Reference **[2.7]**.

$$F_{cr} = 0.182\ E * t/r$$

where:

E = Material module of elasticity

t = Shell wall thickness

r = Shell radius

Table 2-4. F_{cr} = 0.182 E * t/r Equation Values – All Models[a]

Model	E (psi)	t (in.)	r (in.)	F_{cr} (psi)
AOS-025	$28 * 10^6$	1.5	2.75	$2.78 * 10^6$
AOS-050	$28 * 10^6$	3.0	5.5	$2.78 * 10^6$
AOS-100	$28 * 10^6$	6.0	11.0	$2.78 * 10^6$
AOS-165	$28 * 10^6$	9.9	18.15	$2.78 * 10^6$

a. The high F_{cr} value precludes a buckling failure.

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2.1.2.4 FEA Models

Two (2) FEA models are used in the stress analyses of the Model AOS-025, AOS-050, and AOS-100 transport packages – axisymmetric (2D) and 3D. The 2D and 3D models are represented in Figure 2-7 and Figure 2-8, respectively. A rendered plot of the 3D model is provided in Figure 2-9. The 2D model contains approximately 5,500 nodes and 5,500 elements, and the 3D model contains approximately 72,700 nodes and 66,400 elements. Both static and dynamic analyses are performed on the 2D model, while the 3D model is used only for static loads.

The 3D model is generated by rotation of the 2D model. The 2D and 3D models are compatible. The 3D model is composed of 12 identical sections, over a 180° azimuth. In all 3D analyses, there is symmetry about the 0 to 180° meridian plane, requiring only a 180° model. The nodal and element numbers are defined such that adjacent section numbers differ by 10,000. Quad and triangular elements in the 2D model are transformed into solid brick and wedge elements in the 3D model. Spring elements are preserved in the 3D model, and gaps are assumed closed in 3D analyses.

A different set of models is used in the Model AOS-165 transport package analyses, because the package has a slightly different construction. The difference between the Model AOS-165 and other transport packages is that the Model AOS-165's outside shell is composed of two shells that are connected by welds and shrunk fit. The 2D model FEA Model AOS-165 transport package is represented in Figure 2-10.

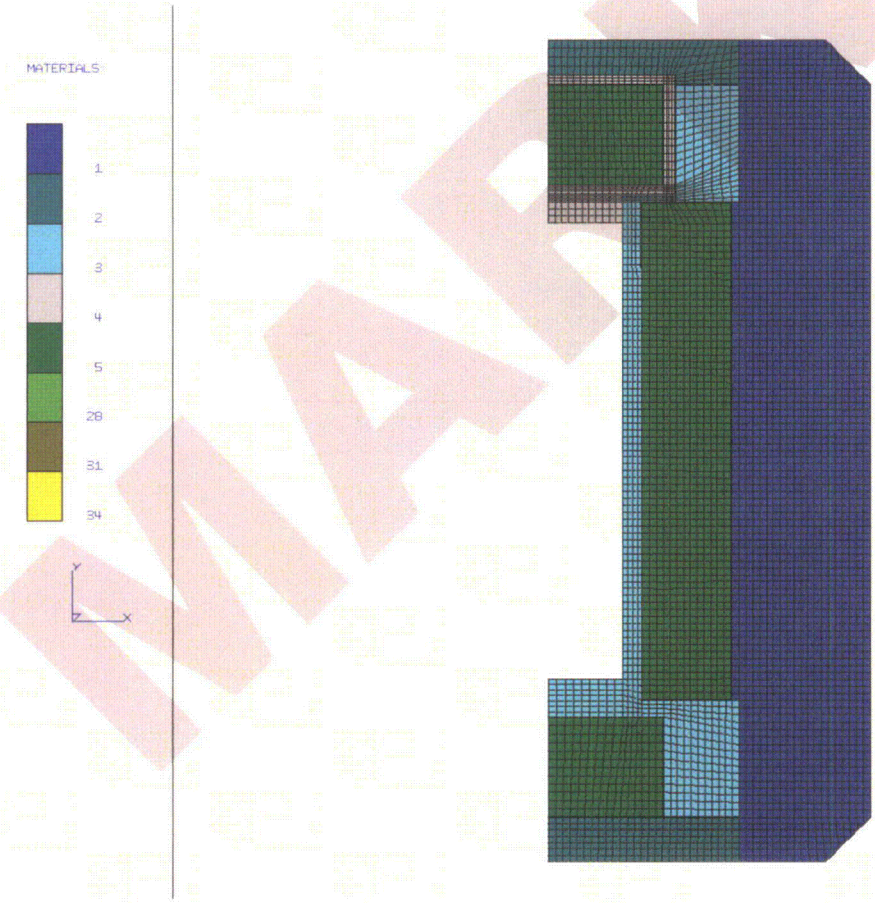

Figure 2-7. Axisymmetric (2D) Model – Model AOS-025, AOS-050, and AOS-100

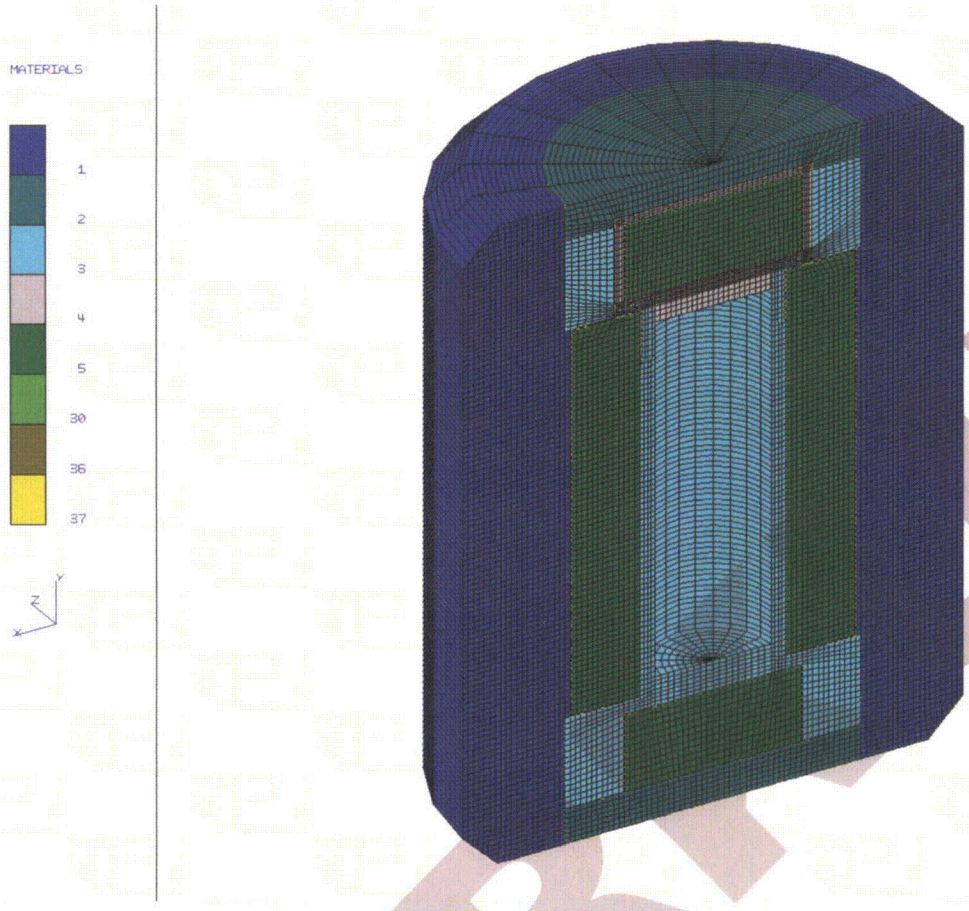

Figure 2-8. 3D Model – Model AOS-025, AOS-050, and AOS-100

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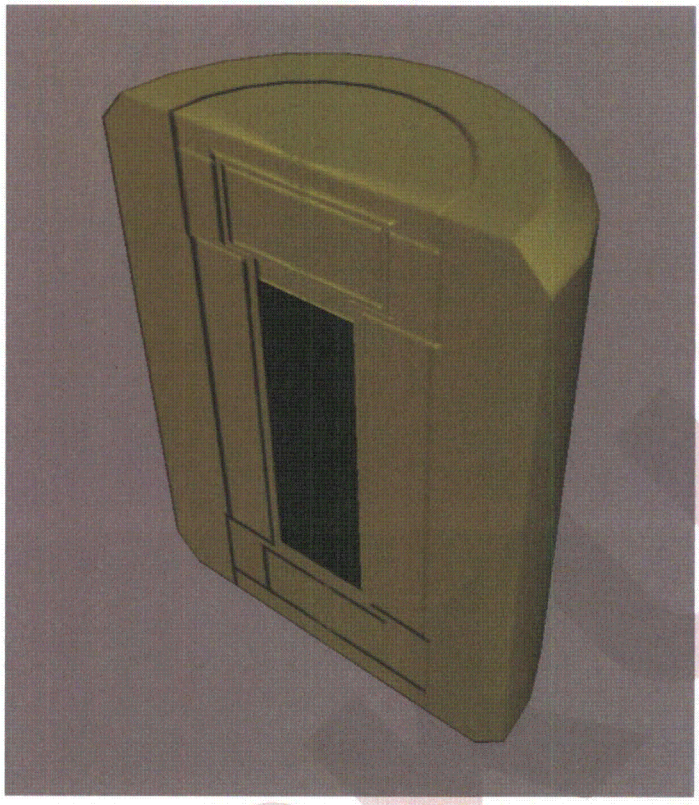

Figure 2-9. 3D, Rendered Model – Model AOS-025, AOS-050, and AOS-100

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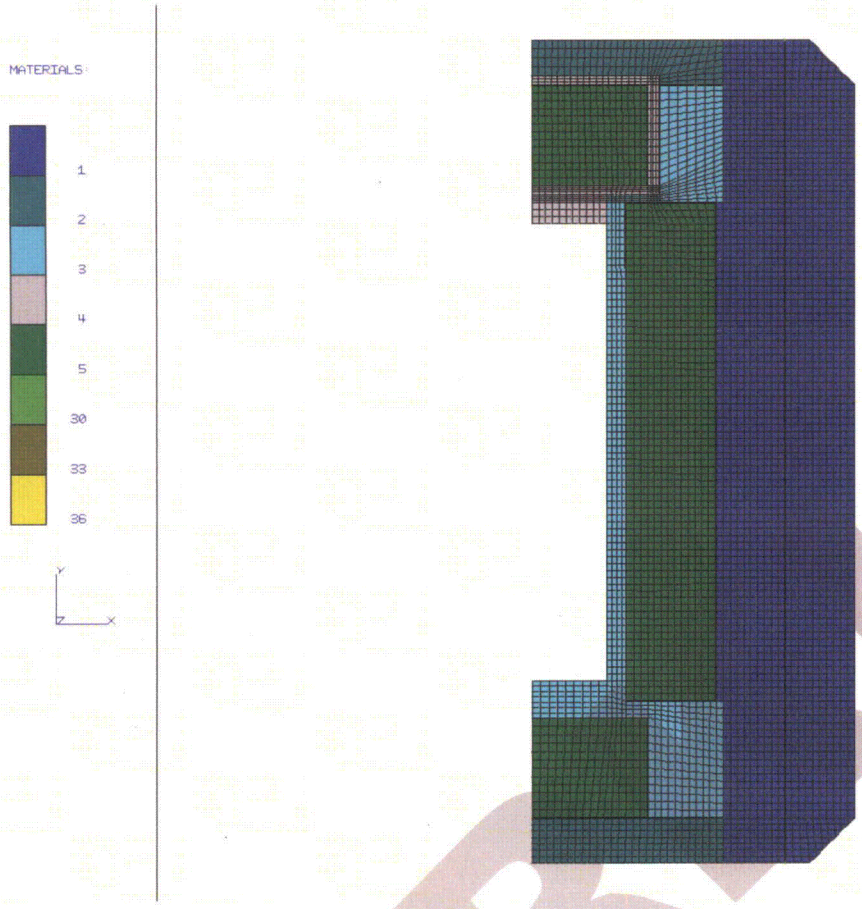

Figure 2-10. Axisymmetric (2D) Model – Model AOS-165

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2.1.2.4.1 Stress Monitoring Locations

The Model AOS-025, AOS-050, and AOS-100 transport packages have 22 stress monitoring locations, illustrated in Figure 2-11. Each location is a cross-section of an inside or outside shell, and contains several elements. Table 2-5 lists the elements that comprise each cross-section.

The Model AOS-165 transport package has 25 stress monitoring locations, illustrated in Figure 2-12. Each location is a cross-section of a cask inside or outside shell, and contains several elements. Table 2-6 lists the elements that comprise each cross-section.

Force and moment resultants at each monitored cross-section are evaluated by integrating the element stresses in the cross-section elements. Element stresses are output at element Gaussian integration points, and the integrations for force and moment resultants are based upon the stress and geometry data at the gauss points. The integrated force and moment resultants are used to determine P_m and P_b stresses for the monitored cross-section.

In 3D analyses, stress is evaluated at monitoring locations in each of the 12 azimuth sections. Therefore, stresses are evaluated at 12 times the number of locations used in 2D analyses. The maximum values found in any of the 12 azimuth sections are used in forming stress combinations.

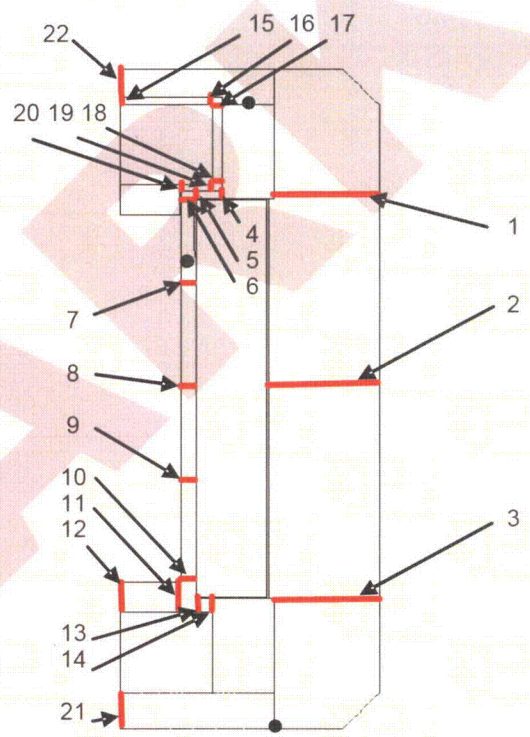

Figure 2-11. P_m and P_b Stress Monitoring Points – Model AOS-025, AOS-050, and AOS-100

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Table 2-5. P_m and P_b Stress Monitoring Section Elements – Models AOS-025, AOS-050, and AOS-100

Section	Elements
1	1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155
2	552, 904, 905, 906, 907, 908, 909, 910, 911, 912, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596
3	348, 349, 350, 351, 352, 353, 354, 355, 356, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516
4	4587, 4591, 4595, 4599
5	4572, 4575, 4578, 4581
6	4552, 4553, 4554, 4555
7	4476, 4477, 4478, 4479
8	4408, 4409, 4410, 4411
9	4344, 4345, 4346, 4347
10	4280, 4281, 4282, 4283
11	4141, 4150, 4159, 4168, 4177, 4186, 4195
12	4133, 4142, 4151, 4160, 4169, 4178, 4187
13	4212, 4215, 4218, 4221
14	4214, 4217, 4220, 4223
15	5218, 5236, 5254
16	5235, 5253, 5271
17	5214, 5215, 5216, 5217
18	5166, 5167, 5168, 5169
19	5140, 5143, 5146, 5149
20	5122, 5126, 5130, 5134
21	3001, 3017, 3033, 3049, 3065, 3081, 3097
22	3190, 3208, 3226, 3244

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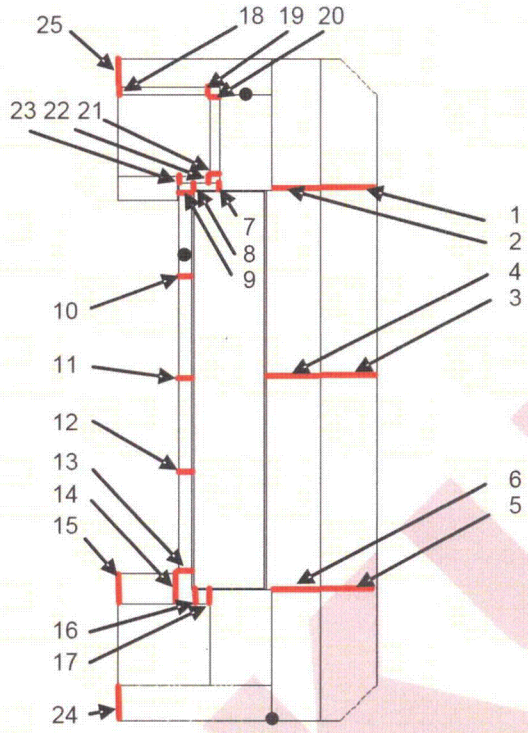

Figure 2-12. P_m and P_b Data Points – Model AOS-165

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Table 2-6. P_m and P_b Stress Monitoring Section Elements – Model AOS-165

Section	Elements
1	2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155
2	1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965
3	1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596
4	552, 904, 905, 906, 907, 908, 909, 910, 911, 912
5	507, 508, 509, 510, 511, 512, 513, 514, 515, 516
6	348, 349, 350, 351, 352, 353, 354, 355, 356
7	4587, 4591, 4595, 4599
8	4572, 4575, 4578, 4581
9	4552, 4553, 4554, 4555
10	4476, 4477, 4478, 4479
11	4408, 4409, 4410, 4411
12	4344, 4345, 4346, 4347
13	4280, 4281, 4282, 4283
14	4141, 4150, 4159, 4168, 4177, 4186, 4195
15	4133, 4142, 4151, 4160, 4169, 4178, 4187
16	4212, 4215, 4218, 4221
17	4214, 4217, 4220, 4223
18	5218, 5236, 5254
19	5235, 5253, 5271
20	5214, 5215, 5216, 5217
21	5166, 5167, 5168, 5169
22	5140, 5143, 5146, 5149
23	5122, 5126, 5130, 5134
24	3001, 3017, 3033, 3049, 3065, 3081, 3097
25	3190, 3208, 3226, 3244

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2.1.2.4.2 Load Cases and Load Combinations

Table 2-7 lists and describes the 31 Load Cases (18 Normal, and 13 Hypothetical Accident, conditions of transport) involved in evaluating each AOS Transport Packaging System model. Table 2-8 lists and describes the designation number associated with each Load Case.

The 2D model is predominately used in the stress analyses of the Load Cases. The 3D model is used to evaluate stress for vibration and shock loadings, and for side and Cg/corner drop loadings.

The 31 Load Cases are combined into 30 Load Combinations (15 Normal, and 15 Hypothetical Accident, conditions of transport), listed in Table 2-9. Load Combinations 1 to 299 are used for Normal conditions of transport. Load Combinations 300 to 399 are used for Hypothetical Accident conditions of transport. Table 2-9 lists only the Load Combinations applicable to the AOS Transport Packaging System.

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Table 2-7. Load Cases – All Models

Conditions of Transport	Load Case	Description
Normal	101	100°F Ambient, Maximum Decay Heat
	102	100°F Ambient, Maximum Decay Heat, Maximum Insolation
	103	-20°F Ambient, Zero Decay Heat, Zero Insolation
	104	-40°F Ambient, Zero Decay Heat, Zero Insolation
	105	-40°F Ambient, Maximum Decay Heat
	106	-20°F Ambient, Maximum Decay Heat
	201	Maximum Internal Pressure • Model AOS-025 – 207 kPa (30 psia) • Model AOS-050 – 414 kPa (60 psia) • Model AOS-100 – 1,931 kPa (280 psia) • Model AOS-165 – 1,517 kPa (220 psia)
	202	Minimum External Pressure, 24 kPa (3.5 psia)
	203	Maximum Increased External Pressure, 140 kPa (20 psia)
	204	Additional Increased External Pressure, 2 MPa (290 psia)
	211	Fabrication Stress
	215	Compression Load (5x weight)
	216	Rod Drop onto Cask
	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[a]	30-ft. Head-On Drop Impact Test, Normal Conditions
Hypothetical Accident	111	Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat
	112	Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
	113	Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
	114	Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
	115	Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
	116	Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
	301	30-ft. Head-On Drop
	302	30-ft. Side Drop + Slap-Down
	303	30-ft. Cg/Corner Drop
	304	30-ft. Head-On Drop at -40°F, Low Temperature
	305	30-ft. Side Drop + Slap-Down at -40°F, Low Temperature
	306	30-ft. Cg/Corner Drop at -40°F, Low Temperature
	311	4-ft. Drop onto Rod

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.*

Table 2-8. Load Case Designations – All Models

Conditions of Transport	Designating Number	Load Case Designation
Normal	101 to 106	Thermal Loading
	201 to 204	Pressure Loading
	211	Fabrication Stress Loading
	215	Compression Load
	216	Rod Impact Loading
	221 to 223	Vibration and Shock Loading
	231	4-ft. Drop Loading
	232[a]	Impact Test, Normal Condition
Hypothetical Accident	111 to 116	Fire Accident
	301 to 306	30-ft. Accident Drop Loading
	311	4-ft. Accident Drop Loading

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.*

Table 2-9. Load Combinations – All Models

Conditions of Transport	Load Combination	Load Cases[a]	Description
Normal	101	102, 201, 211	Hot Environment
	102	104, 201, 211	Cold Environment
	103	103, 201, 211	Increased External Pressure
	104	101, 201, 202, 211	Minimum External Pressure
	105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat
	106	101, 201, 203, 211	Maximum Pressure, Hot Environment
	107	105, 201, 203, 211	Maximum Pressure, 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	Forward Vibration
	222	222, 101, 201, 211	Lateral Vibration
	223	223, 101, 201, 211	Vertical Vibration
	231	231, 102, 201, 211	4-ft. Head-On Drop, Normal Conditions
	232[b]	232, 102, 201, 211	30-ft. Head-On Drop, Normal Conditions (Impact Test)

Table 2-9. Load Combinations – All Models (Continued)

Conditions of Transport	Load Combination	Load Cases[a]	Description
Hypothetical Accident	301	301, 102, 201, 211	Head-On Drop Orientation
	302	302, 102, 201, 211	Side Drop Orientation
	303	303, 102, 201, 211	Cg/Corner Drop Orientation
	304	304, 105, 202, 211	Head-On Drop Orientation at -40°F, Cold Environment
	305	305, 105, 202, 211	Side Drop Orientation at -40°F, Cold Environment
	306	306, 105, 202, 211	Cg/Corner Drop Orientation at -40°F, Cold Environment
	310	204, 101, 211	Additional Increased External Pressure (290 psi)
	311	311, 101, 201, 211	4-ft. Drop onto Rod
	312	311, 104, 201, 211	4-ft. Drop onto Rod at -40°F, Cold Environment
	350	111, 201, 211	Fire at 30 Minutes
	351	112, 201, 211	Fire at 60 Minutes
	352	113, 201, 211	Fire at 90 Minutes
	353	114, 201, 211	Fire at 120 Minutes
	354	115, 201, 211	Fire at 150 Minutes
	355	116, 201, 211	Fire at 180 Minutes

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

b. 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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2.1.3 Weights and Center of Gravity

Table 2-10 lists the dimensions, packaging weight, and center of gravity of each AOS Transport Packaging System model.

Table 2-10. AOS Transport Packaging System Dimensions and Cg Location – All Models

Model	Category	Dimensions (cm / in.)						Packaging Weight[a] (kg / lbs.)	Cg Location[b]		
		Packaging		Cask		Cavity					
		OD	Height	OD	Height	OD	Height		X	Y	Z
AOS-025A	III	28.96	39.62	17.78	22.86	4.14	12.70	71.4	19.05	19.05	26.34
		11.40	15.60	7.00	9.00	1.63	5.00	157	7.50	7.51	10.37
AOS-050A	III	57.96	79.25	35.56	45.72	8.26	25.40	511	41.91	41.91	46.28
		22.82	31.20	14.00	18.00	3.25	10.00	1,126	16.50	16.50	18.22
AOS-100A	II	115.93	158.50	71.12	91.44	16.51	50.80	3,950	91.44	89.15	80.03
		45.64	62.40	28.00	36.00	6.50	20.00	8,700	36.00	35.10	31.51
AOS-100B	III	115.93	158.50	71.12	91.44	16.51	50.80	3,232	91.44	89.15	80.03
		45.64	62.40	28.00	36.00	6.50	20.00	7,125	36.00	35.10	31.51
AOS-100A-S	II	115.93	158.50	71.12	91.44	16.51	50.80	3,901	91.44	89.15	80.03
		45.64	62.40	28.00	36.00	6.50	20.00	8,600	36.00	35.10	31.51
AOS-165A	I	191.26	264.16	117.35	150.88	27.23	83.82	18,234	152.40	121.41	121.92
		75.30	104.00	46.20	59.40	10.72	33.00	40,200	60.00	47.80	48.00
AOS-165B	I	191.26	264.16	117.35	150.88	27.23	83.82	15,535	152.40	121.41	121.92
		75.30	104.00	46.20	59.40	10.72	33.00	34,250	60.00	47.80	48.00

a. All AOS Transport Packaging System models have dimensions greater than 10 cm (4 in.).

b. Refer to Figure 2-13.

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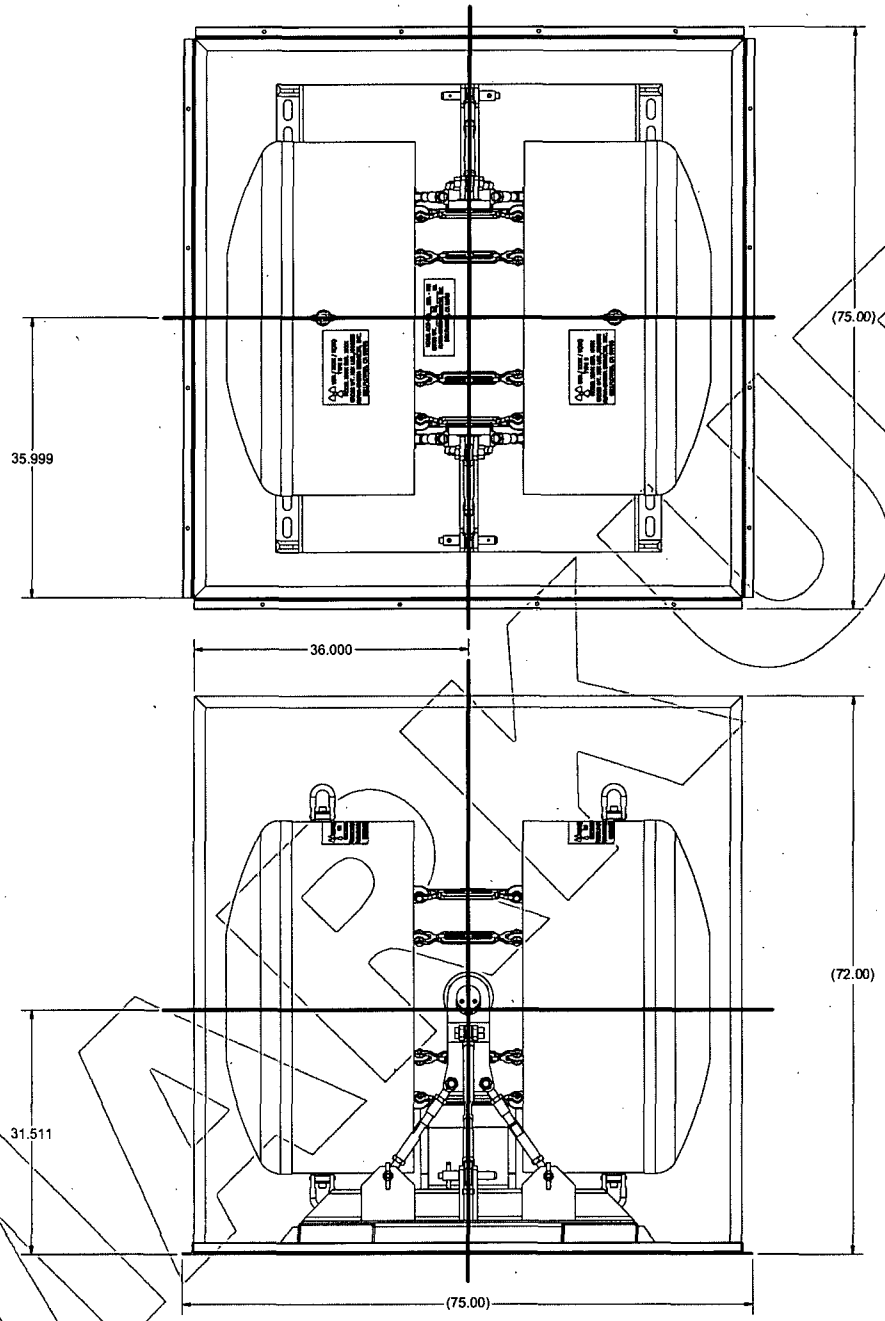

Figure 2-13. Center of Gravity – Model AOS-100

Note: *The dimensions (in inches) shown are for the Model AOS-100; however, the Cg locations are the same for all transport packaging system models.*

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2.1.4 Identification of Codes and Standards for Package Design

Table 2-11. Codes and Standards for Design, Fabrication, and Testing – All Models

Package Components or Features	Component Safety Group										
	Containment		Criticality	Other Safety							
	Primary Vessel, Bolts, Piping, Fittings, and Closure Bolts	Primary Seal	Support Structure/ Neutron Absorber	Gamma Shielding	Structural Shell, Bolts, and Closure	Secondary Seal	Neutron Shielding, Piping, and Fittings	Lifting Lugs	Heat Transfer Devices	Tie-Down Devices	Impact Limiters
Safety Classification	A	A	A	B	B	B	B	B	A	B	A
B&PV Code Section	Sec. III, Division 3		Sec. III, Division 1, Subsection NG	Sec. III, Division 1, Subsections NF and NG							Section VIII, Division 1
Material Requirements	WB-2000		NG-2000	SAE-AMS-T-21014, Class 3	NF-2000		NF-2000	NF-2000	NG-2000	NF-2000	UG
Forming, Fitting and Aligning	WB-4200		NG-4200		NF-4200		NF-4200	NF-4200	NG-4200	NF-4200	UG
Welding	WB-4400		NG-4400		NF-4400		NF-4400	NF-4400	NG-4400	NF-4400	UW
Qualification of Weld Procedure and Personnel	WB-4300		NG-4300		NF-4300		NF-4300	NF-4300	NG-4300	NF-4300	UW
Weld Heat Treatment	WB-4600		NG-4600		NF-4600		NF-4600	NF-4600	NG-4600	NF-4600	UW
Examination	WB-5000		NG-5000		NF-5000		NF-5000	NF-5000	NG-5000	NF-5000	UW/UG
Acceptance Testing	WB-6000	ANSI N14.5	Gamma Scan Test	Guidelines ASTM B311-2002	Per Applicable Code Standards	ANSI N14.5	–	ANSI N14.6	Per Paragraph 8.1.7	ANSI N14.6	Per Table 8.4

2.1.5 Margins of Safety

Table 2-12 and Table 2-13 list the Model AOS-100 transport package Minimum Margins of Safety (Min MS), for Normal and Hypothetical Accident conditions of transport, respectively.

Margins of safety data for the Model AOS-025 and AOS-050 transport packages is provided in Appendix 2.10.1.3 and Appendix 2.10.2.3, respectively. Margins of safety data for the Model AOS-165A and AOS-165B transport packages is provided in Appendix 2.10.3.3 and Appendix 2.10.4.3, respectively.

Table 2-12. Min MS for Normal Conditions of Transport – Model AOS-100

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
101	101 201 211 0 0	1.196E+00	4	Pm+Pb
102	104 201 211 0 0	1.196E+00	4	Pm+Pb
103	103 201 211 0 0	1.196E+00	4	Pm+Pb
104	101 201 202 211 0	1.146E+00	4	Pm+Pb
105	105 201 202 211 0	1.146E+00	4	Pm+Pb
106	101 201 203 211 0	1.087E+00	4	Pm+Pb
107	105 201 203 211 0	1.087E+00	4	Pm+Pb
215	215 101 201 211 0	9.592E-01	4	Pm+Pb
216	216 101 201 211 0	1.159E+00	4	Pm+Pb
217	216 104 201 211 0	1.159E+00	4	Pm+Pb
221	221 101 201 211 0	1.167E+00	4	Pm+Pb
222	222 101 201 211 0	1.176E+00	4	Pm+Pb
223	223 101 201 211 0	1.132E+00	4	Pm+Pb
231	231 102 201 211 0	6.315E-01	4	Pm+Pb

Table 2-13. Min MS for Hypothetical Accident Conditions of Transport – Model AOS-100

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
301	301 102 201 211 0	1.687E+00	4	Pm+Pb
302	302 102 201 211 0	2.605E+00	4	Pm+Pb
303	303 102 201 211 0	2.751E+00	4	Pm+Pb
304	304 105 202 211 0	2.363E+00	4	Pm+Pb
305	305 105 202 211 0	6.025E+00	1	Pm
306	306 105 202 211 0	7.071E+00	4	Pm
310	204 101 211 0 0	2.932E+00	4	Pm+Pb
311	311 101 201 211 0	4.418E-01	15	Pm
312	311 104 201 211 0	4.418E-01	15	Pm
350	111 201 211 0 0	3.854E+00	4	Pm+Pb
351	112 201 211 0 0	3.854E+00	4	Pm+Pb
352	113 201 211 0 0	3.524E+00	4	Pm+Pb
353	114 201 211 0 0	3.524E+00	4	Pm+Pb
354	115 201 211 0 0	3.524E+00	4	Pm+Pb

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2.2 MATERIALS

2.2.1 Material Properties and Specifications

The AOS Transport Packaging System is designed using the following materials:

- Stainless steel, 300 series (SS300)
- Tungsten alloy
- Carbon steel
- Rigid, closed-cell, polyurethane foam

The AOS Transport Packaging System has an impact limiter component consisting of rigid, closed-cell, polyurethane foam encased by a 300 series stainless steel (SS300) shell. This energy-absorbing and temperature insulation material is a General Plastics LAST-A-FOAM® FR-3700 product. The impact limiter's force-deflection data, for each AOS Transport Packaging System model, is provided in Appendix 2.10. These curves are obtained by performing a collapsed analysis with the LIBRA Finite Element code. A complete description of the analytical procedure, as well as all testing and validation performed to verify the procedure, are also provided in Appendix 2.10.

Table 2-14 through Table 2-16 list the mechanical properties used in the structural analysis.

Table 2-14. Stainless Steel Mechanical Properties (Reference [2.6]) – All Models

Temperature (°F)	E:10^6 (psi)	m	α:10^{-6}(1/°F)	ρ(Lbm/in^3) (Reference [2.8])	σy(ksi) (Reference [2.6])
-20 to 100	28.3	0.30	8.6	0.29	30.0
150	–		8.8		26.7
200	27.6		8.9		25.0
250	–		9.1		23.6
300	27.0		9.2		22.4
400	26.5		9.5		20.7
500	25.8		9.7		19.4
600	25.3		9.8		18.4
650	–		9.9		18.0
700	24.8		10.0		17.6
750	–		10.0		17.2
800	24.1		10.1		16.9
850	–		10.1		16.5
900	23.5		10.2		16.2
950	–		10.3		15.9
1,000	22.8		10.3		15.5

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Table 2-15. Lid Bolt Mechanical Properties – All Models

Model	Bolt Size and ASME Standard	Stress Area		Minimum Tensile Strength		Yield Strength	
		cm^2	in^2	kPa	ksi	kPa	ksi
AOS-025	3/8-16 UNC-1A ASME SB-637 UNS N07750 Type 3	0.500	0.078	1.17E+06	170	7.93E+05	115
AOS-050	1/2-13 UNC-1A ASME SB-637 UNS N07750 Type 3	0.915	0.142	1.17E+06	170	7.93E+05	115
AOS-100	7/8-9 UNC-1A ASME SB-637 UNS N07750 Type 3	2.981	0.462	1.17E+06	170	7.93E+05	115
AOS-165	1 1/4-7 UNC-1A ASME SB-637 UNS N07750 Type 3	6.252	0.969	1.17E+06	170	7.93E+05	115

Table 2-16. Trunnion Bolt Mechanical Properties – All Models

Model	Bolt Size and ASME Standard	Stress Area		Minimum Tensile Strength		Yield Strength	
		cm^2	in^2	kPa	ksi	kPa	ksi
AOS-025	1/4-28 UNF-2A ASME SA-193, Grade B6	0.235	0.036	7.58E+05	110	5.86E+05	85
AOS-050	3/8-24 UNF-2A ASME SA-193, Grade B6	0.566	0.088	7.58E+05	110	5.86E+05	85
AOS-100	3/4-16 UNF-2A ASME SA-193, Grade B6	2.406	0.373	7.58E+05	110	5.86E+05	85
AOS-165	1-12 UNF-2A ASME SA-193, Grade B6	4.277	0.663	7.58E+05	110	5.86E+05	85

2.2.2 Chemical, Galvanic, or Other Reactions

The AOS Transport Packaging System is fabricated from 300 series stainless steel (SS300), tungsten alloy, or carbon steel. The packaging construction excludes moisture at the stainless steel/tungsten alloy boundary, thus assuring no galvanic nor deleterious reactions can occur. The cask contents contact the stainless steel cavity surface. The radioactive material contents, in solid form, are placed in an inside container. AOS' experience in operating the 5979 Type B packages, with content-similar arrangements, indicates that neither chemical, galvanic, nor other reactions between the cask cavity surface and radioactive material containers, nor between these containers and their solid contents, occur.

2.2.3 Effects of Radiation on Materials

The cask component is comprised of 300 series stainless steel (SS300) and tungsten alloy or carbon steel, which are not significantly affected by radiation. The lid and port seal materials are resistant to radiation; however, they are replaced regularly, thereby preventing cumulative damage due to radiation.

2.3 FABRICATION AND EXAMINATION

2.3.1 Fabrication

Fabrication stresses are analyzed in Load Case 211. Fabrication stress loading in the Model AOS-025, AOS-050, and AOS-100 transport packages is applied by introducing a deformation of 0.25 mm (0.01 in.) across the inside cask shell welded joint. Fabrication stress loading in the Model AOS-165 transport package is applied by a deformation of 0.41 mm (0.016 in.) across the inside cask shell welded joint, and a shrink fit pressure of 8,620 kPa (1.25 ksi), along the junction of the two (2) outside shell segments.

Table 2-11, "Codes and Standards for Design, Fabrication, and Testing – All Models," summarizes the AOS Transport Packaging System fabrication and testing requirements. These requirements are implemented through a series of engineering documents (such as drawings, fabrication specifications, procedures, shop travelers, and so forth). Conformance to these requirements is monitored and documented throughout the fabrication and testing processes, by Quality Assurance (QA) personnel.

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2.3.2 Examination

Table 2-17 summarizes the AOS Transport Packaging System examination program. Additional detailed information is provided in Chapter 8, "Acceptance Tests and Maintenance Program."

Table 2-17. Examination Program Summary – All Models

Test Category	Test Type	Reference	Test Description
Materials			
Stainless Steel	Certified Material Test Report	ASME Code	Series of chemical and mechanical tests to determine conformance with material specification.
Tungsten Alloy	Density Verification	Engineering Specification	Calculating the resulting component density by weighing and dimensional inspecting components, to calculate volume.
Foam	Formulation Verification	Engineering Specification	Series of tests to establish the material characteristics baseline.
Fabrication			
Component	Adherence to Drawing	Engineering Specification	Visual and dimensional inspections.
Sub-assembly	Adherence to Drawing	Engineering Specification	Visual and dimensional inspections.
Assembly	Pressure and Containment	ASME Code	Hydrostatic and He leak test.
Weldment	NDE	ASME Code	Visual Test (VT), Penetrant Test (PT), and Ultrasonic Test (UT).

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2.4 GENERAL REQUIREMENTS FOR ALL PACKAGES

2.4.1 Minimum Package Size

Table 2-18 lists the smallest overall dimensions (OD) of each transport package model.

Table 2-18. Minimum Package Size – All Models

Model	Dimensions (cm / in.)					
	Packaging		Cask		Cavity	
	OD	Height	OD	Height	OD	Height
AOS-025A	28.96	39.62	17.78	22.86	4.14	12.70
	11.40	15.60	7.00	9.00	1.63	5.00
AOS-050A	57.96	79.25	35.56	45.72	8.26	25.40
	22.82	31.20	14.00	18.00	3.25	10.00
AOS-100A	115.93	158.50	71.12	91.44	16.51	50.80
	45.64	62.40	28.00	36.00	6.50	20.00
AOS-100B	115.93	158.50	71.12	91.44	16.51	50.80
	45.64	62.40	28.00	36.00	6.50	20.00
AOS-100A-S	115.93	158.50	71.12	91.44	16.51	50.80
	45.64	62.40	28.00	36.00	6.50	20.00
AOS-165A	191.26	264.16	117.35	150.88	27.23	83.82
	75.30	104.00	46.20	59.40	10.72	33.00
AOS-165B	191.26	264.16	117.35	150.88	27.23	83.82
	75.30	104.00	46.20	59.40	10.72	33.00

2.4.2 Tamper-Indication Feature

A lock wire and seal, of the type that must be broken, is installed across the overpack joint section. This seal, while intact, provides evidence that unauthorized persons have not opened the package. In addition, some operating sites may place a seal across the lid and cask body, to prevent or detect unauthorized tampering of the cask after it is loaded.

2.4.3 Positive Closure

The AOS Transport Packaging System models are used to ship radioactive materials within the cask component. The cask is sealed, using a metallic lid seal, and a series of bolts to create the joint between the cask body and its lid. Impact limiters are placed at both ends of the cask, and tied to one another by turnbuckles. With this double closure between the impact limiter and cask, inadvertent opening of the cask cannot occur. The vent and drain ports on the cask are plugged and sealed by pipe plugs and straight thread caps with O-Rings. At assembly, the impact limiters also cover both (drain and vent) ports.

2.5 LIFTING AND TIE-DOWN STANDARDS FOR ALL PACKAGES

The following information is presented:

- Lifting Devices
- Tie-Down Devices
- Others Devices (Personnel Barrier, Pallet, Tie-Down Cradle and Turnbuckles)

2.5.1 Lifting Devices

10 CFR 71.45(a) **[2.1]** requires that lifting devices that are a structural part of the transport package must be capable of supporting three times the weight (3 W) of the loaded package, without generating stress in any material of the package in excess of its yield stress.

Figure 2-14 presents a cross-section of the trunnion area, as well as the force diagram associated with the tie-down load. The dimensions for the figure are listed in Table 2-19.

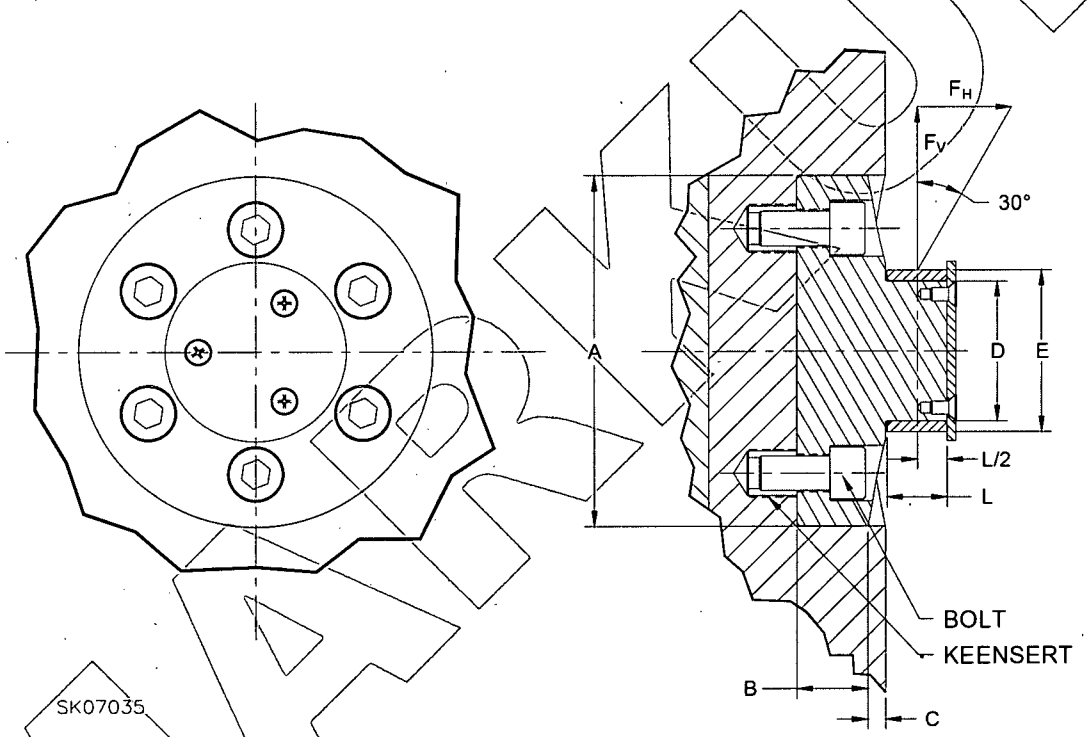


Figure 2-14. Trunnion Area Cross-Section and Force Diagram Associated with Tie-Down Load

MARKUP

Table 2-19. Lifting Load Analysis – All Models

Item	Units	AOS-025		AOS-050		AOS-100		AOS-165	
		Metric	US	Metric	US	Metric	US	Metric	US
Weight	kg lb.	128	282	590	1,300	3,901	8,600	18,234	40,200
A	cm in.	3.85	1.52	7.70	3.03	15.39	6.06	25.40	10.00
B	cm in.	0.77	0.30	1.54	0.61	3.08	1.21	5.08	2.00
C	cm in.	0.19	0.08	0.38	0.15	0.77	0.30	1.27	0.50
D	cm in.	1.54	0.61	3.08	1.21	6.16	2.42	10.16	4.00
E	cm in.	1.78	0.70	3.56	1.40	7.13	2.81	11.76	4.63
L	cm in.	0.67	0.27	1.35	0.53	2.69	1.06	4.45	1.75
L/2	cm in.	0.34	0.13	0.67	0.27	1.35	0.53	2.22	0.88
F_T	N lbf.	869	195	4,006	901	26,503	5,958	123,888	27,851
F_H	N lbf.	435	98	2,003	450	13,252	2,979	61,944	13,926
F_V [a]	N lbf.	753	169	3,470	780	22,953	5,160	107,291	24,120
Bolt		1/4-28 UNF - 2		3/8 - 24 UNF - 2		3/4 - 16 UNF- 2		1-12 UNF-2 x 2.00 L	
Material		SA-193 Grade B6		SA-193 Grade B6		SA-193 Grade B6		SA-193 Grade B6	
Bolt Circle		2.69	1.06	5.39	2.12	10.78	4.24	17.78	7.00
S_u	kPa psi	758	110	758	110	758	110	758	110
S_y	kPa psi	586	85	586	85	586	85	586	85
Quantity		6		6		6		6	
Keensert		KNH 428J		KNH 624J		KNH 1216J		KNH 1612J	
		1/4-28UNF-3B x 0.37		3/8-24UNF-3B x 0.50		3/4-16UNF-3B x 1.12		1-12UNF-3B x 1.37	
D_{minor}	cm in.	0.524	0.206	0.820	0.323	1.414	0.557	2.317	0.912
A_T	cm^2 in^2	0.235	0.036	0.566	0.088	3.284	0.509	4.277	0.663
M_R	Nm lbf-in.	9.78	86.52	90.13	797.73	1,192.50	10,554.55	2,299.38	20,351.25
C_L	cm in.	0.72	0.28	1.44	0.57	2.89	1.14	4.45	1.75
I_{x-x}	cm^4 in^4	0.0037	0.0001	0.0222	0.0005	0.1964	0.0047	1.4159	0.0340
I_{y-y}	cm^4 in^4	0.0340	0.0001	0.0340	0.0005	0.0340	0.0047	0.0340	0.0340
A_TC_L [b]	cm^4 in^4	0.1225	0.0029	1.1821	0.0284	27.4129	0.6586	84.5132	2.0304
I_x	cm^4 in^4	0.5123	0.0123	4.8620	0.1168	110.8300	2.6627	346.5484	8.3259
S_{bolt} [b]	Pa psi	322.18	2,446.55	616.17	4,738.97	703.66	5,484.36	2,443.11	7,778.26
$F_s = S_y/S_{bolt}$		34.74		17.94		15.50		10.93	

a. Included a 1.2 Dynamic Factor.

b. No shear load is applied to the bolt. Shear force is reacted to by the wall of the trunnion socket, on the cask body outside wall.

2.5.2 Tie-Down Devices

10 CFR 71.45(b) **[2.1]** requires that, if there is a system of tie-down devices that is a structural part of the transport package, this system must be capable of withstanding a static force applied to the center of gravity of the package with a:

1. Vertical component of two times the weight (2 W) of the package and its contents;
2. Horizontal component along the direction of travel of ten times the weight (10 W) of the package and its contents; and
3. Horizontal component in the transverse direction of five times the weight (5 W) of the package and its contents.

These applied loads do not generate stresses in any package material in excess of the yield strength of that material, as discussed in the following tables:

- Table 2-39, "Load Case 221, Forward 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-100"
- Table 2-40, "Load Case 222, Lateral 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-100"
- Table 2-41, "Load Case 223, Vertical 10g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-100"

2.5.3 Others Devices (Personnel Barrier, Pallet, Tie-Down Cradle and Turnbuckles)

The following information is presented:

- Analysis of Model AOS-025 Personnel Barrier Fasteners
- Analysis of Model AOS-050 Personnel Barrier Fasteners
- Analysis of Model AOS-100 Personnel Barrier Fasteners
- Analysis of Model AOS-100 Pallet Tie-Down Bolts
- Analysis of Model AOS-Overpack Turnbuckles

MARKUP

2.5.3.1 Analysis of Model AOS-025 Personnel Barrier Fasteners

Vertical Frame

$w = 0.1\ lb/in^3$

$W_1 = 4 * 18 * 1.5 * 1.5 * 0.19 * 0.1 = 3.1\ lb$

$H_1 = 9.0$

Top Frame

$W_2 = 4 * 18 * 1.5 * 1.5 * 0.19 * 0.1 = 3.1\ lb$

$H_2 = 18.0$

Vertical Screens

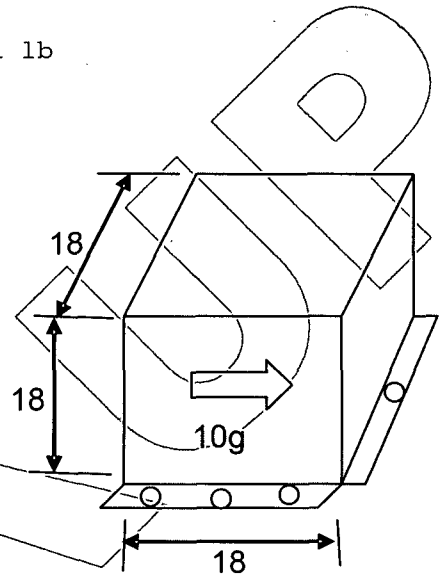
$w = 2.0\ lb/ft^2$

$W_3 = 4 * 1.5 * 1.5 * 2 = 18.0\ lb$

Top Screen

$w = 2.0\ lb/ft^2$

$W_4 = 1.5 * 1.5 * 2 = 4.5\ lb$



Fastener Properties

8-9/16 bolts

$A_s = 0.1816$

$Fy = 20\ ksi$

Max Inertia Force

$G = 10.0g$

Fastener Shear Stress

$V = W_1 + W_2 + W_3 + W_4 = 3.1 + 3.1 + 18.0 + 4.5 = 28.7$

$\tau = G * V / 8 * A_s = (10 * 28.7) / (8 * 0.1816) = 198\ psi$

Fastener Axial Stress [assume three (3) fasteners in tension]

$M = G * (W_1 + W_3) * H_1 + G * (W2 + W4) * H2$

$= 10 * (3.1 + 18.0) * 9.0 + 10 * (3.1 + 4.5) * 18.0 = 3,258$

$L = 4.2$

$\sigma = M / (3 * L * A_s) = 3,258 / (3 * 4.2 * 0.1816) = 1,424$

Equivalent Stress

$f = \sqrt{\sigma^2 + 3\tau^2} = \sqrt{1,424^2 + 198^2} = 1,438\ psi$

Margin of Safety

$MS = Fy / f - 1 = 20,000 / 1,438 - 1 = 12.9$

WORKING

2.5.3.2 Analysis of Model AOS-050 Personnel Barrier Fasteners

Vertical Frame

$w = 0.1\ lb/in^3$

$W_1 = 4 * 32 * 1.5 * 1.5 * 0.19 * 0.1 = 28.8\ lb$

$H_1 = 16.0$

Top Frame

$W_2 = 4 * 36 * 1.5 * 1.5 * 0.19 * 0.1 = 32.4\ lb$

$H_2 = 32.0$

Vertical Screens

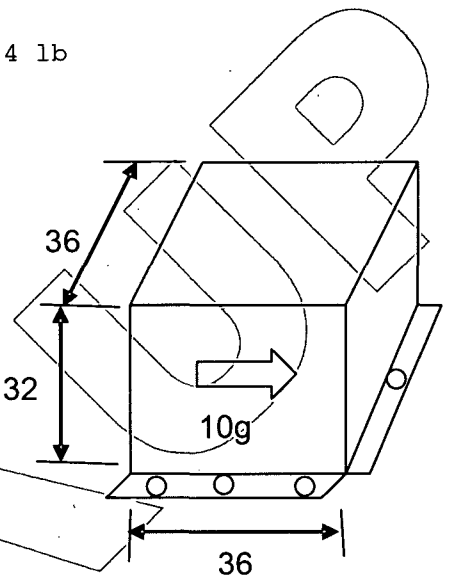
$w = 2.0\ lb/ft^2$

$W_3 = 4 * 2.5 * 3.0 * 2 = 60.0\ lb$

Top Screen

$w = 2.0\ lb/ft^2$

$W_4 = 3.0 * 3.0 * 2 = 18.0\ lb$



Fastener Properties

8-9/16 bolts

$A_s = 0.1816$

$Fy = 20\ ksi$

Max Inertia Force

$G = 10.0g$

Fastener Shear Stress

$V = W_1 + W_2 + W_3 + W_4 = 28.8 + 32.4 + 60.0 + 18.0 = 139.2$

$\tau = G * V / 8 * A_s = (10 * 139.2) / (8 * 0.1816) = 958.1\ psi$

Fastener Axial Stress [assume three (3) fasteners in tension]

$M = G * (W_1 + W_3) * H_1 + G * (W2 + W4) * H2$

$= 10 * (28.8 + 60) * 16.0 + 10 * (32.4 + 18) * 32.0 = 30,340$

$L = 30$

$\sigma = M / (3 * L * A_s) = 30,340 / (3 * 30.0 * 0.1816) = 1,856$

Equivalent Stress

$f = \sqrt{\sigma^2 + 3\tau^2} = \sqrt{0.96^2 + 3 * 1.86^2} = 3.09\ ksi$

Margin of Safety

$MS = Fy / f - 1 = 20.0 / 3.09 - 1 = 5.5$

WORKING

2.5.3.3 Analysis of Model AOS-100 Personnel Barrier Fasteners

Vertical Frame

$w = 0.3\ lb/in^3$

$W_1 = 4 * 72 * 1.5 * 1.5 * 0.19 * 0.3 = 36.9\ lb$

$H_1 = 36.0$

Top Frame

$W_2 = 4 * 72 * 1.5 * 1.5 * 0.19 * 0.3 = 36.9\ lb$

$H_2 = 72.0$

Vertical Screens

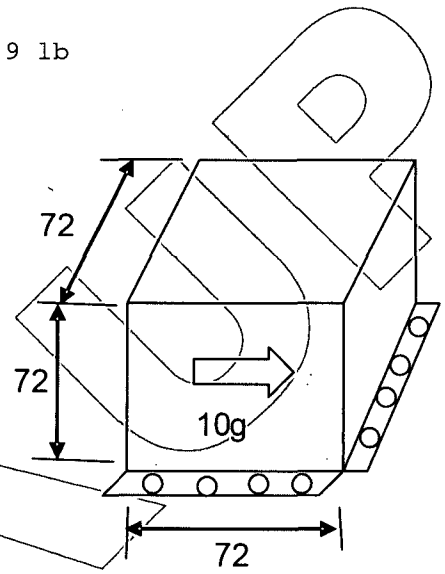
$w = 2.0\ lb/ft^2$

$W_3 = 4 * 6.0 * 6.0 * 2 = 288.0\ lb$

Top Screen

$w = 2.0\ lb/ft^2$

$W_4 = 6.0 * 6.0 * 2 = 72.0\ lb$



Fastener Properties

16-1.0 bolts

$A_s = 0.3340$

$Fy = 20\ ksi$

Max Inertia Force

$G = 10.0g$

Fastener Shear Stress

$V = W_1 + W_2 + W_3 + W_4 = 36.9 + 36.9 + 288 + 72.0 = 433.8$

$\tau = G * V / 16 * A_s = (10 * 433.8) / (16 * 0.3340) = 958.1\ psi$

Fastener Axial Stress (assume 4 fasteners in tension)

$M = G * (W_1 + W_3) * H_1 + G * (W2 + W4) * H2$

$= 10 * (28.8 + 60) * 36.0 + 10 * (32.4 + 18) * 72.0 = 57,917$

$L = 72$

$\sigma = M/(4xLxA_s) = 57917/(4x72x0.3340) = 602\ psi$

Equivalent Stress

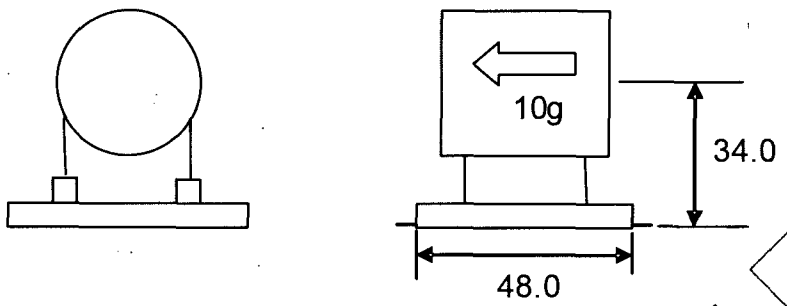
$f = \sqrt{\sigma^2 + 3\tau^2} = \sqrt{0.958^2 + 3 * 0.602^2} = 1.42\ ksi$

Margin of Safety

$MS = Fy / f - 1 = 20.0 / 1.42 - 1 = 13.1$

WORKING

2.5.3.4 Analysis of Model AOS-100 Pallet Tie-Down Bolts



cask + pallet weight: 12.0 k
8-1.0 ϕ bolts
A = 0.6051 in^2
Fy = 85.0 ksi
Fu = 110.0 ksi

τ = (10 * 12) / (8 * 0.6051) = 24.8 ksi

M = 10 * 12 * 34.0 = 4,080 in-k

σ = M / (4 * 48 * 0.6051) = 4,080 / 116.2 = 35.1 ksi

$\sigma_e = \sqrt{\sigma^2 + 3\tau^2} = \sqrt{1,232 + 1,845} = 55.5$ ksi

$(MS)_y = Fy/\sigma_e - 1 = 85.0/55.5 = 0.53$

$(MS)_u = Fu / \sigma_e - 1 = 110.0 / 55.5 = 0.98$

MARKUP

2.5.3.5 Analysis of Model AOS-Overpack Turnbuckles

Eight (8) turnbuckles connect the two (2) overpack structures. Under normal handling conditions, the turnbuckles are not subjected to significant load. However, for analysis purposes, it is assumed that one overpack is constrained, while the overpack and cask assembly is subjected to a 10g forward-aft acceleration.

Inertia force:	F = 10 * 8,600 = 86,000 lb
Number of turnbuckles:	8
Turnbuckle load:	86,000/8 = 10,750 lb
Turnbuckle bolt size:	5/8 in.
Turnbuckle bolt stress area:	As = 0.2256 in^2
Turnbuckle bolt yield stress:	Fy = 85 ksi
Bolt stress:	σ = F / As = 10,750 / 0.2256 = 47.7 ksi

MS = Fy / σ - 1 = 85.0 / 47.7 - 1 = 0.78

MARKUP

2.6 NORMAL CONDITIONS OF TRANSPORT

The containment boundary (located within the cask component of the transport package) enables the AOS Transport Packaging System to withstand Normal conditions of transport, without releasing radioactive material from the transport package. Normal conditions of transport are defined in *10 CFR 71.71* **[2.1]**. This is demonstrated in the following subsections, where all Normal conditions of transport are addressed and shown to meet the applicable design criteria previously discussed in Subsection 2.1.2, "Design Criteria." Because the containment boundary is the primary area of design concern, the evaluation is performed on the cask. The overpack (impact limiter) structure is analyzed, because it affects the cask under Normal conditions of transport.

Normal conditions of transport were evaluated using LIBRA Finite Element methods. Four (4) different finite element models were used to accurately represent the cask structure and specific loading conditions.

2.6.1 Heat

The thermal evaluation for the normal heat condition is presented in Chapter 3, "Thermal Evaluation." The normal heat condition consists of exposing the cask to direct sunlight and 38°C (100°F) still air. Insolation of the package is specified in *10 CFR 71.71(c)(1)* **[2.1]**. An initial temperature field of 21°C (70°F) and a maximum internal heat of the respective model are used for the evaluation. In addition, the decay heat of the content must be accounted for in some of the required analyses. The seven (7) thermal conditions (analyses) required to satisfy the regulations are tabulated in Table 2-20.

The thermal loading temperature fields, Load Cases 101 through 106 and 111 through 116, are taken directly from the heat transfer analyses, and applied to the stress models. The heat transfer and stress models are geometrically identical, with the same node numbering used in both analyses.

Table 2-20. Transport Package Thermal Environment Conditions – All Models

Condition	Thermal Environment
1	37.8°C (100°F) ambient with maximum decay heat and maximum solar load.
2	37.8°C (100°F) ambient with maximum decay heat.
3	Fire transient, t = 0 to 3.0 hours.
4	-40°C (-40°F) ambient with maximum decay heat.
5	-40°C (-40°F) ambient.
6	-28.9°C (-20°F) ambient with maximum decay heat.
7	-28.9°C (-20°F) ambient.

MIP

2.6.1.1 Summary of Temperatures and Pressures

Table 2-21 presents the maximum temperatures, throughout the transport package, resulting from Normal conditions of transport. The structural analyses are applied to the temperature field generated by the thermal analysis, to determine the

. Table 2-22 presents the pressure corresponding to the maximum temperature for each transport package model. This pressure value is based upon 100% relative humidity air occupying the entire cavity volume. These pressures do not exceed the design pressure, which is also listed in Table 2-22. Therefore, the transport package can withstand pressures and temperatures in excess of those encountered in Normal conditions of transport.

Pressure-related Load Cases 201 through 204 are analyzed by the 2D cask model. Pressure is applied to the model's inside cask cavity wall or outside cask surface. The LIBRA LE-4[a] loading function is used to apply pressure loads. This function generates nodal forces in 2D models due to surface tractions along edge nodal lines. The nodal lines are defined by terminal nodes.

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a. *The LIBRA program's LE feature defines several types of edge and surface loadings. The first entry is a negative integer that distinguishes the type of loading. The types of loadings and nodal specifications are listed below, with former record types in parentheses.*

Options Available when Applying the "LE" Command

Type -1 *– General loading on nodes specified by numbering sequence.*

Type -2 *– General loading on arc defined by control points (LE1).*

Type -3 *– Surface pressure on arc defined by control points (LEP).*

Type -4 *– Linearly varying pressure on line specified by end nodes.*

Type -5 *– Linearly varying harmonic pressure on 3D model generated from a 2D model.*

Further Details for Types -4 and -5

Type -4 *– This command generates nodal loads corresponding to linearly varying surface tractions along a line on a 2D model. The line is specified by the two (2) terminal nodes, and loads are applied to all nodes within a specified distance of the line. The linearly varying pressure is specified by the terminal values.*

Type -5 *– This command generates nodal loads corresponding to surface tractions over a 3D model generated from an axisymmetric (2D) model. The tractions may vary linearly along a radial line, and circumferentially as a Fourier harmonic. The loaded nodes are identified by specifying the two (2) terminal nodes on the zero meridian. The linearly varying pressure is specified by the corresponding terminal values on the zero meridian.*

Table 2-21. Temperature Summary of Normal Conditions of Transport – All Models

Package Component	Maximum Temperatures											
	AOS-025A		AOS-050A		AOS-100A AOS-100A-S		AOS-100B		AOS-165A		AOS-165B	
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
Cask Cavity	99	210	128	263	126	258	126	259	365	689	202	395
Shielding Material	98	209	125	257	121	250	122	251	329	623	187	369
Cask Seal Area	98	208	123	254	118	245	118	245	304	580	177	350
Cask Test Port	98	208	123	253	116	241	116	241	289	553	171	339
Cask Drain Port	98	208	124	254	116	242	116	242	290	555	171	340
Cask Vent Port	98	208	123	254	118	245	118	245	305	580	177	350
Cask Outside Surface	98	208	122	252	115	239	115	239	266	510	162	324
Impact Limiter Foam Material	98	208	124	255	119	246	119	246	311	592	180	355
Overpack Accessible Outside Surface[a]	87	189	95	202	79	174	79	174	80	176	80	176

a. Listed temperatures are on the overpack and cask surfaces, and not at the personnel barrier surface.

XUP

Table 2-22. Maximum Cask Cavity Pressure Due to Normal Conditions of Transport – All Models

Model	Volume		Temperature[a]		Pressure[b]			Design Pressure[c]	
	l	in^3	°C	°F	kPa	psia		kPa	psia
AOS-025	0.17	10	99	210	126	18	<	207	30
AOS-050	1.36	83	128	263	136	20	<	414	60
AOS-100A AOS-100A-S	11.21	684	126	258	135	20	<	1,931	280
AOS-100B	11.21	684	126	259	135	20	<	1,931	280
AOS-165A	49	2,978	365	689	209	30	<	1,517	220
AOS-165B	49	2,978	202	395	209	30	<	1,517	220

a. Temperatures listed are the maximum values obtained throughout Normal conditions of transport events.

b. Pressure calculation is based upon the ideal gas law, where:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \Rightarrow \frac{P_1}{T_1} = \frac{P_2}{T_2}$$

Initial Condition

$P_1 = 14.7$ psia

$T_1 = 78°F$

Final Condition

$P_2 = ?$

$T_2 = 256°F$

$$P_2 = \frac{(256 + 460)}{(78 + 460)} * 14.7 = 19.56 \text{ psia}$$

*c. **Model AOS-100 and AOS-165 transport packages** – Pressure value is based upon design conditions.*

MARKUP

2.6.1.2 Differential Thermal Expansion

The effects of thermal gradients on the AOS Transport Packaging System are investigated by the LIBRA Finite Element analyses. These effects are included in the Load Combination procedure, where maximum stresses and stress margins are calculated. Refer to Table 2-44 through Table 2-57 (Normal conditions of transport), and Table 2-79 through Table 2-93 (Hypothetical Accident conditions of transport).

2.6.1.3 Stress Calculations

This paragraph describes the effects of the following:

- Thermal Stresses
- Design Pressure Stresses
- Fabrication Stresses

2.6.1.3.1 Thermal Stresses

The thermal loading temperature fields, Load Cases 101 through 106 and 111 through 116, are taken directly from the heat transfer analyses, and applied to the stress models. The heat transfer and stress models are geometrically identical, with the same node numbering used in both analyses.

2.6.1.3.2 Design Pressure Stresses

Pressure-related Load Cases 201 through 204 are analyzed by the 2D cask model. Pressure is applied to the model's inside cask cavity wall or outside cask surface. The LIBRA LE -4[a] loading function is used to apply pressure loads. This function generates nodal forces in 2D models due to surface tractions along edge nodal lines. The nodal lines are defined by terminal nodes.

2.6.1.3.3 Fabrication Stresses

Fabrication stresses are analyzed in Load Case 211. Fabrication stress loading in the Model AOS-025, AOS-050, and AOS-100 transport packages is applied by introducing a deformation of 0.25 mm (0.01 in.) across the inside cask shell welded joint. Fabrication stress loading in the Model AOS-165 transport package is applied by a deformation of 0.41 mm (0.016 in.) across the inside cask shell welded joint, and a shrink-fit pressure of 8,620 kPa (1.25 ksi), along the junction of the two (2) outside shell segments.

2.6.1.4 Vibration and Shock Loads

Vibration and shock loads are analyzed using the 3D model in three (3) separate analyses. The vibration and shock loads are, conservatively, assumed to be:

- **Load Case 221** – 5g in the forward-aft direction
- **Load Case 222** – 5g in the lateral direction
- **Load Case 223** – 10g in the vertical direction

In all three analyses, displacements are fixed at the trunnions, and vertical displacement is fixed along the cask and truck bed contact line. The fixed nodes are illustrated in Figure 2-15. The inertia loads are applied as body forces.

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a. *Ibid.*

WORKUP

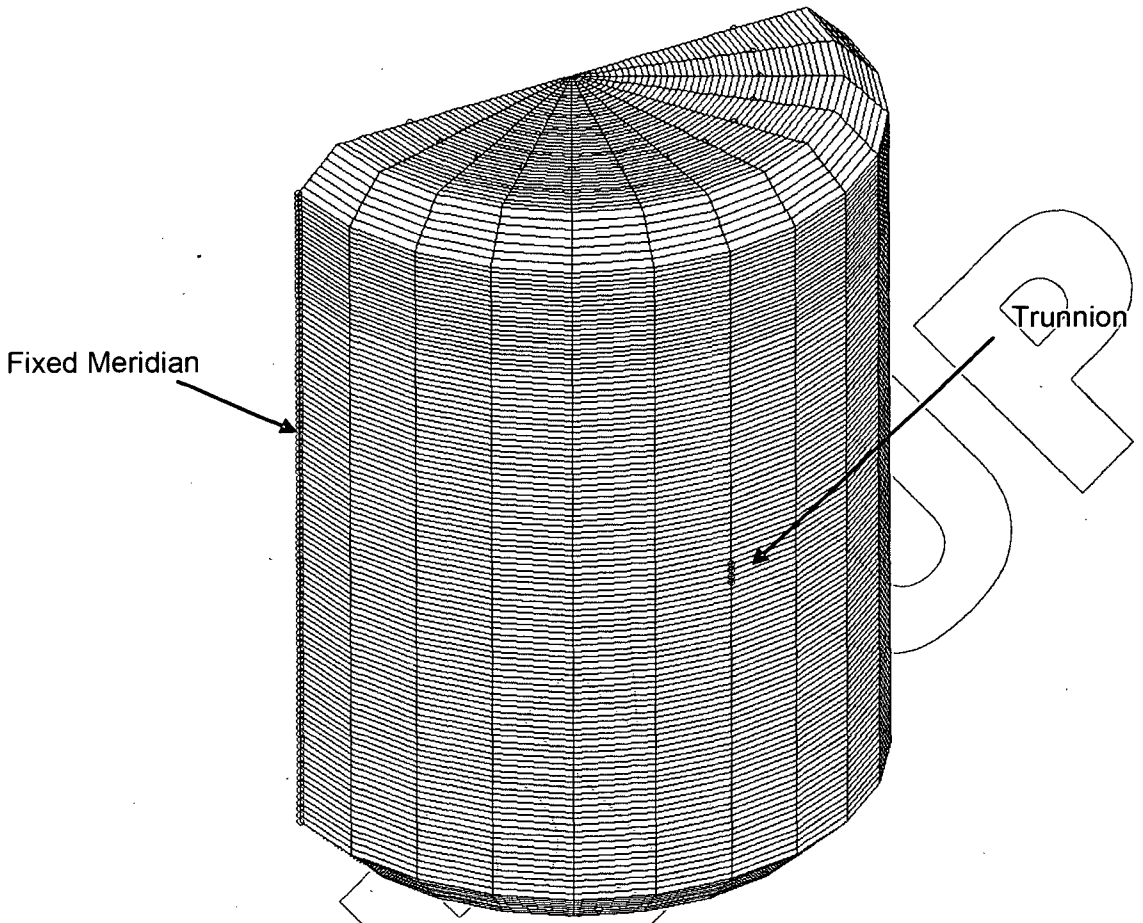

Figure 2-15. Fixed Points for Shock and Vibration Analyses

MARKUP

2.6.1.5 Comparison with Allowable Stresses

Table 2-23 and Table 2-24 present Model AOS-100 transport package Load Cases and Load Combinations, respectively, under Normal conditions of transport. The referenced tables, located in Subsection 2.6.11, provide test case output data.

Similar data for the Model AOS-025 and AOS-050 transport packages is provided in Appendix 2.10.1.1 and Appendix 2.10.2.1, respectively. Similar data for the Model AOS-165A and AOS-165B transport packages is provided in Appendix 2.10.3.1 and Appendix 2.10.4.1, respectively.

Table 2-23. Load Cases Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-100

Load Case	Description	Data
101	100°F Ambient, Maximum Decay Heat	Table 2-26
102	100°F Ambient, Maximum Decay Heat, Maximum Insolation	Table 2-27
103	-20°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-28
104	-40°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-29
105	-40°F Ambient, Maximum Decay Heat	Table 2-30
106	-20°F Ambient, Maximum Decay Heat	Table 2-31
201	Maximum Internal Pressure 1,931 kPa (280 psia)	Table 2-32
202	Minimum External Pressure, 24 kPa (3.5 psia)	Table 2-33
203	Maximum Increased External Pressure, 140 kPa (20 psia)	Table 2-34
204	Additional Increased External Pressure, 2 MPa (290 psia)	Table 2-35
211	Fabrication Stress	Table 2-36
215	Compression Load (5x weight)	Table 2-37
216	Rod Drop onto Cask	Table 2-38
221	Forward 5g Vibration Inertia Load	Table 2-39
222	Lateral 5g Vibration Inertia Load	Table 2-40
223	Vertical 10g Vibration Inertia Load	Table 2-41
231	4-ft. Head-On Drop	Table 2-42
232	30-ft. Head-On Drop Impact Test, Normal Conditions	Table 2-43

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Table 2-24. Load Combinations Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-100

Load Combination	Load Cases	Description	Data
101	102, 201, 211	Hot Environment	Table 2-44
102	104, 201, 211	Cold Environment	Table 2-45
103	103, 201, 211	Increased External Pressure	Table 2-46
104	101, 201, 202, 211	Minimum External Pressure	Table 2-47
105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat	Table 2-48
106	101, 201, 203, 211	Maximum Pressure, Hot Environment	Table 2-49
107	105, 201, 203, 211	Maximum Pressure, Cold Environment	Table 2-50
215	215, 101, 201, 211	Compression Load	Table 2-51
216	216, 101, 201, 211	Rod Drop	Table 2-52
217	216, 104, 201, 211	Rod Drop, Cold Environment	Table 2-53
221	221, 101, 201, 211	Forward Vibration	Table 2-54
222	222, 101, 201, 211	Lateral Vibration	Table 2-55
223	223, 101, 201, 211	Vertical Vibration	Table 2-56
231	231, 102, 201, 211	4-ft. Head-On Drop, Normal Conditions	Table 2-57
232[a]	232, 102, 201, 211	30-ft. Head-On Drop, Normal Conditions (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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2.6.2 Cold

The shipping package must be able to withstand an ambient temperature of -40°C (-40°F) and -29°C (-20°F) in still air and in the shade.

2.6.3 Reduced External Pressure

Pressure-related Load Cases 201 through 204 are analyzed by the 2D cask model. Pressure is applied to the model's inside cask cavity wall or outside cask surface. The LIBRA LE -4 loading function is used to apply pressure loads. This function generates nodal forces in 2D models due to surface tractions along edge nodal lines. The nodal lines are defined by terminal nodes.

2.6.4 Increased External Pressure

The analysis for this condition is conducted in a similar manner as in Subsection 2.6.3. Pressure-related Load Cases 201 through 204 are analyzed by the 2D cask model. Pressure is applied to the model's inside cask cavity wall or outside cask surface. The LIBRA LE -4 loading function is used to apply pressure loads. This function generates nodal forces in 2D models due to surface tractions along edge nodal lines. The nodal lines are defined by terminal nodes.

2.6.5 Vibration

Vibration and shock loads are analyzed using the 3D model in three (3) separate analyses. The vibration and shock loads are, conservatively, assumed to be:

- **Load Case 221** – 5g in the forward-aft direction
- **Load Case 222** – 5g in the lateral direction
- **Load Case 223** – 10g in the vertical direction

In all three analyses, displacements are fixed at the trunnions, and vertical displacement is fixed along the cask and truck bed contact line. The fixed nodes are illustrated in Figure 2-15, "Fixed Points for Shock and Vibration Analyses." The inertia loads are applied as body forces.

2.6.6 Water Spray

The containment capabilities of the AOS Transport Packaging System are not compromised by water spray, because all external surfaces are composed of stainless steel, and the closure seal is impervious to water.

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2.6.7 Free Drop

Evaluation of the AOS Transport Packaging System, to the effect of a free drop, was analyzed using the LIBRA code. Each packaging system model was dropped from a distance based upon the model's weight and physical form of the content to be carried, as listed in Table 2-25.

The analyses performed considers three (3) orientations, as illustrated in Figure 2-16. The orientation that produced the most stress on the cask component of the AOS Transport Packaging System was used as the load condition to be included in the Load Combination procedure.

The analysis of the Free Drop load condition for the Model AOS-025 and AOS-050 transport packages was the same as that of the 9-m (30-ft.) drop under the Hypothetical Accident conditions of transport described in Subsection 2.7.1, "Free Drop." The only difference is that in this evaluation, the resulting stresses were compared with allowable Normal conditions of transport, which is part of the requirements for liquid transportation. The Model AOS-100 and AOS-165 transport packages' evaluation of this condition consisted of a direct integration dynamic analysis.

Table 2-25. Free-Drop Distance – All Models

Model	Packaging Weight[a]		Physical Form (Normal or Special)	Free-Drop Distance	
	kg	lbs.		m	ft.
AOS-025A	71.4	157	Solid[b]	1.2	4
AOS-050A	511	1,126	Solid[2]	1.2	4
AOS-100A	3,950	8,700	Solid	1.2	4
AOS-100B	3,232	7,125	Solid		
AOS-100A-S	3,901	8,600	Solid		
AOS-165A	18,234	40,200	Solid	0.3	1
AOS-165B	15,535	34,250	Solid		

a. All AOS Transport Packaging System models have dimensions greater than 10 cm (4 in.).

b. The Model AOS-025A and AOS-050A transport packages were analyzed to the requirement of transporting liquid, Reference **[2.2]**, *Paragraph 725(a). In a future submittal, the transportation of liquid form will be requested for these models.*

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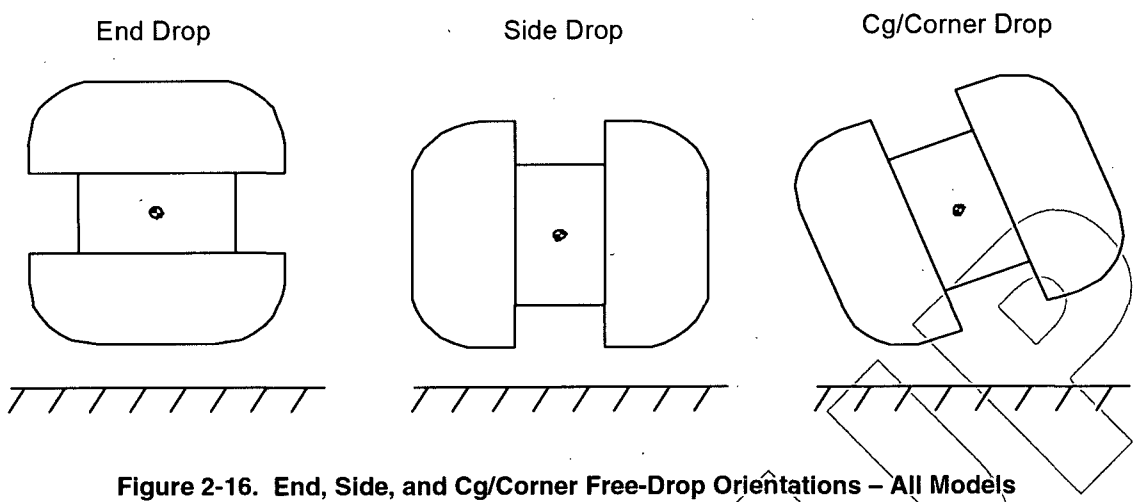

Figure 2-16. End, Side, and Cg/Corner Free-Drop Orientations – All Models

2.6.8 Corner Drop

This requirement is not applicable, because the AOS Transport Packaging System has a symmetrical cross-section. This condition is covered by Subsection 2.6.7, "Free Drop."

2.6.9 Compression

The compression load of 5x the cask weight, Load Case 215, is analyzed using the 2D model. The compression force is applied to the top of the cask as a pressure loading, using the LE -4 load function.

2.6.10 Penetration

The regulations for Normal conditions of transport stipulate that the transport package must be capable of withstanding the impact of the hemispherical end of a vertical steel cylinder, that:

- Weighs 5.9 kg (13 lbs.)
- Has a 31.75-mm (1.25-in.) diameter
- Is dropped from a height of 102 cm (40 in.), normally onto the exposed surface of the package that is expected to be the most vulnerable to puncture

The impact of a rod falling onto the cask, Load Case 216, was analyzed by a direct integration, dynamic analysis. The cask was modeled by the 2D model illustrated in Figure 2-17. The cask was assumed fixed at the base, and an impulse corresponding to the momentum impacting rod was applied at the top of the cask. Displacement at the impact point was monitored as illustrated in Figure 2-18. The stress state at the time of maximum displacement was used for stress evaluation.

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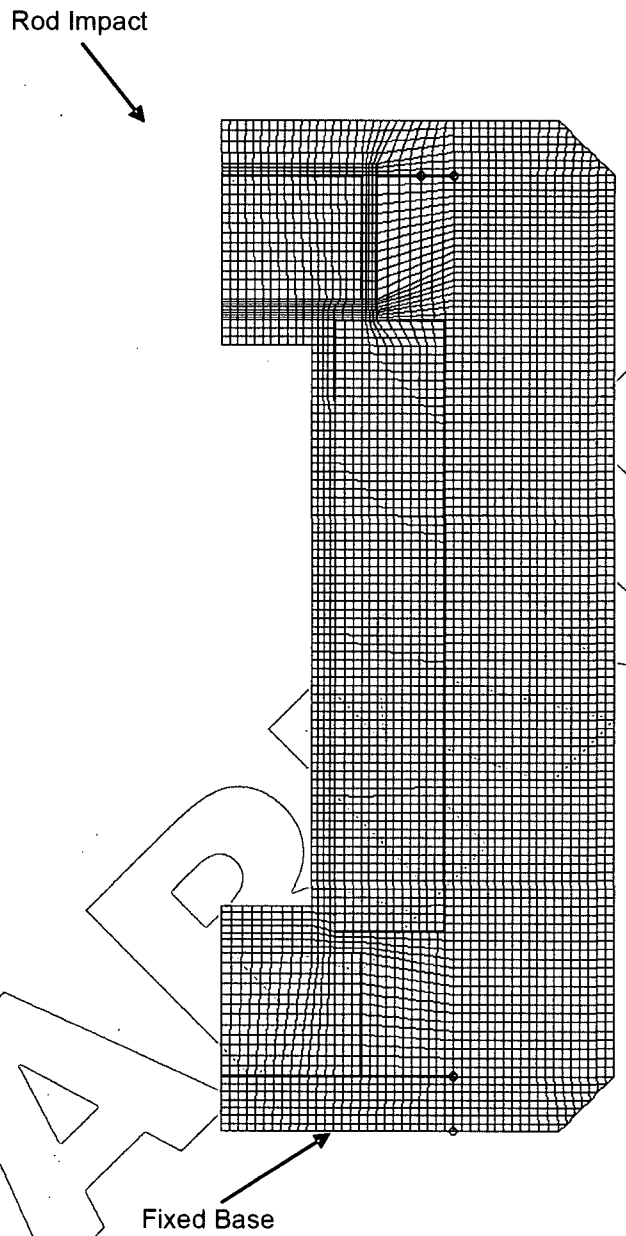

Figure 2-17. Rod Impact Analysis Load Distribution – Model AOS-100

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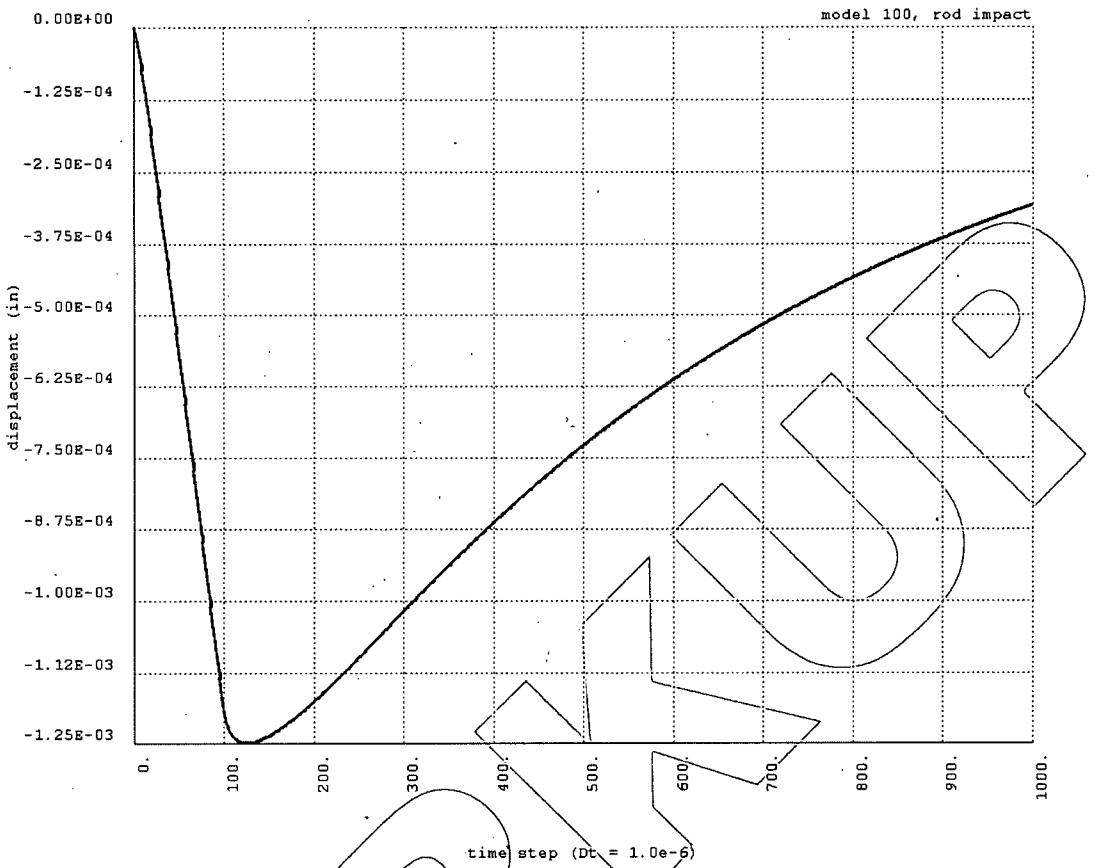

Figure 2-18. Rod Impact Time History Displacement at Impact Node – Model AOS-100

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2.6.11 Stress Summary and Comparison with Allowable

In this section, the resulting stresses from analyses for Normal conditions of transport are combined, following Reference **[2.4]** guidelines.

Table 2-26 through Table 2-43 present Model AOS-100 transport package test case output data, for the Load Cases listed in Table 2-23, "Load Cases Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-100." Comparisons with allowable stress limits are included for Load Cases 101, 102, 103, 104, 105, and 106.

Table 2-44 through Table 2-57 present Model AOS-100 transport package test case output data, for the Load Combinations listed in Table 2-24, "Load Combinations Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-100."

Similar data for the Model AOS-025 and AOS-050 transport packages is provided in Appendix 2.10.1.1 and Appendix 2.10.2.1, respectively. Similar data for the Model AOS-165A and AOS-165B transport packages is provided in Appendix 2.10.3.1 and Appendix 2.10.4.1, respectively.

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Table 2-26. Load Case 101, 100°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.0456E+02	-1.8983E+02	-2.8034E+01	2.9439E+02	4.2926E+02
	7.2091E-01	-1.3088E+00	-1.9329E-01	2.0297E+00	2.9597E+00
2	1.3149E+02	-2.9406E+02	-8.4539E+01	4.2555E+02	8.7203E+02
	9.0661E-01	-2.0275E+00	-5.8288E-01	2.9341E+00	6.0124E+00
3	1.0021E+02	-1.8730E+02	-2.2414E+01	2.8752E+02	4.2741E+02
	6.9094E-01	-1.2914E+00	-1.5454E-01	1.9823E+00	2.9469E+00
4	6.3127E+02	-2.1814E+03	-4.4076E+02	2.8126E+03	5.5355E+03
	4.3524E+00	-1.5040E+01	-3.0390E+00	1.9392E+01	3.8166E+01
5	6.2466E+02	-2.4329E+03	-9.8919E+02	3.0575E+03	4.8291E+03
	4.3069E+00	-1.6774E+01	-6.8202E+00	2.1081E+01	3.3295E+01
6	9.6377E+01	-1.2090E+03	-1.3048E+03	1.3054E+03	1.5833E+03
	6.6450E-01	-8.3357E+00	-8.9960E+00	9.0002E+00	1.0916E+01
7	-1.9217E+01	-4.1327E+02	2.4598E+01	3.9406E+02	4.2739E+02
	-1.3249E-01	-2.8494E+00	1.6960E-01	2.7169E+00	2.9468E+00
8	-1.9485E+01	-4.1288E+02	-1.5849E-01	3.9339E+02	4.2023E+02
	-1.3434E-01	-2.8467E+00	-1.0927E-03	2.7123E+00	2.8974E+00
9	-1.9384E+01	-4.1271E+02	-1.5390E+00	3.9333E+02	4.1618E+02
	-1.3364E-01	-2.8456E+00	-1.0611E-02	2.7119E+00	2.8695E+00
10	-7.2193E+01	-5.3770E+02	6.2101E+01	4.6550E+02	9.5760E+02
	-4.9775E-01	-3.7073E+00	4.2817E-01	3.2095E+00	6.6024E+00
11	-1.2200E+02	-6.7410E+02	-3.2254E+02	5.5211E+02	1.2549E+02
	-8.4114E-01	-4.6478E+00	-2.2238E+00	3.8066E+00	8.6522E-01
12	2.5799E+00	-8.1753E+02	-8.1351E+02	8.2011E+02	1.7232E+02
	1.7788E-02	-5.6367E+00	-5.6090E+00	5.6545E+00	1.1881E+00
13	-8.6733E+01	-1.2094E+03	-1.2100E+02	1.1227E+03	8.1844E+02
	-5.9800E-01	-8.3386E+00	-8.3430E-01	7.7406E+00	5.6430E+00
14	-6.9338E+01	-1.0534E+03	5.7286E+01	9.8411E+02	6.6719E+02
	-4.7807E-01	-7.2632E+00	3.9497E-01	6.7852E+00	4.6001E+00
15	2.1678E+02	-2.8099E+02	-3.4633E+01	4.9777E+02	8.3966E+02
	1.4946E+00	-1.9374E+00	-2.3879E-01	3.4320E+00	5.7893E+00

MARGIN

16	6.5964E+01	-1.3093E+02	-3.3301E+01	1.9689E+02	3.3071E+02
	4.5480E-01	-9.0271E-01	-2.2960E-01	1.3575E+00	2.2802E+00
17	3.0783E+01	-9.2873E+01	-1.1470E+01	1.2366E+02	2.1759E+02
	2.1224E-01	-6.4034E-01	-7.9082E-02	8.5258E-01	1.5002E+00
18	4.5328E+01	-9.9979E+01	5.5228E+02	1.4531E+02	6.1413E+01
	3.1252E-01	-6.8933E-01	3.8078E+00	1.0019E+00	4.2343E-01
19	-1.8918E+01	-2.1523E+02	6.9267E+02	1.9631E+02	2.1305E+02
	-1.3043E-01	-1.4840E+00	4.7758E+00	1.3535E+00	1.4689E+00
20	-3.7965E+01	-5.4220E+02	1.6813E+02	5.0423E+02	2.4979E+02
	-2.6176E-01	-3.7383E+00	1.1592E+00	3.4765E+00	1.7222E+00
21	3.1481E+00	-8.6388E+01	-8.2724E+01	8.9536E+01	1.2184E+02
	2.1705E-02	-5.9563E-01	-5.7036E-01	6.1733E-01	8.4008E-01
22	-2.8719E+01	-1.4109E+02	-1.3557E+02	1.1237E+02	1.3962E+02
	-1.9801E-01	-9.7277E-01	-9.3474E-01	7.7476E-01	9.6264E-01

Allowable Stress for Load Case 101

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	180.14	178.29	20.00	26.70	70.00
2	180.68	176.90	20.00	26.70	70.00
3	180.24	178.43	20.00	26.70	70.00
4	183.03	182.81	20.00	26.70	70.00
5	186.21	185.65	20.00	26.70	70.00
6	187.78	187.22	20.00	26.70	70.00
7	191.02	189.60	20.00	26.70	70.00
8	191.09	189.67	20.00	26.70	70.00
9	191.02	189.60	20.00	26.70	70.00
10	189.72	188.26	20.00	26.70	70.00
11	190.57	188.00	20.00	26.70	70.00
12	194.21	191.15	20.00	26.70	70.00
13	185.40	184.49	20.00	26.70	70.00
14	183.49	183.16	20.00	26.70	70.00
15	184.50	184.35	20.00	26.70	70.00
16	184.47	184.26	20.00	26.70	70.00
17	184.66	184.44	20.00	26.70	70.00
18	185.12	184.99	20.00	26.70	70.00
19	185.46	185.26	20.00	26.70	70.00
20	189.97	188.98	20.00	26.70	70.00
21	181.59	181.37	20.00	26.70	70.00
22	182.07	181.87	20.00	26.70	70.00

Table 2-27. Load Case 102, 100°F Ambient, Maximum Decay Heat, Maximum Insolation, Normal Conditions of Transport – Model AOS-100

Stress (psi/MPa)

Location	Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.0015E+02	-1.8289E+02	-1.3172E+01	2.8304E+02	4.0516E+02
	6.9051E-01	-1.2610E+00	-9.0815E-02	1.9515E+00	2.7935E+00
2	1.3328E+02	-2.8914E+02	-9.2311E+01	4.2242E+02	8.6840E+02
	9.1891E-01	-1.9935E+00	-6.3646E-01	2.9125E+00	5.9874E+00
3	9.6050E+01	-1.8039E+02	-7.5518E+00	2.7644E+02	4.0301E+02
	6.6224E-01	-1.2437E+00	-5.2068E-02	1.9060E+00	2.7786E+00
4	6.9578E+02	-2.1469E+03	-4.8579E+02	2.8427E+03	5.5977E+03
	4.7972E+00	-1.4802E+01	-3.3494E+00	1.9599E+01	3.8595E+01
5	6.5387E+02	-2.3060E+03	-1.0608E+03	2.9599E+03	4.6578E+03
	4.5082E+00	-1.5899E+01	-7.3140E+00	2.0408E+01	3.2114E+01
6	7.6888E+01	-1.2187E+03	-1.5692E+03	1.2956E+03	1.6705E+03
	5.3013E-01	-8.4024E+00	-1.0819E+01	8.9325E+00	1.1518E+01
7	-8.5369E+01	-4.2741E+02	-6.8690E+02	3.4204E+02	4.1552E+02
	-5.8860E-01	-2.9469E+00	-4.7360E+00	2.3583E+00	2.8649E+00
8	-8.7434E+01	-4.2498E+02	-7.0749E+02	3.3755E+02	4.0580E+02
	-6.0283E-01	-2.9302E+00	-4.8780E+00	2.3273E+00	2.7979E+00
9	-8.7533E+01	-4.2466E+02	-7.1661E+02	3.3713E+02	4.0477E+02
	-6.0352E-01	-2.9279E+00	-4.9408E+00	2.3244E+00	2.7908E+00
10	-1.0739E+02	-6.4805E+02	-2.8853E+02	5.4066E+02	9.8941E+02
	-7.4043E-01	-4.4681E+00	-1.9893E+00	3.7277E+00	6.8217E+00
11	-1.5302E+02	-7.9623E+02	-4.6061E+02	6.4320E+02	3.4628E+02
	-1.0551E+00	-5.4898E+00	-3.1758E+00	4.4347E+00	2.3875E+00
12	2.1810E+00	-9.3281E+02	-9.2931E+02	9.3499E+02	3.9876E+02
	1.5038E-02	-6.4315E+00	-6.4074E+00	6.4466E+00	2.7494E+00
13	-6.5774E+01	-1.1914E+03	-1.3105E+02	1.1256E+03	6.5045E+02
	-4.5350E-01	-8.2145E+00	-9.0353E-01	7.7610E+00	4.4847E+00
14	-7.6570E+01	-1.0459E+03	3.4750E+01	9.6935E+02	8.2011E+02
	-5.2793E-01	-7.2114E+00	2.3959E-01	6.6834E+00	5.6545E+00
15	3.5419E+02	-4.4879E+02	-4.9691E+01	8.0298E+02	1.3588E+03
	2.4420E+00	-3.0943E+00	-3.4261E-01	5.5363E+00	9.3684E+00

WATERMARK

16	1.0519E+02	-2.0880E+02	-5.4687E+01	3.1398E+02	5.2118E+02
	7.2526E-01	-1.4396E+00	-3.7705E-01	2.1649E+00	3.5934E+00
17	4.7068E+01	-1.4386E+02	-4.2708E+00	1.9092E+02	3.3382E+02
	3.2452E-01	-9.9185E-01	-2.9446E-02	1.3164E+00	2.3016E+00
18	3.5884E+01	-1.1149E+02	5.4756E+02	1.4737E+02	2.2374E+00
	2.4741E-01	-7.6870E-01	3.7753E+00	1.0161E+00	1.5426E-02
19	-1.7298E+01	-2.3586E+02	6.6697E+02	2.1856E+02	3.0555E+02
	-1.1927E-01	-1.6262E+00	4.5986E+00	1.5069E+00	2.1067E+00
20	-5.0138E+01	-5.4136E+02	1.5529E+02	4.9123E+02	3.7955E+02
	-3.4569E-01	-3.7326E+00	1.0707E+00	3.3869E+00	2.6169E+00
21	3.1134E+00	-8.5401E+01	-8.1794E+01	8.8514E+01	1.2036E+02
	2.1466E-02	-5.8882E-01	-5.6395E-01	6.1028E-01	8.2986E-01
22	-4.3203E+01	-1.4046E+02	-1.2974E+02	9.7261E+01	1.6999E+02
	-2.9788E-01	-9.6847E-01	-8.9455E-01	6.7059E-01	1.1720E+00

Allowable Stress for Load Case 102

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	244.47	242.56	20.00	25.00	66.30
2	245.26	241.80	20.00	25.00	66.30
3	244.57	242.68	20.00	25.00	66.30
4	247.28	247.07	20.00	25.00	66.30
5	250.39	249.84	20.00	25.00	66.30
6	251.90	251.35	20.00	23.60	66.30
7	255.02	253.65	20.00	23.60	66.30
8	255.12	253.76	20.00	23.60	66.30
9	255.02	253.65	20.00	23.60	66.30
10	253.76	252.36	20.00	23.60	66.30
11	254.60	252.13	20.00	23.60	66.30
12	258.14	255.20	20.00	23.60	66.30
13	249.62	248.74	20.00	25.00	66.30
14	247.77	247.44	20.00	25.00	66.30
15	248.49	248.35	20.00	25.00	66.30
16	248.46	248.26	20.00	25.00	66.30
17	248.65	248.43	20.00	25.00	66.30
18	249.18	249.04	20.00	25.00	66.30
19	249.54	249.34	20.00	25.00	66.30
20	253.94	252.98	20.00	23.60	66.30
21	245.80	245.58	20.00	25.00	66.30
22	246.23	246.04	20.00	25.00	66.30

Table 2-28. Load Case 103, -20°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.3482E+01	-8.5843E+00	-1.0329E+01	7.2066E+01	7.2902E+01
	4.3769E-01	-5.9187E-02	-7.1218E-02	4.9688E-01	5.0264E-01
2	5.7962E+01	-7.3768E-01	-1.5287E+01	5.8700E+01	1.6743E-01
	3.9963E-01	-5.0861E-03	-1.0540E-01	4.0472E-01	1.1544E-03
3	6.9792E+01	-7.0002E+00	-1.0848E+01	7.6792E+01	8.6945E+01
	4.8120E-01	-4.8265E-02	-7.4791E-02	5.2946E-01	5.9946E-01
4	2.9374E+03	-2.0246E+03	-3.8426E+02	4.9620E+03	1.0177E+04
	2.0252E+01	-1.3959E+01	-2.6494E+00	3.4212E+01	7.0166E+01
5	4.7887E+03	-2.1862E+03	-3.9240E+02	6.9748E+03	9.1372E+03
	3.3017E+01	-1.5073E+01	-2.7055E+00	4.8090E+01	6.2999E+01
6	3.1014E+03	-1.9487E+02	7.4379E+02	3.2963E+03	5.6790E+03
	2.1383E+01	-1.3436E+00	5.1283E+00	2.2727E+01	3.9155E+01
7	1.5067E+03	2.1325E-01	-3.9524E+01	1.5064E+03	4.5757E+01
	1.0388E+01	1.4703E-03	-2.7251E-01	1.0387E+01	3.1548E-01
8	1.5046E+03	9.1324E-03	1.7180E+00	1.5046E+03	6.4715E-01
	1.0374E+01	6.2966E-05	1.1845E-02	1.0374E+01	4.4620E-03
9	1.5055E+03	1.4930E-02	-2.6797E+01	1.5055E+03	1.9005E+01
	1.0380E+01	1.0294E-04	-1.8476E-01	1.0380E+01	1.3103E-01
10	1.5419E+03	-2.3326E+02	8.3267E+02	1.7752E+03	1.1832E+03
	1.0631E+01	-1.6083E+00	5.7410E+00	1.2239E+01	8.1576E+00
11	4.2181E+02	-5.3081E+02	8.1941E+01	9.5262E+02	7.2075E+02
	2.9082E+00	-3.6598E+00	5.6497E-01	6.5681E+00	4.9694E+00
12	1.8920E+02	-5.3550E+02	8.0639E+01	7.2470E+02	1.5479E+03
	1.3045E+00	-3.6922E+00	5.5598E-01	4.9966E+00	1.0672E+01
13	2.2557E+03	-8.8888E+02	1.5802E+02	3.1446E+03	2.0034E+03
	1.5553E+01	-6.1286E+00	1.0895E+00	2.1681E+01	1.3813E+01
14	1.7857E+03	-7.7851E+02	1.5649E+02	2.5642E+03	3.2124E+03
	1.2312E+01	-5.3676E+00	1.0789E+00	1.7680E+01	2.2149E+01
15	4.1133E+02	-2.1278E+02	2.1340E+02	6.2411E+02	9.3193E+02
	2.8360E+00	-1.4671E+00	1.4714E+00	4.3031E+00	6.4254E+00

WATERMARK

16	9.1644E+02	-3.8128E+02	3.1305E+02	1.2977E+03	1.9190E+03
	6.3187E+00	-2.6288E+00	2.1584E+00	8.9475E+00	1.3231E+01
17	8.6118E+02	-1.6625E+02	-7.3086E+01	1.0274E+03	1.8083E+03
	5.9377E+00	-1.1462E+00	-5.0391E-01	7.0839E+00	1.2468E+01
18	8.5625E+02	-1.4779E+02	-1.2726E+02	1.0040E+03	1.7602E+03
	5.9036E+00	-1.0190E+00	-8.7739E-01	6.9226E+00	1.2136E+01
19	1.0302E+03	-4.2825E+02	2.2546E+02	1.4585E+03	2.2011E+03
	7.1030E+00	-2.9527E+00	1.5545E+00	1.0056E+01	1.5176E+01
20	1.1809E+03	-5.8680E+02	9.5877E+01	1.7677E+03	3.2791E+03
	8.1418E+00	-4.0459E+00	6.6105E-01	1.2188E+01	2.2609E+01
21	1.3795E+02	-6.9196E+02	-6.6008E+01	8.2990E+02	2.0682E+03
	9.5112E-01	-4.7709E+00	-4.5511E-01	5.7220E+00	1.4260E+01
22	6.3805E+01	-3.6307E+01	4.3021E+01	1.0011E+02	1.5270E+02
	4.3992E-01	-2.5033E-01	2.9662E-01	6.9025E-01	1.0528E+00

Allowable Stress for Load Case 103

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

Table 2-29. Load Case 104, -40°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.7589E+01	-1.0492E+01	-1.2625E+01	8.8081E+01	8.9103E+01
	5.3496E-01	-7.2340E-02	-8.7044E-02	6.0730E-01	6.1434E-01
2	7.0843E+01	-9.0161E-01	-1.8685E+01	7.1744E+01	2.0464E-01
	4.8844E-01	-6.2164E-03	-1.2883E-01	4.9466E-01	1.4109E-03
3	8.5301E+01	-8.5558E+00	-1.3258E+01	9.3857E+01	1.0627E+02
	5.8813E-01	-5.8990E-02	-9.1411E-02	6.4712E-01	7.3267E-01
4	3.5901E+03	-2.4745E+03	-4.6965E+02	6.0647E+03	1.2438E+04
	2.4753E+01	-1.7061E+01	-3.2381E+00	4.1814E+01	8.5758E+01
5	5.8528E+03	-2.6720E+03	-4.7960E+02	8.5248E+03	1.1168E+04
	4.0354E+01	-1.8423E+01	-3.3067E+00	5.8776E+01	7.6999E+01
6	3.7906E+03	-2.3817E+02	9.0908E+02	4.0288E+03	6.9410E+03
	2.6135E+01	-1.6421E+00	6.2679E+00	2.7777E+01	4.7857E+01
7	1.8415E+03	2.6064E-01	-4.8307E+01	1.8412E+03	5.5925E+01
	1.2696E+01	1.7970E-03	-3.3307E-01	1.2695E+01	3.8559E-01
8	1.8390E+03	1.1162E-02	2.0998E+00	1.8390E+03	7.9096E-01
	1.2680E+01	7.6958E-05	1.4478E-02	1.2679E+01	5.4535E-03
9	1.8400E+03	1.8247E-02	-3.2752E+01	1.8400E+03	2.3228E+01
	1.2687E+01	1.2581E-04	-2.2582E-01	1.2686E+01	1.6015E-01
10	1.8845E+03	-2.8510E+02	1.0177E+03	2.1696E+03	1.4461E+03
	1.2993E+01	-1.9657E+00	7.0168E+00	1.4959E+01	9.9704E+00
11	5.1554E+02	-6.4877E+02	1.0015E+02	1.1643E+03	8.8092E+02
	3.5545E+00	-4.4731E+00	6.9051E-01	8.0276E+00	6.0737E+00
12	2.3124E+02	-6.5451E+02	9.8558E+01	8.8575E+02	1.8919E+03
	1.5944E+00	-4.5127E+00	6.7954E-01	6.1070E+00	1.3044E+01
13	2.7570E+03	-1.0864E+03	1.9314E+02	3.8434E+03	2.4487E+03
	1.9009E+01	-7.4905E+00	1.3316E+00	2.6499E+01	1.6883E+01
14	2.1825E+03	-9.5151E+02	1.9126E+02	3.1340E+03	3.9263E+03
	1.5048E+01	-6.5604E+00	1.3187E+00	2.1608E+01	2.7071E+01
15	5.0273E+02	-2.6007E+02	2.6083E+02	7.6280E+02	1.1390E+03
	3.4662E+00	-1.7931E+00	1.7983E+00	5.2593E+00	7.8533E+00

WAPRIS

16	1.1201E+03	-4.6601E+02	3.8262E+02	1.5861E+03	2.3454E+03
	7.7228E+00	-3.2130E+00	2.6381E+00	1.0936E+01	1.6171E+01
17	1.0526E+03	-2.0319E+02	-8.9328E+01	1.2557E+03	2.2102E+03
	7.2571E+00	-1.4010E+00	-6.1589E-01	8.6581E+00	1.5239E+01
18	1.0465E+03	-1.8063E+02	-1.5553E+02	1.2272E+03	2.1513E+03
	7.2155E+00	-1.2454E+00	-1.0724E+00	8.4609E+00	1.4833E+01
19	1.2591E+03	-5.2342E+02	2.7557E+02	1.7826E+03	2.6902E+03
	8.6815E+00	-3.6088E+00	1.9000E+00	1.2290E+01	1.8548E+01
20	1.4433E+03	-7.1721E+02	1.1718E+02	2.1605E+03	4.0078E+03
	9.9511E+00	-4.9450E+00	8.0795E-01	1.4896E+01	2.7633E+01
21	1.6860E+02	-8.4572E+02	-8.0676E+01	1.0143E+03	2.5278E+03
	1.1625E+00	-5.8311E+00	-5.5624E-01	6.9935E+00	1.7429E+01
22	7.7984E+01	-4.4375E+01	5.2581E+01	1.2236E+02	1.8663E+02
	5.3768E-01	-3.0596E-01	3.6254E-01	8.4364E-01	1.2868E+00

Allowable Stress for Load Case 104

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

Table 2-30. Load Case 105, -40°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2461E+02	-2.0041E+02	-3.7463E+01	3.2502E+02	4.4848E+02
	8.5917E-01	-1.3818E+00	-2.5830E-01	2.2409E+00	3.0922E+00
2	1.5192E+02	-3.1189E+02	-9.3653E+01	4.6381E+02	9.4237E+02
	1.0475E+00	-2.1504E+00	-6.4571E-01	3.1979E+00	6.4974E+00
3	1.2029E+02	-1.9529E+02	-3.2172E+01	3.1557E+02	4.4052E+02
	8.2935E-01	-1.3465E+00	-2.2182E-01	2.1758E+00	3.0373E+00
4	1.9645E+02	-1.6280E+03	-5.7628E+02	1.8244E+03	2.9197E+03
	1.3545E+00	-1.1225E+01	-3.9733E+00	1.2579E+01	2.0131E+01
5	1.7349E+02	-1.4045E+03	-1.1687E+03	1.5780E+03	2.5122E+03
	1.1962E+00	-9.6839E+00	-8.0581E+00	1.0880E+01	1.7321E+01
6	1.1707E+02	-5.4596E+02	-1.2134E+03	6.6303E+02	1.9864E+02
	8.0720E-01	-3.7642E+00	-8.3664E+00	4.5714E+00	1.3696E+00
7	7.7490E+01	-1.6321E+02	1.6742E+01	2.4070E+02	4.5403E+02
	5.3427E-01	-1.1253E+00	1.1543E-01	1.6596E+00	3.1304E+00
8	7.7867E+01	-1.6396E+02	3.0123E-01	2.4182E+02	4.5691E+02
	5.3687E-01	-1.1304E+00	2.0769E-03	1.6673E+00	3.1503E+00
9	7.5900E+01	-1.6154E+02	-8.3140E+00	2.3745E+02	4.4874E+02
	5.2331E-01	-1.1138E+00	-5.7323E-02	1.6371E+00	3.0940E+00
10	2.1003E+02	-5.4561E+02	2.9314E+02	7.5564E+02	1.3914E+03
	1.4481E+00	-3.7618E+00	2.0211E+00	5.2100E+00	9.5933E+00
11	-1.6891E+02	-7.2892E+02	-3.3087E+02	5.6001E+02	7.4729E+01
	-1.1646E+00	-5.0257E+00	-2.2813E+00	3.8611E+00	5.1524E-01
12	-1.2650E+02	-8.7220E+02	-8.4494E+02	7.4570E+02	3.3516E+02
	-8.7215E-01	-6.0136E+00	-5.8257E+00	5.1414E+00	2.3109E+00
13	-8.8591E+01	-9.3575E+02	-9.3399E+01	8.4716E+02	3.5017E+02
	-6.1081E-01	-6.4518E+00	-6.4396E-01	5.8410E+00	2.4143E+00
14	-1.0711E+02	-8.1608E+02	1.0423E+02	7.0896E+02	2.3357E+02
	-7.3852E-01	-5.6267E+00	7.1867E-01	4.8881E+00	1.6104E+00
15	8.0962E+01	-4.7639E+01	4.0154E+01	1.2860E+02	1.8918E+02
	5.5821E-01	-3.2846E-01	2.7685E-01	8.8668E-01	1.3044E+00

WAIVER PENDING

16	2.1490E+02	-8.9250E+01	7.5742E+01	3.0415E+02	4.4043E+02
	1.4817E+00	-6.1536E-01	5.2222E-01	2.0970E+00	3.0366E+00
17	1.9735E+02	-3.7374E+01	-4.1536E+01	2.3473E+02	4.0528E+02
	1.3607E+00	-2.5769E-01	-2.8638E-01	1.6184E+00	2.7943E+00
18	2.0459E+02	-8.3678E+01	5.6057E+02	2.8826E+02	4.8158E+02
	1.4106E+00	-5.7694E-01	3.8650E+00	1.9875E+00	3.3204E+00
19	9.8206E+01	-2.0808E+02	8.0226E+02	3.0629E+02	2.4028E+02
	6.7711E-01	-1.4347E+00	5.5314E+00	2.1118E+00	1.6567E+00
20	2.3647E+01	-5.2495E+02	2.1939E+02	5.4860E+02	3.9192E+02
	1.6304E-01	-3.6194E+00	1.5127E+00	3.7824E+00	2.7022E+00
21	1.8726E+01	-3.4169E+02	-1.1895E+02	3.6042E+02	9.4276E+02
	1.2911E-01	-2.3559E+00	-8.2016E-01	2.4850E+00	6.5001E+00
22	-6.3056E+00	-1.3717E+02	-1.3566E+02	1.3086E+02	3.4143E+01
	-4.3475E-02	-9.4572E-01	-9.3537E-01	9.0225E-01	2.3541E-01

Allowable Stress for Load Case 105

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	38.72	36.75	20.00	30.00	70.00
2	39.25	35.08	20.00	30.00	70.00
3	38.87	36.93	20.00	30.00	70.00
4	41.91	41.64	20.00	30.00	70.00
5	45.37	44.75	20.00	30.00	70.00
6	47.12	46.51	20.00	30.00	70.00
7	50.97	49.43	20.00	30.00	70.00
8	51.04	49.50	20.00	30.00	70.00
9	50.96	49.42	20.00	30.00	70.00
10	49.30	47.70	20.00	30.00	70.00
11	50.05	47.23	20.00	30.00	70.00
12	53.88	50.53	20.00	30.00	70.00
13	44.38	43.38	20.00	30.00	70.00
14	42.30	41.95	20.00	30.00	70.00
15	43.89	43.73	20.00	30.00	70.00
16	43.85	43.63	20.00	30.00	70.00
17	44.04	43.81	20.00	30.00	70.00
18	44.43	44.28	20.00	30.00	70.00
19	44.70	44.51	20.00	30.00	70.00
20	49.55	48.46	20.00	30.00	70.00
21	40.39	40.15	20.00	30.00	70.00
22	40.88	40.65	20.00	30.00	70.00

Table 2-31. Load Case 106, -20°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.1163E+02	-2.1263E+02	1.2570E+00	3.2426E+02	4.7090E+02
	7.6964E-01	-1.4660E+00	8.6665E-03	2.2357E+00	3.2467E+00
2	1.3470E+02	-3.2192E+02	-3.2378E+01	4.5662E+02	9.4805E+02
	9.2874E-01	-2.2195E+00	-2.2324E-01	3.1483E+00	6.5366E+00
3	1.1193E+02	-2.0690E+02	-1.0373E+00	3.1884E+02	4.5943E+02
	7.7175E-01	-1.4265E+00	-7.1522E-03	2.1983E+00	3.1677E+00
4	3.9269E+02	-1.9435E+03	-3.6164E+02	2.3362E+03	4.5733E+03
	2.7075E+00	-1.3400E+01	-2.4934E+00	1.6107E+01	3.1532E+01
5	3.8680E+02	-2.2551E+03	-9.2934E+02	2.6419E+03	4.0483E+03
	2.6669E+00	-1.5548E+01	-6.4076E+00	1.8215E+01	2.7912E+01
6	-1.8969E+01	-1.1674E+03	-1.1980E+03	1.1485E+03	1.3471E+03
	-1.3079E-01	-8.0493E+00	-8.2602E+00	7.9185E+00	9.2879E+00
7	-3.2317E+01	-5.1350E+02	-8.1972E+01	4.8119E+02	4.5507E+02
	-2.2281E-01	-3.5405E+00	-5.6518E-01	3.3177E+00	3.1376E+00
8	-3.2453E+01	-5.1326E+02	-1.0194E+02	4.8081E+02	4.5012E+02
	-2.2375E-01	-3.5388E+00	-7.0283E-01	3.3150E+00	3.1035E+00
9	-3.2205E+01	-5.1312E+02	-1.0300E+02	4.8092E+02	4.4676E+02
	-2.2205E-01	-3.5379E+00	-7.1017E-01	3.3158E+00	3.0803E+00
10	-1.0397E+02	-6.4325E+02	1.4090E+01	5.3928E+02	1.0682E+03
	-7.1688E-01	-4.4351E+00	9.7144E-02	3.7182E+00	7.3649E+00
11	-1.5305E+02	-7.3035E+02	-3.6719E+02	5.7730E+02	1.6907E+02
	-1.0553E+00	-5.0356E+00	-2.5317E+00	3.9803E+00	1.1657E+00
12	-5.2899E+01	-8.8924E+02	-8.7766E+02	8.3634E+02	8.7656E+01
	-3.6473E-01	-6.1311E+00	-6.0513E+00	5.7664E+00	6.0437E-01
13	-1.0714E+02	-1.3137E+03	-1.4550E+02	1.2066E+03	9.4823E+02
	-7.3872E-01	-9.0577E+00	-1.0032E+00	8.3190E+00	6.5378E+00
14	-7.8628E+01	-1.1420E+03	4.9100E+01	1.0634E+03	6.9713E+02
	-5.4212E-01	-7.8737E+00	3.3853E-01	7.3316E+00	4.8065E+00
15	-1.5765E+02	-4.0771E+02	-1.2403E+02	2.5006E+02	1.2475E+02
	-1.0869E+00	-2.8111E+00	-8.5513E-01	1.7241E+00	8.6011E-01

WATERMARK

16	-1.2791E+01	-1.1256E+02	-8.2572E+01	9.9774E+01	1.3165E+02
	-8.8188E-02	-7.7610E-01	-5.6932E-01	6.8792E-01	9.0771E-01
17	-3.1903E+01	-1.1444E+02	-9.2447E+01	8.2539E+01	1.2982E+02
	-2.1997E-01	-7.8905E-01	-6.3740E-01	5.6908E-01	8.9508E-01
18	5.0825E+01	-3.3144E+02	5.1269E+02	3.8227E+02	4.9688E+02
	3.5043E-01	-2.2852E+00	3.5349E+00	2.6357E+00	3.4259E+00
19	2.0921E+01	-5.8801E+02	5.3508E+02	6.0893E+02	9.9589E+02
	1.4424E-01	-4.0542E+00	3.6892E+00	4.1985E+00	6.8664E+00
20	-6.7029E+01	-8.3306E+02	1.3064E+01	7.6603E+02	1.2379E+03
	-4.6215E-01	-5.7438E+00	9.0072E-02	5.2816E+00	8.5352E+00
21	-2.4951E+00	-1.7783E+02	-1.0091E+02	1.7534E+02	4.3880E+02
	-1.7203E-02	-1.2261E+00	-6.9572E-01	1.2089E+00	3.0254E+00
22	-1.3143E+01	-1.9504E+02	-1.1144E+02	1.8189E+02	4.4845E+02
	-9.0618E-02	-1.3447E+00	-7.6835E-01	1.2541E+00	3.0920E+00

Allowable Stress for Load Case 106

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	62.33	60.36	20.00	30.00	70.00
2	62.90	58.82	20.00	30.00	70.00
3	62.47	60.54	20.00	30.00	70.00
4	65.46	65.20	20.00	30.00	70.00
5	68.87	68.26	20.00	30.00	70.00
6	70.59	69.99	20.00	30.00	70.00
7	74.33	72.81	20.00	30.00	70.00
8	74.40	72.89	20.00	30.00	70.00
9	74.32	72.80	20.00	30.00	70.00
10	72.72	71.15	20.00	30.00	70.00
11	73.49	70.72	20.00	30.00	70.00
12	77.29	73.99	20.00	30.00	70.00
13	67.91	66.93	20.00	30.00	70.00
14	65.86	65.52	20.00	30.00	70.00
15	67.34	67.18	20.00	30.00	70.00
16	67.30	67.08	20.00	30.00	70.00
17	67.49	67.26	20.00	30.00	70.00
18	67.90	67.75	20.00	30.00	70.00
19	68.18	67.99	20.00	30.00	70.00
20	72.97	71.90	20.00	30.00	70.00
21	63.94	63.70	20.00	30.00	70.00
22	64.42	64.20	20.00	30.00	70.00

Table 2-32. Load Case 201, Maximum Internal Pressure 1,931 kPa (280 psia), Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.0745E+00	-1.2812E+01	-3.9938E+01	1.3887E+01	1.3041E+01
	7.4086E-03	-8.8336E-02	-2.7536E-01	9.5745E-02	8.9916E-02
2	1.9621E-02	-9.5804E+00	-3.7802E+01	9.6001E+00	8.0928E-01
	1.3528E-04	-6.6055E-02	-2.6063E-01	6.6190E-02	5.5798E-03
3	2.2656E+00	-1.2326E+01	-3.6331E+01	1.4591E+01	1.9476E+01
	1.5621E-02	-8.4982E-02	-2.5049E-01	1.0060E-01	1.3428E-01
4	2.8893E+03	-1.2658E+03	1.4435E+03	4.1551E+03	7.3286E+03
	1.9921E+01	-8.7275E+00	9.9527E+00	2.8648E+01	5.0529E+01
5	2.2675E+03	-1.1443E+03	1.4644E+03	3.4118E+03	5.6450E+03
	1.5634E+01	-7.8896E+00	1.0097E+01	2.3523E+01	3.8921E+01
6	9.1841E+02	-3.7997E+02	1.8086E+03	1.2984E+03	1.6505E+03
	6.3322E+00	-2.6198E+00	1.2470E+01	8.9520E+00	1.1380E+01
7	1.2576E+01	-1.2354E+02	1.0847E+03	1.3611E+02	5.8551E+00
	8.6711E-02	-8.5176E-01	7.4789E+00	9.3847E-01	4.0369E-02
8	1.2232E+01	-1.2340E+02	1.0985E+03	1.3563E+02	2.1526E-01
	8.4340E-02	-8.5080E-01	7.5741E+00	9.3514E-01	1.4841E-03
9	1.2216E+01	-1.2376E+02	1.1291E+03	1.3598E+02	1.1458E+01
	8.4227E-02	-8.5332E-01	7.7847E+00	9.3754E-01	7.8999E-02
10	5.1145E+02	-3.1410E+02	1.2988E+02	8.2555E+02	9.6671E+02
	3.5263E+00	-2.1656E+00	8.9550E-01	5.6920E+00	6.6652E+00
11	3.4114E+02	-1.8717E+02	8.6447E+01	5.2831E+02	2.2475E+02
	2.3521E+00	-1.2905E+00	5.9603E-01	3.6426E+00	1.5496E+00
12	-2.4114E+01	-4.9997E+02	-2.9756E+01	4.7586E+02	4.0233E+02
	-1.6626E-01	-3.4472E+00	-2.0516E-01	3.2809E+00	2.7740E+00
13	8.6447E+01	-6.4651E+02	-1.0260E+02	7.3296E+02	5.9602E+02
	5.9603E-01	-4.4575E+00	-7.0743E-01	5.0536E+00	4.1094E+00
14	1.0103E+02	-5.8087E+02	-1.1764E+02	6.8190E+02	7.3101E+02
	6.9660E-01	-4.0049E+00	-8.1109E-01	4.7015E+00	5.0402E+00
15	1.6259E+03	-1.8949E+03	-8.8200E+02	3.5208E+03	5.4379E+03
	1.1210E+01	-1.3065E+01	-6.0812E+00	2.4275E+01	3.7493E+01

WATERMARK

16	2.4297E+02	-2.0535E+03	-1.1489E+03	2.2964E+03	3.3625E+03
	1.6752E+00	-1.4158E+01	-7.9213E+00	1.5833E+01	2.3184E+01
17	-4.2901E+01	-1.6649E+03	-1.1215E+03	1.6220E+03	2.4245E+03
	-2.9580E-01	-1.1479E+01	-7.7323E+00	1.1184E+01	1.6716E+01
18	1.0350E+01	-1.8462E+03	-1.0252E+03	1.8565E+03	2.8425E+03
	7.1360E-02	-1.2729E+01	-7.0686E+00	1.2800E+01	1.9598E+01
19	4.7835E+02	-2.5206E+03	-1.1455E+03	2.9990E+03	4.6702E+03
	3.2981E+00	-1.7379E+01	-7.8981E+00	2.0677E+01	3.2200E+01
20	3.3629E+02	-2.0600E+03	-8.9475E+02	2.3963E+03	4.4985E+03
	2.3186E+00	-1.4203E+01	-6.1691E+00	1.6522E+01	3.1016E+01
21	7.0008E-01	-1.9681E+02	-2.0429E+01	1.9751E+02	4.0159E+02
	4.8269E-03	-1.3570E+00	-1.4086E-01	1.3618E+00	2.7689E+00
22	1.3120E+03	-3.7885E+02	5.0285E+02	1.6909E+03	2.3361E+03
	9.0461E+00	-2.6121E+00	3.4670E+00	1.1658E+01	1.6107E+01

MARKUP

Table 2-33. Load Case 202, Minimum External Pressure, 24 kPa (3.5 psia), Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-2.3360E+00	-3.6389E+00	-8.4101E+00	1.3030E+00	5.6886E-01
	-1.6106E-02	-2.5090E-02	-5.7985E-02	8.9835E-03	3.9222E-03
2	-2.2251E+00	-3.4540E+00	-8.1673E+00	1.2289E+00	7.6515E-02
	-1.5341E-02	-2.3814E-02	-5.6311E-02	8.4728E-03	5.2755E-04
3	-2.3988E+00	-3.6788E+00	-8.1338E+00	1.2800E+00	4.2054E-01
	-1.6539E-02	-2.5364E-02	-5.6081E-02	8.8250E-03	2.8995E-03
4	8.6873E+01	-3.5775E+01	6.4095E+01	1.2265E+02	1.9979E+02
	5.9897E-01	-2.4666E-01	4.4192E-01	8.4563E-01	1.3775E+00
5	5.3597E+01	-3.3184E+01	6.7388E+01	8.6781E+01	1.4493E+02
	3.6954E-01	-2.2879E-01	4.6462E-01	5.9833E-01	9.9928E-01
6	1.3890E+01	-1.5930E+01	7.6765E+01	2.9820E+01	2.7270E+01
	9.5765E-02	-1.0984E-01	5.2927E-01	2.0560E-01	1.8802E-01
7	-6.0285E+00	-1.0849E+01	5.7369E+01	4.8204E+00	1.7231E-02
	-4.1565E-02	-7.4801E-02	3.9554E-01	3.3236E-02	1.1880E-04
8	-6.0237E+00	-1.0851E+01	5.7603E+01	4.8276E+00	8.0194E-03
	-4.1532E-02	-7.4817E-02	3.9716E-01	3.3285E-02	5.5292E-05
9	-6.0832E+00	-1.0804E+01	5.9176E+01	4.7206E+00	4.5006E-01
	-4.1942E-02	-7.4490E-02	4.0801E-01	3.2548E-02	3.1030E-03
10	2.0667E+01	-2.3017E+01	6.8270E+00	4.3684E+01	4.4835E+01
	1.4249E-01	-1.5870E-01	4.7071E-02	3.0119E-01	3.0913E-01
11	1.5080E+01	-9.7133E+00	4.3805E+00	2.4793E+01	7.4089E+00
	1.0397E-01	-6.6971E-02	3.0203E-02	1.7094E-01	5.1083E-02
12	-3.4729E+00	-3.9384E+01	-2.6388E+00	3.5911E+01	3.4359E-01
	-2.3945E-02	-2.7154E-01	-1.8194E-02	2.4760E-01	2.3689E-03
13	7.1314E+00	-3.9296E+01	-5.8886E+00	4.6428E+01	3.8704E+01
	4.9169E-02	-2.7094E-01	-4.0601E-02	3.2011E-01	2.6686E-01
14	7.0102E+00	-3.3351E+01	-6.1013E+00	4.0361E+01	4.2551E+01
	4.8333E-02	-2.2995E-01	-4.2067E-02	2.7828E-01	2.9338E-01
15	7.8611E+01	-9.6274E+01	-4.6246E+01	1.7488E+02	2.7093E+02
	5.4200E-01	-6.6379E-01	-3.1886E-01	1.2058E+00	1.8680E+00

WATERMARKED

16	1.1883E+01	-1.0573E+02	-5.9774E+01	1.1761E+02	1.7180E+02
	8.1929E-02	-7.2897E-01	-4.1213E-01	8.1090E-01	1.1845E+00
17	-2.5828E+00	-8.5700E+01	-5.8959E+01	8.3117E+01	1.2343E+02
	-1.7808E-02	-5.9088E-01	-4.0651E-01	5.7307E-01	8.5100E-01
18	7.1470E-01	-9.6276E+01	-5.3349E+01	9.6991E+01	1.4832E+02
	4.9277E-03	-6.6380E-01	-3.6783E-01	6.6873E-01	1.0226E+00
19	2.5084E+01	-1.3163E+02	-5.9543E+01	1.5671E+02	2.4441E+02
	1.7295E-01	-9.0754E-01	-4.1053E-01	1.0805E+00	1.6852E+00
20	1.7760E+01	-1.0809E+02	-4.6333E+01	1.2585E+02	2.3602E+02
	1.2245E-01	-7.4528E-01	-3.1946E-01	8.6773E-01	1.6273E+00
21	-2.5723E+00	-2.9338E+01	-3.3283E+00	2.6766E+01	2.6295E+01
	-1.7736E-02	-2.0228E-01	-2.2948E-02	1.8454E-01	1.8130E-01
22	5.2520E+01	-1.2599E+01	2.0775E+01	6.5119E+01	7.8345E+01
	3.6211E-01	-8.6864E-02	1.4324E-01	4.4898E-01	5.4017E-01

MARKUP

Table 2-34. Load Case 203, Maximum Increased External Pressure, 140 kPa (20 psia), Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.3126E+01	-2.4084E+01	-4.6805E+01	1.0958E+01	6.6823E+00
	-9.0499E-02	-1.6605E-01	-3.2271E-01	7.5555E-02	4.6073E-02
2	-1.2719E+01	-2.3018E+01	-4.5823E+01	1.0298E+01	3.0728E-01
	-8.7697E-02	-1.5870E-01	-3.1594E-01	7.1003E-02	2.1186E-03
3	-1.3537E+01	-2.4745E+01	-4.6003E+01	1.1209E+01	7.2915E+00
	-9.3331E-02	-1.7061E-01	-3.1718E-01	7.7281E-02	5.0273E-02
4	7.7949E+01	-1.6574E+02	1.9547E+01	2.4369E+02	4.7358E+02
	5.3744E-01	-1.1428E+00	1.3477E-01	1.6802E+00	3.2652E+00
5	7.7028E+01	-2.0985E+02	3.2638E+01	2.8688E+02	4.1046E+02
	5.3109E-01	-1.4469E+00	2.2503E-01	1.9780E+00	2.8300E+00
6	-7.6705E+00	-1.2702E+02	6.5105E+00	1.1935E+02	1.9826E+02
	-5.2886E-02	-8.7576E-01	4.4888E-02	8.2287E-01	1.3670E+00
7	-6.5226E+00	-6.9798E+01	5.8866E+01	6.3276E+01	1.1730E+00
	-4.4972E-02	-4.8124E-01	4.0587E-01	4.3627E-01	8.0873E-03
8	-6.5220E+00	-6.9748E+01	5.7262E+01	6.3226E+01	1.2151E-02
	-4.4967E-02	-4.8090E-01	3.9481E-01	4.3593E-01	8.3778E-05
9	-6.5034E+00	-6.9724E+01	5.8513E+01	6.3221E+01	5.7573E-01
	-4.4839E-02	-4.8073E-01	4.0343E-01	4.3589E-01	3.9695E-03
10	-1.7827E+00	-7.1026E+01	1.0023E+01	6.9243E+01	2.6848E+00
	-1.2291E-02	-4.8971E-01	6.9108E-02	4.7741E-01	1.8511E-02
11	7.0682E+00	-2.0909E+01	1.1492E+00	2.7977E+01	1.4931E+01
	4.8733E-02	-1.4416E-01	7.9238E-03	1.9289E-01	1.0295E-01
12	-7.6942E+00	-1.3260E+02	-1.1590E+01	1.2490E+02	1.3869E+02
	-5.3049E-02	-9.1423E-01	-7.9911E-02	8.6118E-01	9.5623E-01
13	1.8797E+01	-7.1605E+01	-1.3701E+01	9.0402E+01	8.8937E+01
	1.2960E-01	-4.9370E-01	-9.4466E-02	6.2330E-01	6.1320E-01
14	1.4042E+01	-5.4197E+01	-1.0913E+01	6.8240E+01	5.4589E+01
	9.6818E-02	-3.7368E-01	-7.5244E-02	4.7050E-01	3.7638E-01
15	-6.5318E+01	-2.4885E+02	-7.3545E+01	1.8353E+02	2.2005E+02
	-4.5035E-01	-1.7157E+00	-5.0708E-01	1.2654E+00	1.5172E+00

WORKING DRAFT

16	1.9412E+01	-1.2380E+02	-6.3409E+01	1.4322E+02	2.0975E+02
	1.3384E-01	-8.5360E-01	-4.3719E-01	9.8744E-01	1.4462E+00
17	-1.1423E+00	-1.0229E+02	-5.4177E+01	1.0115E+02	1.5936E+02
	-7.8758E-03	-7.0526E-01	-3.7354E-01	6.9738E-01	1.0987E+00
18	2.2928E-01	-1.0755E+02	-5.2818E+01	1.0778E+02	1.7108E+02
	1.5808E-03	-7.4152E-01	-3.6417E-01	7.4310E-01	1.1796E+00
19	2.7292E+01	-1.4174E+02	-6.5878E+01	1.6904E+02	2.5177E+02
	1.8817E-01	-9.7729E-01	-4.5421E-01	1.1655E+00	1.7359E+00
20	2.0009E+01	-1.0845E+02	-5.3036E+01	1.2846E+02	2.4152E+02
	1.3796E-01	-7.4777E-01	-3.6567E-01	8.8573E-01	1.6652E+00
21	-1.5622E+01	-1.4864E+02	-1.7156E+01	1.3302E+02	7.2967E+01
	-1.0771E-01	-1.0249E+00	-1.1829E-01	9.1715E-01	5.0309E-01
22	-5.1788E+00	-5.4847E+01	-7.3022E+00	4.9668E+01	2.2968E+01
	-3.5707E-02	-3.7816E-01	-5.0347E-02	3.4245E-01	1.5836E-01

MARKUP

Table 2-35. Load Case 204, Additional Increased External Pressure, 2 MPa (290 psia), Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.8938E+02	-3.5619E+02	-6.7702E+02	1.6681E+02	1.0421E+02
	-1.3057E+00	-2.4558E+00	-4.6679E+00	1.1501E+00	7.1852E-01
2	-1.8438E+02	-3.4056E+02	-6.6267E+02	1.5618E+02	4.4556E+00
	-1.2712E+00	-2.3481E+00	-4.5690E+00	1.0769E+00	3.0720E-02
3	-1.9571E+02	-3.6662E+02	-6.6608E+02	1.7092E+02	1.1573E+02
	-1.3493E+00	-2.5278E+00	-4.5925E+00	1.1784E+00	7.9794E-01
4	1.6926E+03	-3.7634E+03	-5.4869E+02	5.4560E+03	1.0170E+04
	1.1670E+01	-2.5947E+01	-3.7831E+00	3.7618E+01	7.0117E+01
5	1.5542E+03	-3.9613E+03	-4.0001E+02	5.5155E+03	8.4232E+03
	1.0716E+01	-2.7312E+01	-2.7580E+00	3.8028E+01	5.8076E+01
6	-6.1023E+01	-2.1961E+03	-9.8109E+02	2.1351E+03	3.4499E+03
	-4.2074E-01	-1.5141E+01	-6.7644E+00	1.4721E+01	2.3786E+01
7	-6.5404E+00	-1.1180E+03	8.4648E+01	1.1114E+03	1.8282E+01
	-4.5094E-02	-7.7082E+00	5.8363E-01	7.6631E+00	1.2605E-01
8	-6.5434E+00	-1.1172E+03	5.6792E+01	1.1107E+03	2.8813E-01
	-4.5115E-02	-7.7028E+00	3.9156E-01	7.6577E+00	1.9866E-03
9	-6.3082E+00	-1.1165E+03	5.3730E+01	1.1102E+03	1.6962E+01
	-4.3493E-02	-7.6981E+00	3.7046E-01	7.6546E+00	1.1695E-01
10	-1.3828E+02	-1.1616E+03	3.4250E+01	1.0234E+03	6.6777E+02
	-9.5338E-01	-8.0093E+00	2.3614E-01	7.0559E+00	4.6041E+00
11	1.6835E+02	-5.0911E+02	-6.4845E+01	6.7746E+02	4.0912E+02
	1.1608E+00	-3.5102E+00	-4.4709E-01	4.6709E+00	2.8208E+00
12	-7.0673E+01	-1.7027E+03	-1.7382E+02	1.6320E+03	2.4142E+03
	-4.8728E-01	-1.1740E+01	-1.1984E+00	1.1252E+01	1.6645E+01
13	2.5169E+02	-7.2728E+02	-1.6806E+02	9.7897E+02	1.0358E+03
	1.7354E+00	-5.0144E+00	-1.1587E+00	6.7498E+00	7.1418E+00
14	1.6580E+02	-5.0221E+02	-1.1545E+02	6.6801E+02	3.6496E+02
	1.1431E+00	-3.4626E+00	-7.9597E-01	4.6057E+00	2.5163E+00
15	-1.1726E+03	-4.8875E+03	-6.3248E+02	3.7150E+03	7.0757E+01
	-8.0845E+00	-3.3698E+01	-4.3608E+00	2.5614E+01	4.8785E-01

WORKING DRAFT

16	1.8950E+02	-5.8363E+02	-1.7592E+02	7.7313E+02	1.1317E+03
	1.3066E+00	-4.0240E+00	-1.2129E+00	5.3306E+00	7.8029E+00
17	2.7957E+01	-5.2449E+02	2.5910E+00	5.5244E+02	9.7715E+02
	1.9275E-01	-3.6162E+00	1.7864E-02	3.8090E+00	6.7372E+00
18	4.2621E+01	-5.3946E+02	-7.2332E+01	5.8208E+02	1.0222E+03
	2.9386E-01	-3.7195E+00	-4.9871E-01	4.0133E+00	7.0475E+00
19	1.9275E+02	-6.3767E+02	-2.9370E+02	8.3042E+02	1.0015E+03
	1.3290E+00	-4.3966E+00	-2.0250E+00	5.7256E+00	6.9048E+00
20	3.4137E+02	-5.2526E+02	-2.7881E+02	8.6663E+02	1.0628E+03
	2.3536E+00	-3.6216E+00	-1.9224E+00	5.9752E+00	7.3278E+00
21	-2.2739E+02	-2.1138E+03	-2.4453E+02	1.8864E+03	8.9000E+02
	-1.5678E+00	-1.4574E+01	-1.6860E+00	1.3007E+01	6.1363E+00
22	-1.1200E+02	-1.6656E+03	-4.1001E+02	1.5536E+03	8.9413E+02
	-7.7225E-01	-1.1484E+01	-2.8269E+00	1.0712E+01	6.1648E+00

MARKUP

Table 2-36. Load Case 211, Fabrication Stress, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.8501E+02	-1.0148E+02	4.1733E+01	5.8649E+02	8.4660E+02
	3.3440E+00	-6.9966E-01	2.8774E-01	4.0437E+00	5.8371E+00
2	7.9194E+00	-2.3676E+01	3.1818E+01	3.1596E+01	2.6392E+01
	5.4603E-02	-1.6324E-01	2.1938E-01	2.1784E-01	1.8196E-01
3	6.5146E-01	-9.7676E+00	3.1614E+00	1.0419E+01	3.7264E+00
	4.4916E-03	-6.7345E-02	2.1797E-02	7.1837E-02	2.5693E-02
4	5.1276E+02	-2.7696E+02	-1.7763E+01	7.8972E+02	1.3865E+03
	3.5354E+00	-1.9096E+00	-1.2247E-01	5.4449E+00	9.5595E+00
5	5.7698E+02	-2.8656E+02	-5.4983E+01	8.6354E+02	1.3236E+03
	3.9781E+00	-1.9758E+00	-3.7910E-01	5.9539E+00	9.1258E+00
6	3.5146E+02	-1.0345E+01	8.6866E+01	3.6181E+02	6.1937E+02
	2.4232E+00	-7.1328E-02	5.9892E-01	2.4946E+00	4.2704E+00
7	1.4944E+02	4.3845E-01	-8.9387E-01	1.4900E+02	1.9476E+00
	1.0303E+00	3.0230E-03	-6.1630E-03	1.0273E+00	1.3428E-02
8	1.4935E+02	4.0939E-01	3.7247E+00	1.4894E+02	4.4174E-02
	1.0297E+00	2.8226E-03	2.5681E-02	1.0269E+00	3.0457E-04
9	1.4935E+02	3.9967E-01	1.9826E+00	1.4895E+02	6.1644E-02
	1.0297E+00	2.7556E-03	1.3670E-02	1.0270E+00	4.2502E-04
10	1.4984E+02	-5.6285E+00	6.3516E+01	1.5547E+02	4.1670E+01
	1.0331E+00	-3.8807E-02	4.3792E-01	1.0719E+00	2.8730E-01
11	5.6314E+01	-2.7677E+01	3.3436E+01	8.3991E+01	5.9976E+01
	3.8827E-01	-1.9083E-01	2.3053E-01	5.7910E-01	4.1352E-01
12	5.9136E+01	1.9400E+01	3.9125E+01	3.9736E+01	8.5089E+00
	4.0773E-01	1.3376E-01	2.6975E-01	2.7397E-01	5.8667E-02
13	2.5872E+02	-4.8757E+01	6.9335E+01	3.0748E+02	3.2102E+02
	1.7838E+00	-3.3617E-01	4.7805E-01	2.1200E+00	2.2133E+00
14	2.4820E+02	-4.9865E+01	7.3710E+01	2.9807E+02	2.5178E+02
	1.7113E+00	-3.4381E-01	5.0822E-01	2.0551E+00	1.7360E+00
15	4.0912E+02	9.4841E+01	4.9988E+01	3.1428E+02	1.2156E+01
	2.8208E+00	6.5391E-01	3.4466E-01	2.1669E+00	8.3816E-02

WATERMARKED

16	2.2502E+01	-2.6229E+00	8.3354E+00	2.5125E+01	3.2013E+01
	1.5515E-01	-1.8084E-02	5.7470E-02	1.7323E-01	2.2073E-01
17	2.0822E+01	1.5247E+00	-1.3011E+01	1.9297E+01	3.2841E+01
	1.4356E-01	1.0512E-02	-8.9705E-02	1.3305E-01	2.2643E-01
18	6.2622E+01	-2.5562E+01	-3.2996E+01	8.8184E+01	1.5707E+02
	4.3176E-01	-1.7625E-01	-2.2750E-01	6.0801E-01	1.0830E+00
19	7.2071E+01	-4.2653E+01	1.2702E+01	1.1472E+02	1.3128E+02
	4.9691E-01	-2.9408E-01	8.7580E-02	7.9099E-01	9.0518E-01
20	7.6190E+01	-7.0101E+01	1.2497E+01	1.4629E+02	2.1132E+02
	5.2531E-01	-4.8333E-01	8.6166E-02	1.0086E+00	1.4570E+00
21	2.2184E+01	-4.5781E+00	4.4874E-01	2.6762E+01	6.4225E+01
	1.5295E-01	-3.1565E-02	3.0939E-03	1.8452E-01	4.4281E-01
22	3.6010E+02	7.9852E+01	3.4061E+02	2.8025E+02	3.5378E+00
	2.4828E+00	5.5056E-01	2.3484E+00	1.9323E+00	2.4392E-02

MARKUP

Table 2-37. Load Case 215, Compression Load (5x weight), Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.1427E+00	-1.1561E+02	-1.4779E+01	1.1776E+02	1.7666E+02
	1.4773E-02	-7.9713E-01	-1.0190E-01	8.1190E-01	1.2180E+00
2	1.3744E+00	-8.9586E+01	1.2265E+01	9.0960E+01	2.6562E+00
	9.4765E-03	-6.1767E-01	8.4564E-02	6.2715E-01	1.8314E-02
3	-2.6839E+00	-1.0411E+02	4.7691E+00	1.0142E+02	3.1706E+01
	-1.8505E-02	-7.1779E-01	3.2882E-02	6.9929E-01	2.1861E-01
4	2.4483E+02	-3.3867E+02	6.3893E+01	5.8350E+02	1.0689E+03
	1.6880E+00	-2.3351E+00	4.4053E-01	4.0231E+00	7.3696E+00
5	2.3313E+02	-3.8544E+02	6.8359E+01	6.1857E+02	8.6548E+02
	1.6074E+00	-2.6575E+00	4.7132E-01	4.2649E+00	5.9673E+00
6	-6.8471E+01	-3.1066E+02	-6.1555E+01	2.4219E+02	2.9432E+02
	-4.7209E-01	-2.1420E+00	-4.2441E-01	1.6699E+00	2.0293E+00
7	-2.7875E-01	-1.8775E+02	-1.3815E-01	1.8747E+02	1.1303E+00
	-1.9219E-03	-1.2945E+00	-9.5253E-04	1.2926E+00	7.7932E-03
8	-2.8878E-01	-1.4923E+02	-2.1976E+00	1.4894E+02	7.4619E-03
	-1.9911E-03	-1.0289E+00	-1.5152E-02	1.0269E+00	5.1448E-05
9	-2.8783E-01	-1.3303E+02	-1.1917E+00	1.3274E+02	5.6833E-01
	-1.9845E-03	-9.1722E-01	-8.2163E-03	9.1524E-01	3.9185E-03
10	-3.2371E+00	-1.3498E+02	-3.8109E+01	1.3174E+02	1.9073E+00
	-2.2319E-02	-9.3065E-01	-2.6275E-01	9.0834E-01	1.3150E-02
11	1.2389E+01	-3.9875E+01	-1.9484E+01	5.2263E+01	5.3310E+01
	8.5418E-02	-2.7493E-01	-1.3434E-01	3.6034E-01	3.6756E-01
12	-2.0559E+01	-8.4795E+01	-2.5724E+01	6.4236E+01	8.7681E+01
	-1.4175E-01	-5.8464E-01	-1.7736E-01	4.4289E-01	6.0454E-01
13	4.2954E+01	-1.7097E+02	-3.9620E+01	2.1392E+02	2.0468E+02
	2.9616E-01	-1.1788E+00	-2.7317E-01	1.4749E+00	1.4112E+00
14	3.6073E+01	-1.4459E+02	-3.8268E+01	1.8066E+02	1.6318E+02
	2.4872E-01	-9.9692E-01	-2.6385E-01	1.2456E+00	1.1251E+00
15	-5.6966E+02	-2.5364E+03	-2.8963E+02	1.9667E+03	1.2530E+02
	-3.9277E+00	-1.7488E+01	-1.9970E+00	1.3560E+01	8.6392E-01

MARKED FOR REVISION

16	1.5793E+02	-3.7569E+02	-6.2233E+01	5.3361E+02	7.2545E+02
	1.0889E+00	-2.5903E+00	-4.2908E-01	3.6791E+00	5.0018E+00
17	-9.0350E+01	-3.9564E+02	-3.7640E+01	3.0529E+02	4.6497E+02
	-6.2294E-01	-2.7278E+00	-2.5952E-01	2.1049E+00	3.2059E+00
18	-5.2849E+01	-2.3151E+02	-2.4716E+01	1.7866E+02	2.6489E+02
	-3.6438E-01	-1.5962E+00	-1.7041E-01	1.2318E+00	1.8263E+00
19	1.3227E+02	-2.3816E+02	-4.3004E+01	3.7043E+02	5.0360E+02
	9.1194E-01	-1.6421E+00	-2.9650E-01	2.5540E+00	3.4722E+00
20	1.8855E+02	-2.6087E+02	-5.4248E+01	4.4942E+02	7.7006E+02
	1.3000E+00	-1.7986E+00	-3.7403E-01	3.0986E+00	5.3094E+00
21	-1.2105E+01	-1.3020E+02	-1.2899E+01	1.1809E+02	6.0673E+01
	-8.3458E-02	-8.9767E-01	-8.8933E-02	8.1421E-01	4.1833E-01
22	-2.0024E+02	-7.4053E+02	-2.7267E+02	5.4029E+02	1.2643E+02
	-1.3806E+00	-5.1058E+00	-1.8800E+00	3.7252E+00	8.7170E-01

MARKUP

Table 2-38. Load Case 216, Rod Drop onto Cask, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.9351E+00	-1.4939E+01	1.9652E+01	2.1874E+01	1.0295E+01
	4.7816E-02	-1.0300E-01	1.3549E-01	1.5082E-01	7.0982E-02
2	1.8598E-01	-1.4805E+01	-4.6635E-01	1.4991E+01	4.7396E+00
	1.2823E-03	-1.0208E-01	-3.2153E-03	1.0336E-01	3.2678E-02
3	8.5889E-01	-1.4149E+01	2.5823E-02	1.5007E+01	1.6130E+00
	5.9218E-03	-9.7551E-02	1.7804E-04	1.0347E-01	1.1121E-02
4	8.4839E+01	-2.1907E+01	5.4474E+01	1.0675E+02	1.2853E+02
	5.8494E-01	-1.5104E-01	3.7558E-01	7.3599E-01	8.8620E-01
5	4.7845E+01	-1.4411E+01	4.5501E+01	6.2256E+01	4.7272E+01
	3.2988E-01	-9.9357E-02	3.1372E-01	4.2924E-01	3.2593E-01
6	5.7487E+00	-6.9224E+01	2.3931E+01	7.4973E+01	5.0121E+01
	3.9636E-02	-4.7728E-01	1.6500E-01	5.1692E-01	3.4557E-01
7	-6.5971E-02	-4.7962E+01	-9.5408E-01	4.7896E+01	7.4163E-01
	-4.5485E-04	-3.3068E-01	-6.5781E-03	3.3023E-01	5.1134E-03
8	-5.7404E-02	-3.3744E+01	-5.5923E-01	3.3686E+01	1.4710E-02
	-3.9579E-04	-2.3265E-01	-3.8557E-03	2.3226E-01	1.0142E-04
9	-5.1379E-02	-2.5449E+01	-3.0394E-01	2.5398E+01	4.3382E-02
	-3.5424E-04	-1.7547E-01	-2.0956E-03	1.7511E-01	2.9911E-04
10	-8.5508E-02	-2.0945E+01	-6.0977E+00	2.0860E+01	2.5782E+00
	-5.8956E-04	-1.4441E-01	-4.2042E-02	1.4382E-01	1.7776E-02
11	2.7807E+00	-5.0059E+00	-1.4611E+00	7.7866E+00	8.8785E+00
	1.9172E-02	-3.4514E-02	-1.0074E-02	5.3687E-02	6.1215E-02
12	-1.8020E+00	-9.3999E+00	-2.2058E+00	7.5980E+00	8.1777E+00
	-1.2424E-02	-6.4810E-02	-1.5208E-02	5.2386E-02	5.6383E-02
13	8.2108E+00	-2.4248E+01	-3.4108E+00	3.2459E+01	2.7914E+01
	5.6611E-02	-1.6718E-01	-2.3517E-02	2.2380E-01	1.9246E-01
14	7.5774E+00	-2.1016E+01	-3.2835E+00	2.8593E+01	2.8007E+01
	5.2245E-02	-1.4490E-01	-2.2639E-02	1.9714E-01	1.9310E-01
15	-6.7742E+02	-3.9685E+03	-2.3188E+02	3.2911E+03	6.1380E+02
	-4.6707E+00	-2.7362E+01	-1.5988E+00	2.2691E+01	4.2320E+00

MARSH

16	1.3538E+02	-2.8598E+02	-4.2928E+00	4.2136E+02	6.3646E+02
	9.3340E-01	-1.9718E+00	-2.9598E-02	2.9052E+00	4.3882E+00
17	2.2037E+00	-2.4495E+02	4.4627E+01	2.4715E+02	4.3387E+02
	1.5194E-02	-1.6888E+00	3.0770E-01	1.7040E+00	2.9914E+00
18	-7.9413E+00	-8.1786E+01	-1.8869E+01	7.3845E+01	1.6264E+01
	-5.4753E-02	-5.6390E-01	-1.3009E-01	5.0914E-01	1.1214E-01
19	3.0973E+01	-3.5211E+01	-1.9758E+00	6.6184E+01	7.1670E+01
	2.1355E-01	-2.4277E-01	-1.3623E-02	4.5633E-01	4.9415E-01
20	4.9085E+01	-4.1864E+01	-1.3974E+01	9.0948E+01	1.1526E+02
	3.3843E-01	-2.8864E-01	-9.6346E-02	6.2707E-01	7.9469E-01
21	-3.9030E-01	-5.5047E+00	-4.1901E-01	5.1144E+00	2.5677E+00
	-2.6910E-03	-3.7954E-02	-2.8889E-03	3.5263E-02	1.7704E-02
22	2.0708E+02	-3.0796E+03	-6.3347E+02	3.2866E+03	3.9244E+03
	1.4278E+00	-2.1233E+01	-4.3676E+00	2.2661E+01	2.7058E+01

MARKUP

Table 2-39. Load Case 221, Forward 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.0909E+01	5.7642E+00	-7.4686E+00	7.3611E+01	1.7331E+01
	3.5100E-01	3.9743E-02	-5.1494E-02	5.0753E-01	1.1950E-01
2	3.4439E+02	1.8634E+01	-9.4984E+00	5.7436E+02	2.1569E+02
	2.3745E+00	1.2848E-01	-6.5489E-02	3.9601E+00	1.4871E+00
3	2.4736E+01	-8.3144E+00	-2.9517E+01	8.1230E+01	2.7206E+01
	1.7055E-01	-5.7326E-02	-2.0351E-01	5.6006E-01	1.8758E-01
4	1.6947E+01	-2.7233E+01	-8.4872E+01	8.4441E+01	1.0241E+02
	1.1685E-01	-1.8777E-01	-5.8517E-01	5.8220E-01	7.0607E-01
5	1.3253E+01	-1.7093E+01	-5.6859E+01	7.5646E+01	7.6701E+01
	9.1377E-02	-1.1785E-01	-3.9203E-01	5.2156E-01	5.2883E-01
6	2.0642E+01	-5.1415E+00	-2.1602E+01	5.4079E+01	4.1115E+01
	1.4232E-01	-3.5450E-02	-1.4894E-01	3.7286E-01	2.8348E-01
7	7.6258E+00	3.2580E+00	-1.2995E+00	8.9820E+00	1.9285E+00
	5.2578E-02	2.2463E-02	-8.9600E-03	6.1928E-02	1.3297E-02
8	5.1941E+00	2.3421E-01	-3.2647E-01	5.5107E+00	7.4209E-02
	3.5812E-02	1.6148E-03	-2.2510E-03	3.7995E-02	5.1165E-04
9	5.1893E+00	1.7516E+00	-2.2843E+00	7.4091E+00	2.0879E+00
	3.5779E-02	1.2077E-02	-1.5750E-02	5.1084E-02	1.4396E-02
10	1.9129E+01	1.2170E+01	-6.4041E+00	3.0963E+01	2.4016E+01
	1.3189E-01	8.3911E-02	-4.4155E-02	2.1348E-01	1.6558E-01
11	2.4083E+01	7.2850E+00	-1.0193E+01	3.4195E+01	5.8023E+00
	1.6605E-01	5.0228E-02	-7.0278E-02	2.3577E-01	4.0006E-02
12	2.1603E+01	5.6274E+00	-1.0872E+01	3.2703E+01	3.0867E+01
	1.4895E-01	3.8799E-02	-7.4963E-02	2.2548E-01	2.1282E-01
13	6.4750E+01	2.4882E+01	-1.0147E+00	6.5764E+01	5.7776E+01
	4.4643E-01	1.7156E-01	-6.9959E-03	4.5343E-01	3.9835E-01
14	6.6044E+01	2.3689E+01	1.5545E-01	6.5889E+01	4.2765E+01
	4.5536E-01	1.6333E-01	1.0718E-03	4.5429E-01	2.9486E-01
15	8.1629E+00	3.1123E+00	-9.8210E+00	1.7984E+01	2.8190E+00
	5.6281E-02	2.1458E-02	-6.7713E-02	1.2399E-01	1.9436E-02

WATERMARK

16	2.6435E+01	3.9816E+00	-1.6387E+01	3.6515E+01	4.7647E+01
	1.8226E-01	2.7452E-02	-1.1299E-01	2.5176E-01	3.2851E-01
17	2.4223E+01	2.8615E+00	-9.1621E+00	3.4105E+01	3.8845E+01
	1.6701E-01	1.9729E-02	-6.3171E-02	2.3515E-01	2.6783E-01
18	2.2931E+01	5.8844E+00	-1.9777E+01	4.2707E+01	4.8003E+01
	1.5810E-01	4.0571E-02	-1.3635E-01	2.9446E-01	3.3097E-01
19	6.7283E+00	-6.6636E+00	-3.3925E+01	3.7309E+01	2.7426E+01
	4.6390E-02	-4.5944E-02	-2.3390E-01	2.5724E-01	1.8910E-01
20	6.5938E+00	-4.3351E+00	-3.8818E+01	4.4889E+01	4.2442E+01
	4.5463E-02	-2.9890E-02	-2.6764E-01	3.0950E-01	2.9263E-01
21	2.5305E+01	-4.7890E+00	-3.8929E+01	6.4078E+01	6.6868E+01
	1.7447E-01	-3.3019E-02	-2.6840E-01	4.4180E-01	4.6104E-01
22	2.8439E+01	1.0083E+01	-1.0418E+01	3.8844E+01	4.6927E+01
	1.9608E-01	6.9520E-02	-7.1827E-02	2.6782E-01	3.2355E-01

MARKUP

Table 2-40. Load Case 222, Lateral 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.1240E+01	1.3291E+01	-3.0511E+01	8.2260E+01	2.8858E+01
	4.9118E-01	9.1636E-02	-2.1037E-01	5.6716E-01	1.9897E-01
2	6.2732E+01	1.3877E+01	-3.0223E+01	7.2012E+01	2.8158E+01
	4.3252E-01	9.5678E-02	-2.0838E-01	4.9650E-01	1.9414E-01
3	7.1425E+01	-1.4215E+00	-3.0956E+01	8.2167E+01	2.8128E+01
	4.9246E-01	-9.8012E-03	-2.1343E-01	5.6652E-01	1.9394E-01
4	6.7309E+01	8.0916E+00	-1.9100E+00	7.3802E+01	5.3892E+01
	4.6408E-01	5.5790E-02	-1.3169E-02	5.0885E-01	3.7157E-01
5	4.9247E+01	8.0436E+00	2.4472E+00	7.1873E+01	3.4502E+01
	3.3955E-01	5.5458E-02	1.6873E-02	4.9555E-01	2.3789E-01
6	2.0494E+01	4.1996E+00	-1.9913E+00	3.4243E+01	1.3430E+01
	1.4130E-01	2.8955E-02	-1.3729E-02	2.3610E-01	9.2597E-02
7	4.1164E+00	2.0516E+00	-3.9530E+00	5.2087E+00	9.6752E-01
	2.8381E-02	1.4145E-02	-2.7255E-02	3.5913E-02	6.6708E-03
8	4.4437E+00	-1.5330E+00	-4.4320E+00	5.1907E+00	7.2393E-01
	3.0638E-02	-1.0570E-02	-3.0557E-02	3.5788E-02	4.9913E-03
9	4.5641E+00	2.3433E+00	-4.4226E+00	5.4564E+00	1.1768E+00
	3.1468E-02	1.6156E-02	-3.0493E-02	3.7620E-02	8.1136E-03
10	1.2084E+01	2.2139E+00	-4.4435E+00	2.4125E+01	4.2212E+00
	8.3315E-02	1.5264E-02	-3.0637E-02	1.6633E-01	2.9104E-02
11	9.2518E+00	1.3516E+00	-3.2457E+00	1.3203E+01	1.0480E+01
	6.3789E-02	9.3189E-03	-2.2378E-02	9.1029E-02	7.2256E-02
12	9.6111E+00	5.5150E-01	-2.4205E+00	1.2032E+01	1.3278E+01
	6.6266E-02	3.8025E-03	-1.6689E-02	8.2955E-02	9.1545E-02
13	3.2253E+01	2.4577E+00	-2.9153E-01	4.1451E+01	8.1757E+00
	2.2238E-01	1.6946E-02	-2.0100E-03	2.8580E-01	5.6370E-02
14	3.4636E+01	2.8244E+00	-3.2610E+00	3.7929E+01	1.9413E+01
	2.3881E-01	1.9474E-02	-2.2484E-02	2.6151E-01	1.3385E-01
15	5.2150E+01	4.1010E-01	-4.0859E+01	9.3009E+01	8.7405E+01
	3.5956E-01	2.8276E-03	-2.8171E-01	6.4127E-01	6.0264E-01

WATERMARKED

16	1.8389E+01	5.2528E-01	-4.7004E+00	2.3093E+01	8.9575E-01
	1.2679E-01	3.6217E-03	-3.2408E-02	1.5922E-01	6.1760E-03
17	7.8532E+00	3.7195E+00	-6.4676E+00	1.4321E+01	9.1741E-01
	5.4146E-02	2.5645E-02	-4.4592E-02	9.8739E-02	6.3253E-03
18	1.0765E+01	3.7921E+00	-1.0762E+01	1.8925E+01	1.1053E+01
	7.4224E-02	2.6145E-02	-7.4201E-02	1.3048E-01	7.6209E-02
19	2.4575E+01	1.7395E+00	-5.7261E+00	3.0303E+01	4.0855E+00
	1.6944E-01	1.1994E-02	-3.9480E-02	2.0893E-01	2.8169E-02
20	2.3090E+01	6.1382E-01	-3.2827E+00	2.6382E+01	8.9109E+00
	1.5920E-01	4.2322E-03	-2.2633E-02	1.8190E-01	6.1438E-02
21	2.1791E+01	1.2672E+00	-5.7778E+00	2.7568E+01	2.9001E+01
	1.5024E-01	8.7371E-03	-3.9836E-02	1.9008E-01	1.9995E-01
22	1.2330E+01	7.9553E-01	-3.1981E+00	1.5528E+01	1.6344E+01
	8.5012E-02	5.4850E-03	-2.2050E-02	1.0706E-01	1.1269E-01

MARKUP

Table 2-41. Load Case 223, Vertical 10g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.0180E+02	2.8538E+01	-5.4872E+01	3.5667E+02	1.7134E+02
	2.0808E+00	1.9676E-01	-3.7833E-01	2.4592E+00	1.1814E+00
2	4.2561E+02	6.7936E+01	-6.0491E+01	4.6940E+02	1.5903E+02
	2.9345E+00	4.6840E-01	-4.1707E-01	3.2364E+00	1.0965E+00
3	2.8303E+02	2.4884E+01	-5.2951E+01	3.3598E+02	1.8995E+02
	1.9514E+00	1.7157E-01	-3.6509E-01	2.3165E+00	1.3097E+00
4	2.5420E+02	1.4099E+01	-3.9771E+01	2.9397E+02	1.1722E+02
	1.7526E+00	9.7208E-02	-2.7421E-01	2.0268E+00	8.0819E-01
5	1.9543E+02	8.9608E+00	-2.6996E+01	3.0035E+02	5.1008E+01
	1.3474E+00	6.1783E-02	-1.8613E-01	2.0708E+00	3.5169E-01
6	8.6192E+01	-9.6650E+00	-5.4046E+01	1.3131E+02	3.5225E+01
	5.9427E-01	-6.6638E-02	-3.7263E-01	9.0533E-01	2.4287E-01
7	1.7269E+01	-1.3750E+01	-2.3632E+01	3.1355E+01	7.9298E+00
	1.1906E-01	-9.4805E-02	-1.6294E-01	2.1619E-01	5.4674E-02
8	1.5054E+01	-1.2528E+01	-2.0692E+01	2.8612E+01	9.0397E+00
	1.0379E-01	-8.6376E-02	-1.4267E-01	1.9727E-01	6.2326E-02
9	1.3797E+01	-1.2554E+01	-2.0670E+01	2.7380E+01	1.0080E+01
	9.5128E-02	-8.6556E-02	-1.4251E-01	1.8878E-01	6.9497E-02
10	2.7956E+01	-1.4937E+01	-2.9711E+01	4.6498E+01	2.0733E+01
	1.9275E-01	-1.0299E-01	-2.0485E-01	3.2059E-01	1.4295E-01
11	5.3785E+01	-2.0405E+00	-2.2598E+01	7.6384E+01	3.8214E+01
	3.7084E-01	-1.4069E-02	-1.5581E-01	5.2665E-01	2.6347E-01
12	4.5388E+01	-2.7830E+00	-2.8124E+01	7.3512E+01	3.0122E+01
	3.1294E-01	-1.9188E-02	-1.9391E-01	5.0685E-01	2.0768E-01
13	1.3317E+02	2.1117E+00	-1.6603E+01	1.5956E+02	1.7672E+01
	9.1821E-01	1.4559E-02	-1.1447E-01	1.1001E+00	1.2184E-01
14	1.4150E+02	5.7231E+00	-2.4676E+01	1.6617E+02	4.7456E+01
	9.7558E-01	3.9460E-02	-1.7013E-01	1.1457E+00	3.2720E-01
15	1.1289E+02	-1.7151E+01	-7.5450E+01	1.8834E+02	1.7633E+02
	7.7834E-01	-1.1825E-01	-5.2021E-01	1.2986E+00	1.2157E+00

WATERMARKED

16	6.8443E+01	5.2058E+00	-2.2461E+01	9.0904E+01	3.7206E+01
	4.7190E-01	3.5892E-02	-1.5486E-01	6.2676E-01	2.5653E-01
17	3.6963E+01	-1.1977E+01	-2.4593E+01	6.1556E+01	1.4591E+01
	2.5485E-01	-8.2579E-02	-1.6956E-01	4.2441E-01	1.0060E-01
18	3.0674E+01	-1.1843E+01	-3.3970E+01	6.4644E+01	2.9698E+01
	2.1149E-01	-8.1652E-02	-2.3422E-01	4.4571E-01	2.0476E-01
19	1.0275E+02	5.4424E+00	-2.4322E+01	1.2707E+02	3.4943E+01
	7.0844E-01	3.7524E-02	-1.6769E-01	8.7613E-01	2.4092E-01
20	1.0904E+02	4.4346E+00	-2.1981E+01	1.3102E+02	5.4453E+01
	7.5179E-01	3.0575E-02	-1.5155E-01	9.0334E-01	3.7544E-01
21	1.0065E+02	-2.2079E-01	-4.6588E+01	1.4724E+02	6.3699E+01
	6.9398E-01	-1.5223E-03	-3.2121E-01	1.0152E+00	4.3919E-01
22	5.5118E+01	-1.0169E+00	-2.4961E+01	8.0078E+01	3.8883E+01
	3.8002E-01	-7.0114E-03	-1.7210E-01	5.5212E-01	2.6809E-01

MARKUP

Table 2-42. Load Case 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.2853E+01	-1.0977E+03	-2.0589E+02	1.0849E+03	4.7469E+02
	-8.8620E-02	-7.5684E+00	-1.4195E+00	7.4798E+00	3.2729E+00
2	1.2223E+01	-6.1587E+02	-2.0841E+01	6.2809E+02	8.1476E+00
	8.4277E-02	-4.2463E+00	-1.4369E-01	4.3305E+00	5.6176E-02
3	8.8200E+00	-3.3891E+02	-1.1948E+01	3.4773E+02	7.1518E+00
	6.0812E-02	-2.3367E+00	-8.2380E-02	2.3975E+00	4.9310E-02
4	4.7163E+02	-1.8601E+03	-5.8448E+02	2.3317E+03	2.3965E+03
	3.2518E+00	-1.2825E+01	-4.0299E+00	1.6077E+01	1.6524E+01
5	1.8665E+02	-8.7321E+02	-3.4213E+02	1.0599E+03	1.6189E+03
	1.2869E+00	-6.0206E+00	-2.3589E+00	7.3075E+00	1.1162E+01
6	-1.2740E+02	-4.6311E+02	-3.2207E+02	3.3571E+02	3.5121E+02
	-8.7838E-01	-3.1930E+00	-2.2206E+00	2.3147E+00	2.4215E+00
7	-1.1177E+00	-2.4189E+02	-7.4138E+00	2.4077E+02	7.1070E+00
	-7.7060E-03	-1.6677E+00	-5.1116E-02	1.6600E+00	4.9001E-02
8	-4.6593E-01	-2.1510E+02	-5.4592E+00	2.1463E+02	2.4324E-01
	-3.2125E-03	-1.4831E+00	-3.7640E-02	1.4798E+00	1.6771E-03
9	-4.1492E-01	-2.0657E+02	-6.0204E+00	2.0615E+02	6.7484E-01
	-2.8608E-03	-1.4242E+00	-4.1509E-02	1.4214E+00	4.6529E-03
10	-3.8229E+01	-2.9467E+02	-7.4196E+00	2.5644E+02	1.6853E+02
	-2.6358E-01	-2.0317E+00	-5.1156E-02	1.7681E+00	1.1619E+00
11	6.7138E+01	-1.4725E+02	6.5033E+00	2.1439E+02	9.7993E+01
	4.6290E-01	-1.0153E+00	4.4839E-02	1.4782E+00	6.7564E-01
12	4.9891E+01	-8.2390E+01	3.7818E+01	1.3228E+02	2.5890E+02
	3.4398E-01	-5.6806E-01	2.6075E-01	9.1205E-01	1.7851E+00
13	9.8947E+01	-1.2251E+02	2.3669E+01	2.2145E+02	1.0970E+02
	6.8222E-01	-8.4464E-01	1.6319E-01	1.5269E+00	7.5634E-01
14	9.3831E+01	-7.9989E+01	4.2522E+01	1.7382E+02	8.3651E+01
	6.4694E-01	-5.5150E-01	2.9318E-01	1.1984E+00	5.7675E-01
15	4.1650E+02	2.3152E+01	-1.4441E+01	3.9335E+02	2.2674E+00
	2.8717E+00	1.5963E-01	-9.9570E-02	2.7120E+00	1.5633E-02

WORKING DRAFT

16	1.4758E+02	-2.6283E+02	-1.2124E+02	4.1041E+02	2.9345E+02
	1.0175E+00	-1.8122E+00	-8.3594E-01	2.8297E+00	2.0233E+00
17	2.0973E+02	-2.2657E+02	-1.5480E+02	4.3630E+02	4.7193E+02
	1.4460E+00	-1.5622E+00	-1.0673E+00	3.0082E+00	3.2538E+00
18	2.3870E+02	-4.7632E+02	-5.2169E+01	7.1502E+02	9.4682E+02
	1.6458E+00	-3.2841E+00	-3.5969E-01	4.9299E+00	6.5281E+00
19	1.5557E+02	-5.2221E+02	-2.1593E+02	6.7778E+02	6.1496E+02
	1.0726E+00	-3.6005E+00	-1.4888E+00	4.6731E+00	4.2400E+00
20	4.9873E+01	-3.9084E+02	-2.1791E+02	4.4071E+02	8.0099E+02
	3.4386E-01	-2.6947E+00	-1.5024E+00	3.0386E+00	5.5226E+00
21	2.9646E+02	2.6576E+01	2.4258E+01	2.6989E+02	9.2910E+01
	2.0440E+00	1.8323E-01	1.6725E-01	1.8608E+00	6.4059E-01
22	2.4678E+02	1.3684E+01	1.2241E+02	2.3309E+02	2.3471E+02
	1.7015E+00	9.4351E-02	8.4399E-01	1.6071E+00	1.6183E+00

MARKUP

Table 2-43. Load Case 232, 30-ft. Head-On Drop Impact Test, Normal Conditions, Normal Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-3.5624E+01	-3.0377E+03	-5.7141E+02	3.0021E+03	1.3153E+03
	-2.4562E-01	-2.0944E+01	-3.9398E+00	2.0699E+01	9.0686E+00
2	3.3840E+01	-1.6948E+03	-5.7305E+01	1.7286E+03	2.1319E+01
	2.3332E-01	-1.1685E+01	-3.9511E-01	1.1919E+01	1.4699E-01
3	2.3417E+01	-9.1756E+02	-3.3970E+01	9.4097E+02	1.3890E+01
	1.6145E-01	-6.3263E+00	-2.3421E-01	6.4878E+00	9.5771E-02
4	1.3051E+03	-5.1575E+03	-1.6233E+03	6.4626E+03	6.6418E+03
	8.9985E+00	-3.5560E+01	-1.1192E+01	4.4558E+01	4.5794E+01
5	5.1571E+02	-2.4203E+03	-9.5034E+02	2.9360E+03	4.4849E+03
	3.5557E+00	-1.6687E+01	-6.5523E+00	2.0243E+01	3.0922E+01
6	-3.5056E+02	-1.2789E+03	-8.9242E+02	9.2831E+02	9.7681E+02
	-2.4170E+00	-8.8175E+00	-6.1530E+00	6.4005E+00	6.7348E+00
7	-3.0675E+00	-6.6503E+02	-2.0442E+01	6.6196E+02	1.9669E+01
	-2.1150E-02	-4.5852E+00	-1.4094E-01	4.5641E+00	1.3561E-01
8	-1.2572E+00	-5.8923E+02	-1.4967E+01	5.8797E+02	6.8131E-01
	-8.6684E-03	-4.0626E+00	-1.0319E-01	4.0539E+00	4.6975E-03
9	-1.0983E+00	-5.6084E+02	-1.6324E+01	5.5975E+02	1.6999E+00
	-7.5728E-03	-3.8669E+00	-1.1255E-01	3.8593E+00	1.1720E-02
10	-1.0327E+02	-7.9022E+02	-1.7452E+01	6.8695E+02	4.5667E+02
	-7.1206E-01	-5.4484E+00	-1.2033E-01	4.7363E+00	3.1486E+00
11	1.8320E+02	-3.9676E+02	1.9767E+01	5.7996E+02	2.6192E+02
	1.2631E+00	-2.7355E+00	1.3629E-01	3.9987E+00	1.8059E+00
12	1.3812E+02	-2.1573E+02	1.0509E+02	3.5384E+02	6.9455E+02
	9.5228E-01	-1.4874E+00	7.2455E-01	2.4397E+00	4.7887E+00
13	2.6981E+02	-3.1839E+02	6.9013E+01	5.8820E+02	2.7305E+02
	1.8603E+00	-2.1952E+00	4.7583E-01	4.0555E+00	1.8826E+00
14	2.5627E+02	-2.0323E+02	1.2073E+02	4.5950E+02	2.1369E+02
	1.7669E+00	-1.4012E+00	8.3243E-01	3.1681E+00	1.4733E+00
15	1.1604E+03	6.6171E+01	-3.8550E+01	1.0942E+03	6.1555E+00
	8.0003E+00	4.5624E-01	-2.6579E-01	7.5441E+00	4.2441E-02

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16	4.1228E+02	-7.2998E+02	-3.3516E+02	1.1423E+03	8.1758E+02
	2.8425E+00	-5.0331E+00	-2.3108E+00	7.8756E+00	5.6370E+00
17	5.8537E+02	-6.2846E+02	-4.2834E+02	1.2138E+03	1.3129E+03
	4.0360E+00	-4.3331E+00	-2.9533E+00	8.3691E+00	9.0519E+00
18	6.6580E+02	-1.3209E+03	-1.4426E+02	1.9867E+03	2.6286E+03
	4.5905E+00	-9.1071E+00	-9.9464E-01	1.3698E+01	1.8123E+01
19	4.3034E+02	-1.4481E+03	-6.0022E+02	1.8784E+03	1.7026E+03
	2.9671E+00	-9.9843E+00	-4.1383E+00	1.2951E+01	1.1739E+01
20	1.3614E+02	-1.0829E+03	-6.0449E+02	1.2190E+03	2.2178E+03
	9.3864E-01	-7.4661E+00	-4.1678E+00	8.4048E+00	1.5291E+01
21	8.6909E+02	7.8247E+01	7.1473E+01	7.9084E+02	2.7440E+02
	5.9921E+00	5.3950E-01	4.9279E-01	5.4526E+00	1.8920E+00
22	6.8767E+02	3.9006E+01	3.4223E+02	6.4867E+02	6.5267E+02
	4.7413E+00	2.6894E-01	2.3596E+00	4.4724E+00	4.5000E+00

MARKUP

Table 2-44. Load Combination 101, Hot Environment, Normal Conditions of Transport – Model AOS-100

Load Cases: 102, 201, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.60	0.86	0.28	1.46	1.74	20.00	70.00	>10
	4.14	5.93	1.95	10.07	12.02	137.90	482.63	
2	0.04	0.03	0.42	0.07	0.49	20.00	70.00	>10
	0.28	0.19	2.91	0.47	3.38	137.90	482.63	
3	0.03	0.02	0.28	0.05	0.32	20.00	70.00	>10
	0.17	0.16	1.91	0.33	2.24	137.90	482.63	
4	4.94	8.72	2.84	13.66	16.50	20.00	70.00	1.20
	34.09	60.09	19.60	94.18	113.78	137.90	482.63	
5	4.28	6.97	2.96	11.24	14.20	20.00	70.00	1.67
	29.48	48.05	20.41	77.52	97.93	137.90	482.63	
6	1.66	2.27	1.30	3.93	5.23	20.00	70.00	6.63
	11.45	15.65	8.93	27.10	36.03	137.90	482.63	
7	0.29	0.01	0.34	0.29	0.63	20.00	70.00	>10
	1.97	0.05	2.36	2.02	4.38	137.90	482.63	
8	0.28	0.00	0.34	0.28	0.62	20.00	70.00	>10
	1.96	0.00	2.33	1.96	4.29	137.90	482.63	
9	0.28	0.01	0.34	0.30	0.63	20.00	70.00	>10
	1.96	0.08	2.32	2.04	4.37	137.90	482.63	
10	0.98	1.01	0.54	1.99	2.53	20.00	70.00	>10
	6.76	6.95	3.73	13.72	17.44	137.90	482.63	
11	0.61	0.28	0.64	0.90	1.54	20.00	70.00	>10
	4.22	1.96	4.43	6.18	10.62	137.90	482.63	
12	0.52	0.41	0.93	0.93	1.86	20.00	70.00	>10
	3.55	2.83	6.45	6.39	12.83	137.90	482.63	
13	1.04	0.92	1.13	1.96	3.08	20.00	70.00	>10
	7.17	6.32	7.76	13.50	21.26	137.90	482.63	

MARKUP

14	0.98	0.98	0.97	1.96	2.93	20.00	70.00	>10
	6.76	6.78	6.68	13.53	20.22	137.90	482.63	
15	3.84	5.45	0.80	9.29	10.09	20.00	70.00	2.23
	26.44	37.58	5.54	64.02	69.56	137.90	482.63	
16	2.32	3.39	0.31	5.72	6.03	20.00	70.00	4.25
	16.01	23.40	2.16	39.41	41.58	137.90	482.63	
17	1.64	2.46	0.19	4.10	4.29	20.00	70.00	6.32
	11.32	16.94	1.32	28.26	29.58	137.90	482.63	
18	1.94	3.00	0.15	4.94	5.09	20.00	70.00	5.07
	13.41	20.68	1.02	34.09	35.11	137.90	482.63	
19	3.11	4.80	0.22	7.92	8.13	20.00	70.00	2.79
	21.47	33.11	1.51	54.57	56.08	137.90	482.63	
20	2.54	4.71	0.49	7.25	7.74	20.00	70.00	3.14
	17.53	32.47	3.39	50.00	53.39	137.90	482.63	
21	0.22	0.47	0.09	0.69	0.78	20.00	70.00	>10
	1.55	3.21	0.61	4.76	5.37	137.90	482.63	
22	1.97	2.34	0.10	4.31	4.41	20.00	70.00	5.96
	13.59	16.13	0.67	29.72	30.39	137.90	482.63	

Min MS: 1.196, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-45. Load Combination 102, Cold Environment, Normal Conditions of Transport – Model AOS-100

Load Cases: 104, 201, 211
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.60	0.86	0.09	1.46	1.55	20.00	70.00	>10
	4.14	5.93	0.61	10.07	10.67	137.90	482.63	
2	0.04	0.03	0.07	0.07	0.14	20.00	70.00	>10
	0.28	0.19	0.49	0.47	0.97	137.90	482.63	
3	0.03	0.02	0.09	0.05	0.14	20.00	70.00	>10
	0.17	0.16	0.65	0.33	0.98	137.90	482.63	
4	4.94	8.72	6.06	13.66	19.72	20.00	70.00	1.20
	34.09	60.09	41.81	94.18	136.00	137.90	482.63	
5	4.28	6.97	8.52	11.24	19.77	20.00	70.00	1.67
	29.48	48.05	58.78	77.52	136.30	137.90	482.63	
6	1.66	2.27	4.03	3.93	7.96	20.00	70.00	6.54
	11.45	15.65	27.78	27.10	54.87	137.90	482.63	
7	0.29	0.01	1.84	0.29	2.13	20.00	70.00	>10
	1.97	0.05	12.69	2.02	14.71	137.90	482.63	
8	0.28	0.00	1.84	0.28	2.12	20.00	70.00	>10
	1.96	0.00	12.68	1.96	14.64	137.90	482.63	
9	0.28	0.01	1.84	0.30	2.14	20.00	70.00	>10
	1.96	0.08	12.69	2.04	14.73	137.90	482.63	
10	0.98	1.01	2.17	1.99	4.16	20.00	70.00	>10
	6.76	6.95	14.96	13.72	28.68	137.90	482.63	
11	0.61	0.28	1.16	0.90	2.06	20.00	70.00	>10
	4.22	1.96	8.03	6.18	14.21	137.90	482.63	
12	0.52	0.41	0.89	0.93	1.81	20.00	70.00	>10
	3.55	2.83	6.11	6.39	12.49	137.90	482.63	
13	1.04	0.92	3.84	1.96	5.80	20.00	70.00	9.34
	7.17	6.32	26.50	13.50	40.00	137.90	482.63	

MARKUP

14	0.98	0.98	3.13	1.96	5.10	20.00	70.00	>10
	6.76	6.78	21.61	13.53	35.14	137.90	482.63	
15	3.84	5.45	0.76	9.29	10.05	20.00	70.00	2.23
	26.44	37.58	5.26	64.02	69.28	137.90	482.63	
16	2.32	3.39	1.59	5.72	7.30	20.00	70.00	4.25
	16.01	23.40	10.94	39.41	50.35	137.90	482.63	
17	1.64	2.46	1.26	4.10	5.35	20.00	70.00	6.32
	11.32	16.94	8.66	28.26	36.92	137.90	482.63	
18	1.94	3.00	1.23	4.94	6.17	20.00	70.00	5.07
	13.41	20.68	8.46	34.09	42.55	137.90	482.63	
19	3.11	4.80	1.78	7.92	9.70	20.00	70.00	2.79
	21.47	33.11	12.29	54.57	66.86	137.90	482.63	
20	2.54	4.71	2.16	7.25	9.41	20.00	70.00	3.14
	17.53	32.47	14.90	50.00	64.90	137.90	482.63	
21	0.22	0.47	1.01	0.69	1.70	20.00	70.00	>10
	1.55	3.21	6.99	4.76	11.75	137.90	482.63	
22	1.97	2.34	0.12	4.31	4.43	20.00	70.00	5.96
	13.59	16.13	0.84	29.72	30.57	137.90	482.63	

Min MS: 1.196, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-46. Load Combination 103, Increased External Pressure, Normal Conditions of Transport – Model AOS-100

Load Cases: 103, 201, 211
-20°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.60	0.86	0.07	1.46	1.53	20.00	70.00	>10
	4.14	5.93	0.50	10.07	10.56	137.90	482.63	
2	0.04	0.03	0.06	0.07	0.13	20.00	70.00	>10
	0.28	0.19	0.40	0.47	0.88	137.90	482.63	
3	0.03	0.02	0.08	0.05	0.13	20.00	70.00	>10
	0.17	0.16	0.53	0.33	0.86	137.90	482.63	
4	4.94	8.72	4.96	13.66	18.62	20.00	70.00	1.20
	34.09	60.09	34.21	94.18	128.39	137.90	482.63	
5	4.28	6.97	6.97	11.24	18.22	20.00	70.00	1.67
	29.48	48.05	48.09	77.52	125.61	137.90	482.63	
6	1.66	2.27	3.30	3.93	7.23	20.00	70.00	6.63
	11.45	15.65	22.73	27.10	49.82	137.90	482.63	
7	0.29	0.01	1.51	0.29	1.80	20.00	70.00	>10
	1.97	0.05	10.39	2.02	12.41	137.90	482.63	
8	0.28	0.00	1.50	0.28	1.79	20.00	70.00	>10
	1.96	0.00	10.37	1.96	12.34	137.90	482.63	
9	0.28	0.01	1.51	0.30	1.80	20.00	70.00	>10
	1.96	0.08	10.38	2.04	12.42	137.90	482.63	
10	0.98	1.01	1.78	1.99	3.76	20.00	70.00	>10
	6.76	6.95	12.24	13.72	25.96	137.90	482.63	
11	0.61	0.28	0.95	0.90	1.85	20.00	70.00	>10
	4.22	1.96	6.57	6.18	12.75	137.90	482.63	
12	0.52	0.41	0.72	0.93	1.65	20.00	70.00	>10
	3.55	2.83	5.00	6.39	11.38	137.90	482.63	
13	1.04	0.92	3.14	1.96	5.10	20.00	70.00	>10
	7.17	6.32	21.68	13.50	35.18	137.90	482.63	

MARKUP

14	0.98	0.98	2.56	1.96	4.53	20.00	70.00	>10
	6.76	6.78	17.68	13.53	31.21	137.90	482.63	
15	3.84	5.45	0.62	9.29	9.91	20.00	70.00	2.23
	26.44	37.58	4.30	64.02	68.32	137.90	482.63	
16	2.32	3.39	1.30	5.72	7.01	20.00	70.00	4.25
	16.01	23.40	8.95	39.41	48.36	137.90	482.63	
17	1.64	2.46	1.03	4.10	5.13	20.00	70.00	6.32
	11.32	16.94	7.08	28.26	35.34	137.90	482.63	
18	1.94	3.00	1.00	4.94	5.95	20.00	70.00	5.07
	13.41	20.68	6.92	34.09	41.01	137.90	482.63	
19	3.11	4.80	1.46	7.92	9.37	20.00	70.00	2.79
	21.47	33.11	10.06	54.57	64.63	137.90	482.63	
20	2.54	4.71	1.77	7.25	9.02	20.00	70.00	3.14
	17.53	32.47	12.19	50.00	62.19	137.90	482.63	
21	0.22	0.47	0.83	0.69	1.52	20.00	70.00	>10
	1.55	3.21	5.72	4.76	10.48	137.90	482.63	
22	1.97	2.34	0.10	4.31	4.41	20.00	70.00	5.96
	13.59	16.13	0.69	29.72	30.41	137.90	482.63	

Min MS: 1.196, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-47. Load Combination 104, Minimum External Pressure, Normal Conditions of Transport – Model AOS-100

Load Cases: 101, 201, 202, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 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	0.60	0.86	0.29	1.46	1.76	20.00	70.00	>10
	4.15	5.93	2.03	10.08	12.11	137.90	482.63	
2	0.04	0.03	0.43	0.07	0.50	20.00	70.00	>10
	0.29	0.19	2.93	0.48	3.41	137.90	482.63	
3	0.03	0.02	0.29	0.05	0.34	20.00	70.00	>10
	0.18	0.16	1.98	0.34	2.33	137.90	482.63	
4	5.07	8.91	2.81	13.98	16.79	20.00	70.00	1.15
	34.94	61.47	19.39	96.40	115.80	137.90	482.63	
5	4.36	7.11	3.06	11.48	14.53	20.00	70.00	1.61
	30.08	49.05	21.08	79.12	100.20	137.90	482.63	
6	1.69	2.30	1.31	3.99	5.29	20.00	70.00	6.52
	11.65	15.84	9.00	27.49	36.49	137.90	482.63	
7	0.29	0.01	0.39	0.30	0.69	20.00	70.00	>10
	2.00	0.05	2.72	2.05	4.77	137.90	482.63	
8	0.29	0.00	0.39	0.29	0.68	20.00	70.00	>10
	2.00	0.00	2.71	2.00	4.71	137.90	482.63	
9	0.29	0.01	0.39	0.30	0.69	20.00	70.00	>10
	2.00	0.08	2.71	2.08	4.79	137.90	482.63	
10	1.02	1.05	0.47	2.08	2.54	20.00	70.00	>10
	7.07	7.26	3.21	14.33	17.54	137.90	482.63	
11	0.64	0.29	0.55	0.93	1.48	20.00	70.00	>10
	4.39	2.01	3.81	6.41	10.21	137.90	482.63	
12	0.55	0.41	0.82	0.96	1.78	20.00	70.00	>10
	3.80	2.84	5.65	6.64	12.29	137.90	482.63	
13	1.09	0.96	1.12	2.04	3.17	20.00	70.00	>10
	7.49	6.59	7.74	14.08	21.82	137.90	482.63	

MARKUP

14	1.02	1.03	0.98	2.05	3.03	20.00	70.00	>10
	7.03	7.07	6.79	14.10	20.89	137.90	482.63	
15	4.01	5.72	0.50	9.73	10.23	20.00	70.00	2.08
	27.65	39.44	3.43	67.09	70.52	137.90	482.63	
16	2.44	3.57	0.20	6.01	6.20	20.00	70.00	4.00
	16.82	24.59	1.36	41.41	42.76	137.90	482.63	
17	1.72	2.58	0.12	4.31	4.43	20.00	70.00	5.97
	11.89	17.79	0.85	29.68	30.54	137.90	482.63	
18	2.04	3.15	0.15	5.19	5.33	20.00	70.00	4.78
	14.08	21.70	1.00	35.78	36.78	137.90	482.63	
19	3.27	5.05	0.20	8.32	8.51	20.00	70.00	2.61
	22.55	34.79	1.35	57.34	58.69	137.90	482.63	
20	2.67	4.95	0.50	7.61	8.12	20.00	70.00	2.94
	18.40	34.10	3.48	52.50	55.98	137.90	482.63	
21	0.25	0.49	0.09	0.74	0.83	20.00	70.00	>10
	1.73	3.39	0.62	5.12	5.74	137.90	482.63	
22	2.04	2.42	0.11	4.45	4.57	20.00	70.00	5.74
	14.04	16.67	0.77	30.71	31.49	137.90	482.63	

Min MS: 1.146, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-48. Load Combination 105, Cold Environment with Maximum Decay Heat, Normal Conditions of Transport – Model AOS-100

Load Cases: 105, 201, 202, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 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	0.60	0.86	0.33	1.46	1.79	20.00	70.00	>10
	4.15	5.93	2.24	10.08	12.32	137.90	482.63	
2	0.04	0.03	0.46	0.07	0.53	20.00	70.00	>10
	0.29	0.19	3.20	0.48	3.68	137.90	482.63	
3	0.03	0.02	0.32	0.05	0.37	20.00	70.00	>10
	0.18	0.16	2.18	0.34	2.52	137.90	482.63	
4	5.07	8.91	1.82	13.98	15.81	20.00	70.00	1.15
	34.94	61.47	12.58	96.40	108.98	137.90	482.63	
5	4.36	7.11	1.58	11.48	13.05	20.00	70.00	1.61
	30.08	49.05	10.88	79.12	90.00	137.90	482.63	
6	1.69	2.30	0.66	3.99	4.65	20.00	70.00	6.52
	11.65	15.84	4.57	27.49	32.06	137.90	482.63	
7	0.29	0.01	0.24	0.30	0.54	20.00	70.00	>10
	2.00	0.05	1.66	2.05	3.71	137.90	482.63	
8	0.29	0.00	0.24	0.29	0.53	20.00	70.00	>10
	2.00	0.00	1.67	2.00	3.66	137.90	482.63	
9	0.29	0.01	0.24	0.30	0.54	20.00	70.00	>10
	2.00	0.08	1.64	2.08	3.72	137.90	482.63	
10	1.02	1.05	0.76	2.08	2.83	20.00	70.00	>10
	7.07	7.26	5.21	14.33	19.54	137.90	482.63	
11	0.64	0.29	0.56	0.93	1.49	20.00	70.00	>10
	4.39	2.01	3.86	6.41	10.27	137.90	482.63	
12	0.55	0.41	0.75	0.96	1.71	20.00	70.00	>10
	3.80	2.84	5.14	6.64	11.78	137.90	482.63	
13	1.09	0.96	0.85	2.04	2.89	20.00	70.00	>10
	7.49	6.59	5.84	14.08	19.92	137.90	482.63	

WARMUP

14	1.02	1.03	0.71	2.05	2.75	20.00	70.00	>10
	7.03	7.07	4.89	14.10	18.99	137.90	482.63	
15	4.01	5.72	0.13	9.73	9.86	20.00	70.00	2.08
	27.65	39.44	0.89	67.09	67.98	137.90	482.63	
16	2.44	3.57	0.30	6.01	6.31	20.00	70.00	4.00
	16.82	24.59	2.10	41.41	43.50	137.90	482.63	
17	1.72	2.58	0.23	4.31	4.54	20.00	70.00	5.97
	11.89	17.79	1.62	29.68	31.30	137.90	482.63	
18	2.04	3.15	0.29	5.19	5.48	20.00	70.00	4.78
	14.08	21.70	1.99	35.78	37.77	137.90	482.63	
19	3.27	5.05	0.31	8.32	8.62	20.00	70.00	2.61
	22.55	34.79	2.11	57.34	59.45	137.90	482.63	
20	2.67	4.95	0.55	7.61	8.16	20.00	70.00	2.94
	18.40	34.10	3.78	52.50	56.28	137.90	482.63	
21	0.25	0.49	0.36	0.74	1.10	20.00	70.00	>10
	1.73	3.39	2.49	5.12	7.61	137.90	482.63	
22	2.04	2.42	0.13	4.45	4.59	20.00	70.00	5.74
	14.04	16.67	0.90	30.71	31.61	137.90	482.63	

Min MS: 1.146, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-49. Load Combination 106, Maximum Pressure, Hot Environment, Normal Conditions of Transport – Model AOS-100

Load Cases: 101, 201, 203, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 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	0.61	0.87	0.29	1.48	1.77	20.00	70.00	>10
	4.22	5.97	2.03	10.19	12.22	137.90	482.63	
2	0.05	0.03	0.43	0.08	0.50	20.00	70.00	>10
	0.36	0.19	2.93	0.54	3.48	137.90	482.63	
3	0.04	0.03	0.29	0.07	0.35	20.00	70.00	>10
	0.25	0.21	1.98	0.46	2.44	137.90	482.63	
4	5.19	9.19	2.81	14.38	17.19	20.00	70.00	1.09
	35.77	63.35	19.39	99.13	118.52	137.90	482.63	
5	4.56	7.38	3.06	11.94	15.00	20.00	70.00	1.51
	31.46	50.88	21.08	82.33	103.41	137.90	482.63	
6	1.78	2.47	1.31	4.25	5.55	20.00	70.00	6.06
	12.27	17.02	9.00	29.29	38.29	137.90	482.63	
7	0.35	0.01	0.39	0.36	0.75	20.00	70.00	>10
	2.40	0.06	2.72	2.46	5.18	137.90	482.63	
8	0.35	0.00	0.39	0.35	0.74	20.00	70.00	>10
	2.40	0.00	2.71	2.40	5.11	137.90	482.63	
9	0.35	0.01	0.39	0.36	0.75	20.00	70.00	>10
	2.40	0.08	2.71	2.48	5.20	137.90	482.63	
10	1.05	1.01	0.47	2.06	2.53	20.00	70.00	>10
	7.24	6.97	3.21	14.21	17.42	137.90	482.63	
11	0.64	0.30	0.55	0.94	1.49	20.00	70.00	>10
	4.41	2.07	3.81	6.48	10.29	137.90	482.63	
12	0.64	0.55	0.82	1.19	2.01	20.00	70.00	>10
	4.42	3.79	5.65	8.20	13.86	137.90	482.63	
13	1.13	1.01	1.12	2.14	3.26	20.00	70.00	>10
	7.80	6.94	7.74	14.73	22.47	137.90	482.63	

MAY SUP

14	1.05	1.04	0.98	2.09	3.07	20.00	70.00	>10
	7.23	7.15	6.79	14.38	21.16	137.90	482.63	
15	4.02	5.67	0.50	9.69	10.19	20.00	70.00	2.10
	27.71	39.09	3.43	66.80	70.23	137.90	482.63	
16	2.46	3.60	0.20	6.07	6.27	20.00	70.00	3.94
	16.99	24.85	1.36	41.84	43.20	137.90	482.63	
17	1.74	2.62	0.12	4.36	4.48	20.00	70.00	5.88
	12.01	18.04	0.85	30.06	30.91	137.90	482.63	
18	2.05	3.17	0.15	5.22	5.37	20.00	70.00	4.74
	14.15	21.86	1.00	36.01	37.01	137.90	482.63	
19	3.28	5.05	0.20	8.34	8.53	20.00	70.00	2.60
	22.63	34.84	1.35	57.47	58.83	137.90	482.63	
20	2.67	4.95	0.50	7.62	8.13	20.00	70.00	2.94
	18.42	34.14	3.48	52.55	56.03	137.90	482.63	
21	0.36	0.54	0.09	0.90	0.99	20.00	70.00	>10
	2.46	3.71	0.62	6.18	6.80	137.90	482.63	
22	2.02	2.36	0.11	4.38	4.50	20.00	70.00	5.84
	13.93	16.29	0.77	30.22	31.00	137.90	482.63	

Min MS: 1.087, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-50. Load Combination 107, Maximum Pressure, Cold Environment, Normal Conditions of Transport – Model AOS-100

Load Cases: 105, 201, 203, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 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	0.61	0.87	0.33	1.48	1.80	20.00	70.00	>10
	4.22	5.97	2.24	10.19	12.43	137.90	482.63	
2	0.05	0.03	0.46	0.08	0.54	20.00	70.00	>10
	0.36	0.19	3.20	0.54	3.74	137.90	482.63	
3	0.04	0.03	0.32	0.07	0.38	20.00	70.00	>10
	0.25	0.21	2.18	0.46	2.64	137.90	482.63	
4	5.19	9.19	1.82	14.38	16.20	20.00	70.00	1.09
	35.77	63.35	12.58	99.13	111.71	137.90	482.63	
5	4.56	7.38	1.58	11.94	13.52	20.00	70.00	1.51
	31.46	50.88	10.88	82.33	93.21	137.90	482.63	
6	1.78	2.47	0.66	4.25	4.91	20.00	70.00	6.06
	12.27	17.02	4.57	29.29	33.86	137.90	482.63	
7	0.35	0.01	0.24	0.36	0.60	20.00	70.00	>10
	2.40	0.06	1.66	2.46	4.12	137.90	482.63	
8	0.35	0.00	0.24	0.35	0.59	20.00	70.00	>10
	2.40	0.00	1.67	2.40	4.07	137.90	482.63	
9	0.35	0.01	0.24	0.36	0.60	20.00	70.00	>10
	2.40	0.08	1.64	2.48	4.12	137.90	482.63	
10	1.05	1.01	0.76	2.06	2.82	20.00	70.00	>10
	7.24	6.97	5.21	14.21	19.42	137.90	482.63	
11	0.64	0.30	0.56	0.94	1.50	20.00	70.00	>10
	4.41	2.07	3.86	6.48	10.34	137.90	482.63	
12	0.64	0.55	0.75	1.19	1.94	20.00	70.00	>10
	4.42	3.79	5.14	8.20	13.35	137.90	482.63	
13	1.13	1.01	0.85	2.14	2.98	20.00	70.00	>10
	7.80	6.94	5.84	14.73	20.57	137.90	482.63	

MARKUP

14	1.05	1.04	0.71	2.09	2.79	20.00	70.00	>10
	7.23	7.15	4.89	14.38	19.27	137.90	482.63	
15	4.02	5.67	0.13	9.69	9.82	20.00	70.00	2.10
	27.71	39.09	0.89	66.80	67.69	137.90	482.63	
16	2.46	3.60	0.30	6.07	6.37	20.00	70.00	3.94
	16.99	24.85	2.10	41.84	43.94	137.90	482.63	
17	1.74	2.62	0.23	4.36	4.59	20.00	70.00	5.88
	12.01	18.04	1.62	30.06	31.67	137.90	482.63	
18	2.05	3.17	0.29	5.22	5.51	20.00	70.00	4.74
	14.15	21.86	1.99	36.01	38.00	137.90	482.63	
19	3.28	5.05	0.31	8.34	8.64	20.00	70.00	2.60
	22.63	34.84	2.11	57.47	59.59	137.90	482.63	
20	2.67	4.95	0.55	7.62	8.17	20.00	70.00	2.94
	18.42	34.14	3.78	52.55	56.34	137.90	482.63	
21	0.36	0.54	0.36	0.90	1.26	20.00	70.00	>10
	2.46	3.71	2.49	6.18	8.66	137.90	482.63	
22	2.02	2.36	0.13	4.38	4.51	20.00	70.00	5.84
	13.93	16.29	0.90	30.22	31.12	137.90	482.63	

Min MS: 1.087, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-51. Load Combination 215, Compression Load, Normal Conditions of Transport – Model AOS-100

Load Cases: 215, 101, 201, 211
Compression Load (5x weight)
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.72	1.04	0.29	1.75	2.05	20.00	70.00	>10
	4.95	7.15	2.03	12.10	14.13	137.90	482.63	
2	0.13	0.03	0.43	0.16	0.59	20.00	70.00	>10
	0.91	0.21	2.93	1.12	4.05	137.90	482.63	
3	0.13	0.05	0.29	0.18	0.47	20.00	70.00	>10
	0.87	0.38	1.98	1.25	3.23	137.90	482.63	
4	5.53	9.78	2.81	15.31	18.12	20.00	70.00	0.96
	38.12	67.46	19.39	105.57	124.97	137.90	482.63	
5	4.89	7.83	3.06	12.73	15.79	20.00	70.00	1.36
	33.74	54.01	21.08	87.76	108.84	137.90	482.63	
6	1.90	2.56	1.31	4.47	5.77	20.00	70.00	5.72
	13.12	17.68	9.00	30.80	39.80	137.90	482.63	
7	0.47	0.01	0.39	0.48	0.88	20.00	70.00	>10
	3.26	0.06	2.72	3.32	6.04	137.90	482.63	
8	0.43	0.00	0.39	0.43	0.83	20.00	70.00	>10
	2.99	0.00	2.71	2.99	5.70	137.90	482.63	
9	0.42	0.01	0.39	0.43	0.82	20.00	70.00	>10
	2.88	0.08	2.71	2.96	5.67	137.90	482.63	
10	1.11	1.01	0.47	2.12	2.59	20.00	70.00	>10
	7.67	6.97	3.21	14.64	17.85	137.90	482.63	
11	0.66	0.34	0.55	1.00	1.55	20.00	70.00	>10
	4.58	2.33	3.81	6.91	10.72	137.90	482.63	
12	0.58	0.50	0.82	1.08	1.90	20.00	70.00	>10
	4.00	3.44	5.65	7.43	13.09	137.90	482.63	
13	1.25	1.12	1.12	2.38	3.50	20.00	70.00	>10
	8.65	7.73	7.74	16.38	24.12	137.90	482.63	

WATERMARK

14	1.16	1.15	0.98	2.31	3.29	20.00	70.00	>10
	8.00	7.90	6.79	15.90	22.69	137.90	482.63	
15	5.80	5.58	0.50	11.38	11.87	20.00	70.00	1.64
	40.00	38.44	3.43	78.44	81.87	137.90	482.63	
16	2.86	4.12	0.20	6.98	7.17	20.00	70.00	3.30
	19.69	28.41	1.36	48.09	49.45	137.90	482.63	
17	1.95	2.92	0.12	4.87	4.99	20.00	70.00	5.16
	13.42	20.15	0.85	33.57	34.42	137.90	482.63	
18	2.12	3.26	0.15	5.39	5.53	20.00	70.00	4.57
	14.64	22.51	1.00	37.15	38.15	137.90	482.63	
19	3.48	5.31	0.20	8.79	8.99	20.00	70.00	2.41
	24.02	36.58	1.35	60.60	61.95	137.90	482.63	
20	2.99	5.48	0.50	8.47	8.98	20.00	70.00	2.54
	20.63	37.78	3.48	58.41	61.89	137.90	482.63	
21	0.34	0.53	0.09	0.87	0.96	20.00	70.00	>10
	2.36	3.63	0.62	5.99	6.61	137.90	482.63	
22	2.51	2.47	0.11	4.98	5.09	20.00	70.00	5.03
	17.32	17.00	0.77	34.32	35.09	137.90	482.63	

Min MS: 0.959, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-52. Load Combination 216, Rod Drop, Normal Conditions of Transport – Model AOS-100

Load Cases: 216, 101, 201, 211
Rod Drop onto Cask
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.62	0.87	0.29	1.49	1.79	20.00	70.00	>10
	4.29	6.00	2.03	10.29	12.32	137.90	482.63	
2	0.06	0.03	0.43	0.09	0.51	20.00	70.00	>10
	0.39	0.22	2.93	0.61	3.54	137.90	482.63	
3	0.04	0.02	0.29	0.06	0.35	20.00	70.00	>10
	0.28	0.17	1.98	0.45	2.43	137.90	482.63	
4	5.05	8.84	2.81	13.90	16.71	20.00	70.00	1.16
	34.83	60.97	19.39	95.80	115.20	137.90	482.63	
5	4.34	7.02	3.06	11.35	14.41	20.00	70.00	1.64
	29.91	48.37	21.08	78.28	99.36	137.90	482.63	
6	1.74	2.32	1.31	4.06	5.36	20.00	70.00	6.40
	11.96	16.00	9.00	27.96	36.96	137.90	482.63	
7	0.33	0.01	0.39	0.34	0.74	20.00	70.00	>10
	2.30	0.06	2.72	2.35	5.07	137.90	482.63	
8	0.32	0.00	0.39	0.32	0.71	20.00	70.00	>10
	2.19	0.00	2.71	2.20	4.91	137.90	482.63	
9	0.31	0.01	0.39	0.32	0.72	20.00	70.00	>10
	2.14	0.08	2.71	2.22	4.93	137.90	482.63	
10	1.00	1.01	0.47	2.01	2.48	20.00	70.00	>10
	6.91	6.97	3.21	13.88	17.09	137.90	482.63	
11	0.62	0.29	0.55	0.91	1.47	20.00	70.00	>10
	4.28	2.02	3.81	6.30	10.11	137.90	482.63	
12	0.52	0.42	0.82	0.94	1.76	20.00	70.00	>10
	3.61	2.89	5.65	6.50	12.15	137.90	482.63	
13	1.07	0.94	1.12	2.02	3.14	20.00	70.00	>10
	7.40	6.52	7.74	13.91	21.65	137.90	482.63	

MARKUP

14	1.01	1.01	0.98	2.02	3.00	20.00	70.00	>10
	6.95	6.97	6.79	13.92	20.71	137.90	482.63	
15	7.13	6.06	0.50	13.19	13.69	20.00	70.00	1.27
	49.13	41.81	3.43	90.94	94.37	137.90	482.63	
16	2.74	4.03	0.20	6.77	6.97	20.00	70.00	3.43
	18.91	27.79	1.36	46.70	48.06	137.90	482.63	
17	1.89	2.89	0.12	4.78	4.90	20.00	70.00	5.28
	13.02	19.93	0.85	32.95	33.81	137.90	482.63	
18	2.02	3.02	0.15	5.03	5.18	20.00	70.00	4.96
	13.92	20.79	1.00	34.71	35.71	137.90	482.63	
19	3.18	4.87	0.20	8.05	8.25	20.00	70.00	2.73
	21.92	33.60	1.35	55.52	56.88	137.90	482.63	
20	2.63	4.83	0.50	7.46	7.96	20.00	70.00	3.02
	18.16	33.27	3.48	51.43	54.90	137.90	482.63	
21	0.23	0.47	0.09	0.70	0.79	20.00	70.00	>10
	1.58	3.23	0.62	4.81	5.43	137.90	482.63	
22	5.26	6.26	0.11	11.52	11.63	20.00	70.00	1.60
	36.25	43.19	0.77	79.44	80.21	137.90	482.63	

Min MS: 1.159, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-53. Load Combination 217, Rod Drop, Cold Environment, Normal Conditions of Transport – Model AOS-100

Load Cases: 216, 104, 201, 211
Rod Drop onto Cask
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.62	0.87	0.09	1.49	1.58	20.00	70.00	>10
	4.29	6.00	0.61	10.29	10.90	137.90	482.63	
2	0.06	0.03	0.07	0.09	0.16	20.00	70.00	>10
	0.39	0.22	0.49	0.61	1.10	137.90	482.63	
3	0.04	0.02	0.09	0.06	0.16	20.00	70.00	>10
	0.28	0.17	0.65	0.45	1.09	137.90	482.63	
4	5.05	8.84	6.06	13.90	19.96	20.00	70.00	1.16
	34.83	60.97	41.81	95.80	137.62	137.90	482.63	
5	4.34	7.02	8.52	11.35	19.88	20.00	70.00	1.64
	29.91	48.37	58.78	78.28	137.06	137.90	482.63	
6	1.74	2.32	4.03	4.06	8.08	20.00	70.00	6.40
	11.96	16.00	27.78	27.96	55.74	137.90	482.63	
7	0.33	0.01	1.84	0.34	2.18	20.00	70.00	>10
	2.30	0.06	12.69	2.35	15.05	137.90	482.63	
8	0.32	0.00	1.84	0.32	2.16	20.00	70.00	>10
	2.19	0.00	12.68	2.20	14.88	137.90	482.63	
9	0.31	0.01	1.84	0.32	2.16	20.00	70.00	>10
	2.14	0.08	12.69	2.22	14.91	137.90	482.63	
10	1.00	1.01	2.17	2.01	4.18	20.00	70.00	>10
	6.91	6.97	14.96	13.88	28.84	137.90	482.63	
11	0.62	0.29	1.16	0.91	2.08	20.00	70.00	>10
	4.28	2.02	8.03	6.30	14.33	137.90	482.63	
12	0.52	0.42	0.89	0.94	1.83	20.00	70.00	>10
	3.61	2.89	6.11	6.50	12.60	137.90	482.63	
13	1.07	0.94	3.84	2.02	5.86	20.00	70.00	9.24
	7.40	6.52	26.50	13.91	40.41	137.90	482.63	

MARKUP

14	1.01	1.01	3.13	2.02	5.15	20.00	70.00	>10
	6.95	6.97	21.61	13.92	35.53	137.90	482.63	
15	7.13	6.06	0.76	13.19	13.95	20.00	70.00	1.27
	49.13	41.81	5.26	90.94	96.20	137.90	482.63	
16	2.74	4.03	1.59	6.77	8.36	20.00	70.00	3.43
	18.91	27.79	10.94	46.70	57.64	137.90	482.63	
17	1.89	2.89	1.26	4.78	6.04	20.00	70.00	5.28
	13.02	19.93	8.66	32.95	41.61	137.90	482.63	
18	2.02	3.02	1.23	5.03	6.26	20.00	70.00	4.96
	13.92	20.79	8.46	34.71	43.17	137.90	482.63	
19	3.18	4.87	1.78	8.05	9.84	20.00	70.00	2.73
	21.92	33.60	12.29	55.52	67.81	137.90	482.63	
20	2.63	4.83	2.16	7.46	9.62	20.00	70.00	3.02
	18.16	33.27	14.90	51.43	66.32	137.90	482.63	
21	0.23	0.47	1.01	0.70	1.71	20.00	70.00	>10
	1.58	3.23	6.99	4.81	11.80	137.90	482.63	
22	5.26	6.26	0.12	11.52	11.64	20.00	70.00	1.60
	36.25	43.19	0.84	79.44	80.28	137.90	482.63	

Min MS: 1.159, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-54. Load Combination 221, Forward Vibration, Normal Conditions of Transport – Model AOS-100

Load Cases: 221, 101, 201, 211
Forward 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.67	0.88	0.29	1.55	1.85	20.00	70.00	>10
	4.65	6.05	2.03	10.69	12.72	137.90	482.63	
2	0.62	0.24	0.43	0.86	1.28	20.00	70.00	>10
	4.24	1.67	2.93	5.92	8.85	137.90	482.63	
3	0.11	0.05	0.29	0.16	0.44	20.00	70.00	>10
	0.73	0.35	1.98	1.08	3.06	137.90	482.63	
4	5.03	8.82	2.81	13.85	16.66	20.00	70.00	1.17
	34.68	60.79	19.39	95.47	114.86	137.90	482.63	
5	4.35	7.05	3.06	11.40	14.45	20.00	70.00	1.63
	30.00	48.58	21.08	78.57	99.66	137.90	482.63	
6	1.71	2.31	1.31	4.03	5.33	20.00	70.00	6.45
	11.82	15.93	9.00	27.75	36.75	137.90	482.63	
7	0.29	0.01	0.39	0.30	0.70	20.00	70.00	>10
	2.03	0.07	2.72	2.09	4.81	137.90	482.63	
8	0.29	0.00	0.39	0.29	0.68	20.00	70.00	>10
	2.00	0.00	2.71	2.00	4.71	137.90	482.63	
9	0.29	0.01	0.39	0.31	0.70	20.00	70.00	>10
	2.02	0.09	2.71	2.11	4.82	137.90	482.63	
10	1.01	1.03	0.47	2.04	2.51	20.00	70.00	>10
	6.98	7.12	3.21	14.10	17.31	137.90	482.63	
11	0.65	0.29	0.55	0.94	1.49	20.00	70.00	>10
	4.46	2.00	3.81	6.46	10.27	137.90	482.63	
12	0.55	0.44	0.82	0.99	1.81	20.00	70.00	>10
	3.78	3.05	5.65	6.83	12.48	137.90	482.63	
13	1.11	0.97	1.12	2.08	3.20	20.00	70.00	>10
	7.63	6.72	7.74	14.35	22.09	137.90	482.63	

MARKUP

14	1.05	1.03	0.98	2.07	3.06	20.00	70.00	>10
	7.21	7.07	6.79	14.28	21.07	137.90	482.63	
15	3.85	5.45	0.50	9.31	9.80	20.00	70.00	2.22
	26.57	37.60	3.43	64.16	67.59	137.90	482.63	
16	2.36	3.44	0.20	5.80	6.00	20.00	70.00	4.17
	16.26	23.73	1.36	39.99	41.35	137.90	482.63	
17	1.68	2.50	0.12	4.17	4.30	20.00	70.00	6.19
	11.55	17.21	0.85	28.76	29.61	137.90	482.63	
18	1.99	3.05	0.15	5.03	5.18	20.00	70.00	4.96
	13.70	21.01	1.00	34.71	35.72	137.90	482.63	
19	3.15	4.83	0.20	7.98	8.18	20.00	70.00	2.76
	21.73	33.29	1.35	55.02	56.37	137.90	482.63	
20	2.59	4.75	0.50	7.34	7.84	20.00	70.00	3.09
	17.84	32.77	3.48	50.61	54.08	137.90	482.63	
21	0.29	0.53	0.09	0.82	0.91	20.00	70.00	>10
	1.99	3.67	0.62	5.66	6.28	137.90	482.63	
22	2.01	2.39	0.11	4.40	4.51	20.00	70.00	5.82
	13.86	16.45	0.77	30.31	31.09	137.90	482.63	

Min MS: 1.167, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-55. Load Combination 222, Lateral Vibration, Normal Conditions of Transport – Model AOS-100

Load Cases: 222, 101, 201, 211
Lateral 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.68	0.89	0.29	1.57	1.87	20.00	70.00	>10
	4.71	6.13	2.03	10.83	12.86	137.90	482.63	
2	0.11	0.06	0.43	0.17	0.59	20.00	70.00	>10
	0.78	0.38	2.93	1.16	4.10	137.90	482.63	
3	0.11	0.05	0.29	0.16	0.45	20.00	70.00	>10
	0.74	0.35	1.98	1.09	3.08	137.90	482.63	
4	5.02	8.77	2.81	13.79	16.60	20.00	70.00	1.18
	34.60	60.46	19.39	95.06	114.45	137.90	482.63	
5	4.35	7.00	3.06	11.35	14.41	20.00	70.00	1.64
	29.97	48.28	21.08	78.26	99.34	137.90	482.63	
6	1.69	2.28	1.31	3.98	5.28	20.00	70.00	6.54
	11.68	15.74	9.00	27.43	36.43	137.90	482.63	
7	0.29	0.01	0.39	0.30	0.69	20.00	70.00	>10
	2.00	0.06	2.72	2.06	4.78	137.90	482.63	
8	0.29	0.00	0.39	0.29	0.68	20.00	70.00	>10
	2.00	0.01	2.71	2.00	4.72	137.90	482.63	
9	0.29	0.01	0.39	0.30	0.70	20.00	70.00	>10
	2.00	0.09	2.71	2.09	4.80	137.90	482.63	
10	1.01	1.01	0.47	2.02	2.48	20.00	70.00	>10
	6.93	6.98	3.21	13.91	17.12	137.90	482.63	
11	0.63	0.30	0.55	0.92	1.47	20.00	70.00	>10
	4.31	2.04	3.81	6.35	10.15	137.90	482.63	
12	0.53	0.42	0.82	0.95	1.77	20.00	70.00	>10
	3.64	2.92	5.65	6.56	12.22	137.90	482.63	
13	1.08	0.93	1.12	2.01	3.13	20.00	70.00	>10
	7.46	6.38	7.74	13.84	21.58	137.90	482.63	

WAPA SUP

14	1.02	1.00	0.98	2.02	3.00	20.00	70.00	>10
	7.02	6.91	6.79	13.93	20.71	137.90	482.63	
15	3.93	5.54	0.50	9.47	9.96	20.00	70.00	2.17
	27.08	38.18	3.43	65.26	68.69	137.90	482.63	
16	2.34	3.40	0.20	5.74	5.94	20.00	70.00	4.23
	16.17	23.41	1.36	39.58	40.93	137.90	482.63	
17	1.66	2.46	0.12	4.11	4.24	20.00	70.00	6.29
	11.42	16.95	0.85	28.36	29.22	137.90	482.63	
18	1.96	3.01	0.15	4.97	5.12	20.00	70.00	5.03
	13.54	20.76	1.00	34.30	35.30	137.90	482.63	
19	3.14	4.81	0.20	7.95	8.15	20.00	70.00	2.77
	21.68	33.13	1.35	54.81	56.16	137.90	482.63	
20	2.57	4.72	0.50	7.29	7.79	20.00	70.00	3.12
	17.71	32.53	3.48	50.25	53.72	137.90	482.63	
21	0.25	0.49	0.09	0.75	0.84	20.00	70.00	>10
	1.74	3.41	0.62	5.15	5.77	137.90	482.63	
22	1.99	2.36	0.11	4.34	4.46	20.00	70.00	5.91
	13.70	16.24	0.77	29.94	30.72	137.90	482.63	

Min MS: 1.176, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-56. Load Combination 223, Vertical Vibration, Normal Conditions of Transport – Model AOS-100

Load Cases: 223, 101, 201, 211
Vertical 10g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.96	1.03	0.29	1.99	2.28	20.00	70.00	>10
	6.60	7.11	2.03	13.71	15.74	137.90	482.63	
2	0.51	0.19	0.43	0.70	1.12	20.00	70.00	>10
	3.52	1.28	2.93	4.80	7.74	137.90	482.63	
3	0.36	0.21	0.29	0.57	0.86	20.00	70.00	>10
	2.49	1.47	1.98	3.96	5.94	137.90	482.63	
4	5.24	8.83	2.81	14.07	16.88	20.00	70.00	1.13
	36.12	60.90	19.39	97.02	116.41	137.90	482.63	
5	4.58	7.02	3.06	11.60	14.65	20.00	70.00	1.59
	31.55	48.40	21.08	79.95	101.03	137.90	482.63	
6	1.79	2.31	1.31	4.10	5.40	20.00	70.00	6.32
	12.35	15.89	9.00	28.25	37.25	137.90	482.63	
7	0.32	0.02	0.39	0.33	0.73	20.00	70.00	>10
	2.18	0.11	2.72	2.29	5.01	137.90	482.63	
8	0.31	0.01	0.39	0.32	0.72	20.00	70.00	>10
	2.16	0.06	2.71	2.22	4.94	137.90	482.63	
9	0.31	0.02	0.39	0.33	0.73	20.00	70.00	>10
	2.15	0.15	2.71	2.30	5.01	137.90	482.63	
10	1.03	1.03	0.47	2.06	2.52	20.00	70.00	>10
	7.08	7.10	3.21	14.18	17.39	137.90	482.63	
11	0.69	0.32	0.55	1.01	1.56	20.00	70.00	>10
	4.75	2.23	3.81	6.97	10.78	137.90	482.63	
12	0.59	0.44	0.82	1.03	1.85	20.00	70.00	>10
	4.06	3.04	5.65	7.10	12.76	137.90	482.63	
13	1.20	0.93	1.12	2.13	3.26	20.00	70.00	>10
	8.27	6.44	7.74	14.72	22.46	137.90	482.63	

WAITING UP

14	1.15	1.03	0.98	2.18	3.16	20.00	70.00	>10
	7.90	7.10	6.79	15.01	21.79	137.90	482.63	
15	4.02	5.63	0.50	9.65	10.15	20.00	70.00	2.11
	27.74	38.79	3.43	66.53	69.97	137.90	482.63	
16	2.41	3.43	0.20	5.84	6.04	20.00	70.00	4.13
	16.63	23.66	1.36	40.29	41.65	137.90	482.63	
17	1.70	2.47	0.12	4.17	4.30	20.00	70.00	6.19
	11.74	17.04	0.85	28.78	29.64	137.90	482.63	
18	2.01	3.03	0.15	5.04	5.18	20.00	70.00	4.95
	13.85	20.89	1.00	34.74	35.74	137.90	482.63	
19	3.24	4.84	0.20	8.08	8.27	20.00	70.00	2.71
	22.34	33.35	1.35	55.69	57.04	137.90	482.63	
20	2.67	4.76	0.50	7.44	7.94	20.00	70.00	3.03
	18.43	32.85	3.48	51.28	54.76	137.90	482.63	
21	0.37	0.53	0.09	0.90	0.99	20.00	70.00	>10
	2.56	3.65	0.62	6.21	6.83	137.90	482.63	
22	2.05	2.38	0.11	4.43	4.54	20.00	70.00	5.77
	14.14	16.40	0.77	30.54	31.32	137.90	482.63	

Min MS: 1.132, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-57. Load Combination 231, 4-ft. Head-On Drop, Normal Conditions, Normal Conditions of Transport – Model AOS-100

Load Cases: 231, 102, 201, 211
4-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.69	1.33	0.28	3.02	3.30	20.00	66.30	8.94
	11.62	9.20	1.95	20.82	22.77	137.90	457.12	
2	0.67	0.04	0.42	0.70	1.13	20.00	66.30	>10
	4.61	0.24	2.91	4.86	7.77	137.90	457.12	
3	0.37	0.03	0.28	0.40	0.68	20.00	66.30	>10
	2.57	0.21	1.91	2.78	4.69	137.90	457.12	
4	7.28	11.11	2.84	18.39	21.23	20.00	66.30	0.63
	50.17	76.61	19.60	126.78	146.38	137.90	457.12	
5	5.34	8.59	2.96	13.92	16.88	20.00	66.30	1.15
	36.79	59.21	20.41	95.99	116.40	137.90	457.12	
6	2.00	2.62	1.30	4.62	5.91	20.00	66.30	5.50
	13.76	18.07	8.93	31.83	40.77	137.90	457.12	
7	0.53	0.01	0.34	0.54	0.88	20.00	66.30	>10
	3.63	0.10	2.36	3.73	6.09	137.90	457.12	
8	0.50	0.00	0.34	0.50	0.84	20.00	66.30	>10
	3.44	0.00	2.33	3.45	5.77	137.90	457.12	
9	0.49	0.01	0.34	0.50	0.84	20.00	66.30	>10
	3.39	0.08	2.32	3.47	5.79	137.90	457.12	
10	1.24	1.18	0.54	2.41	2.96	20.00	66.30	>10
	8.53	8.11	3.73	16.65	20.37	137.90	457.12	
11	0.83	0.38	0.64	1.21	1.85	20.00	66.30	>10
	5.70	2.64	4.43	8.34	12.77	137.90	457.12	
12	0.65	0.67	0.93	1.32	2.25	20.00	66.30	>10
	4.47	4.62	6.45	9.08	15.53	137.90	457.12	
13	1.26	1.03	1.13	2.29	3.41	20.00	66.30	>10
	8.70	7.08	7.76	15.78	23.54	137.90	457.12	

MARKUP

14	1.15	1.07	0.97	2.22	3.19	20.00	66.30	>10
	7.96	7.35	6.68	15.31	21.99	137.90	457.12	
15	4.23	5.45	0.80	9.68	10.48	20.00	66.30	2.10
	29.15	37.59	5.54	66.75	72.28	137.90	457.12	
16	2.73	3.69	0.31	6.42	6.73	20.00	66.30	3.67
	18.84	25.43	2.16	44.26	46.43	137.90	457.12	
17	2.08	2.93	0.19	5.01	5.20	20.00	66.30	4.99
	14.32	20.20	1.32	34.52	35.84	137.90	457.12	
18	2.66	3.95	0.15	6.61	6.75	20.00	66.30	3.54
	18.34	27.21	1.02	45.55	46.56	137.90	457.12	
19	3.79	5.42	0.22	9.21	9.43	20.00	66.30	2.26
	26.14	37.35	1.51	63.49	64.99	137.90	457.12	
20	2.98	5.51	0.49	8.49	8.99	20.00	66.30	2.53
	20.57	38.00	3.39	58.56	61.95	137.90	457.12	
21	0.49	0.56	0.09	1.05	1.14	20.00	66.30	>10
	3.41	3.85	0.61	7.26	7.87	137.90	457.12	
22	2.20	2.57	0.10	4.78	4.88	20.00	66.30	5.28
	15.20	17.75	0.67	32.95	33.62	137.90	457.12	

Min MS: 0.631, Location: 4, Combination: Pm+Pb

MARKUP

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MARKUP

2.7 HYPOTHETICAL ACCIDENT CONDITIONS OF TRANSPORT

The AOS Transport Packaging System, when subjected to the Hypothetical Accident conditions of transport specified in *10 CFR 71.73*, meets the performance requirements specified in *10 CFR 71* **[2.1]**, Subpart E. This is demonstrated in Subsection 2.7.1, "Free Drop." The Free-Drop, Penetration, and Fire conditions are addressed and shown to meet the applicable design criteria provided in Subsection 2.1.2, "Design Criteria." The evaluation was performed by using LIBRA Finite Element analysis, supported by a full-size, scale-free, drop test. The analysis conducted for all Hypothetical Accident conditions of transport is described within these subsections. The testing performed and results are also briefly discussed; however, the complete test report is included in Chapter 8, Appendix 8.3.2, "Impact (Free-Drop) Test Report."

The full-size, scale-free drop test was performed at General Electric, Vallecitos Nuclear Center, Sunol, California, for Alpha-Omega Services, Inc., of Bellflower, California. In addition, Alpha-Omega Services contracted CSA Engineering, Inc., of Mountain View, California, to instrument and record the test results and GE Energy Nuclear contracted RANOR, Inc., of Westminster, Massachusetts, to perform all pre- and post-dimensional inspections. A copy of the Dimensional Inspection report is included in Chapter 8, Appendix 8.3.3, "Dimensional Inspection Report – Model AOS-165A."

2.7.1 Free Drop

The AOS Transport Packaging System is described in Subsection 2.1.1, "Discussion." As discussed in that subsection, the cask component is covered at both ends by the impact limiter. The impact limiter is designed to absorb the energy developed during the drop, mitigating the drop's effect on the cask. The analysis presented in this subsection consists of two (2) parts:

- To identify the load onto the cask, by performing a pseudo-static collapse analysis of the impact limiter, and
- To impose this resulting load onto the cask in the stress analysis

The tables provided within this subsection present the Model AOS-100 transport package's results, under Hypothetical Accident conditions of transport. Results specific to the Model AOS-025, AOS-050, and AOS-165 transport packages is provided in Appendix 2.10.1.4, Appendix 2.10.2.4, and Appendix 2.10.3.4, respectively.

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2.7.1.1 End Drop

2.7.1.1.1 Head-On Free-Drop Impact Limiter Analysis

The Model AOS-100 transport package's impact limiter structure, or overpack, is composed of General Plastics LAST-A-FOAM FR-3700 9.1-kg (20-lb.) foam and 3.17-mm (0.125-in.) stainless steel cladding. The entire assembly consists of two (2) overpacks connected by eight (8) turnbuckles. Each overpack is approximately 190.5 cm (75 in.) in diameter by 101.6 cm (40 in.) in height. There is an uncovered cask length of approximately 56 cm (22 in.) between the two overpacks. The overpack ends are spherical, providing a tapered surface. In addition, the ends contain a recessed, cylindrical section of approximately 66 cm (26 in.) in diameter by 17.8 cm (7 in.) in depth.

The foam material accounts for most of the impact limiter's energy absorbing capability. The energy absorbed by the cladding is small and not included in this analysis. The impact limiter foam is analyzed by static, 3D, large displacement, finite element analyses. The foam is modeled by solid elements with Piola-Kirchhoff stress tensors, and FR-3700 9.1-kg (20-lb.) foam constitutive behavior. Strain energy developed in the foam is determined for a sequence of applied displacement fields corresponding to the impact of the cask on a rigid plane. Displacements are applied in 0.25 mm (0.01 in.) increments for both head-on and side-drop configurations, until the strain energy developed in the foam equals the potential energy of a 9-m (30-ft.) drop. The configuration corresponding to the maximum slap-down impact is determined from a series of dynamic analyses with different cask impact orientations and side-drop impact properties. The orientation producing maximum impact force is selected as the slap-down configuration.

Figure 2-19 shows the FEA model used in the drop analyses. The model represents a 180° section of the impact limiter and contains 2,835 nodes, 2,220 elements, and 8,496 degrees of freedom. A small, artificial hole is modeled at the axis of rotation of the overpack to restrict the model to brick elements. Radial degrees of freedom are fixed at the hole. Foam element constitutive properties are developed from 9.1-kg (20-lb.) foam General Plastics LAST-A-FOAM FR-3700 stress strain data (listed in Table 2-58) and 0.3 Poisson's ratio.

Table 2-58. Foam Stress Strain Data – All Models

Strain (%)	Stress (psi)	Strain (%)	Stress (psi)
0.10	1,890	0.50	2,604
0.20	1,915	0.60	3,561
0.30	1,940	0.65	4,858
0.40	2,168	0.70	5,397

In the impact analysis, a series of displacement fields simulating the head-on impact of the overpack onto a rigid surface was applied. The displacement steps correspond to 0.25 mm (0.01 in.) displacements of the rigid surface. The geometric and constitutive element properties were updated after each displacement step. Figure 2-20 illustrates the strain energy developed in the foam, and total force at the rigid surface, as a function of surface displacement. For a 180° model, and 38,000-lb. weight (Model AOS-165A; 33,000-lb. cask and 5,000-lb. impact limiter), the maximum displacement corresponds to the strain energy.

$$U = (1/2)\ 38{,}000 * 360 = 6.84 * 10^6 \text{ in.-lb.}$$

From Figure 2-20, the corresponding displacement is 13.7 cm (5.4 in.), the total force is $12.9 * 10^6$ N ($2.9 * 10^6$ lbs.), and the maximum acceleration is:

$$a = (2)\ 3.1 * 10^6 / 38{,}000 = 163.2g$$

Figure 2-21 shows longitudinal foam displacements, where the displacement contours are plotted on the deformed geometry. The equivalent stress and strain at maximum displacement are plotted in Figure 2-22 and Figure 2-23, respectively.

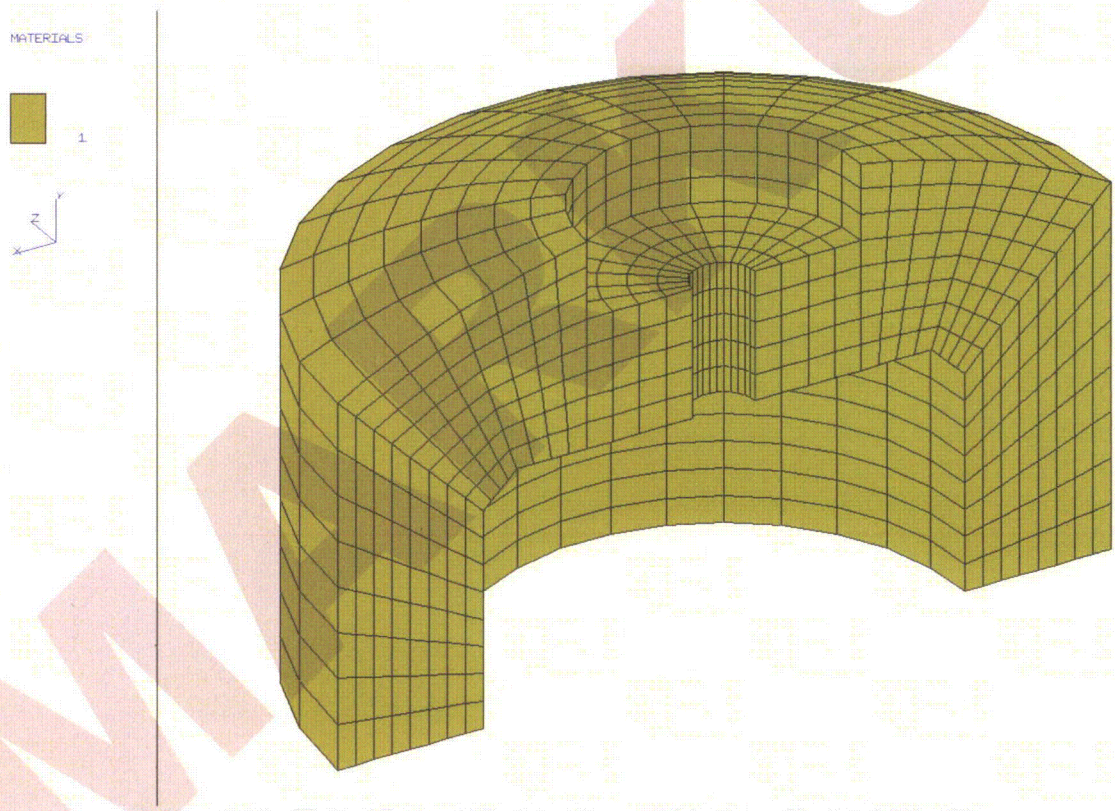

Figure 2-19. Finite Element Model of Impact Limiter – Model AOS-100

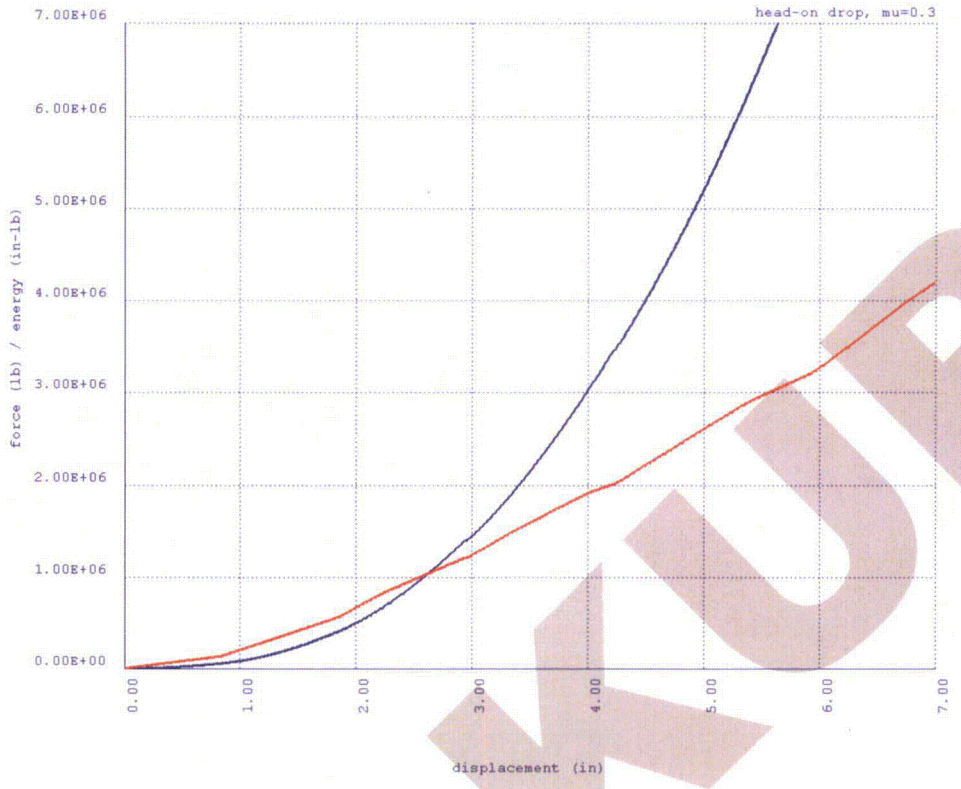

Figure 2-20. Head-On Drop Force and Energy – Model AOS-100

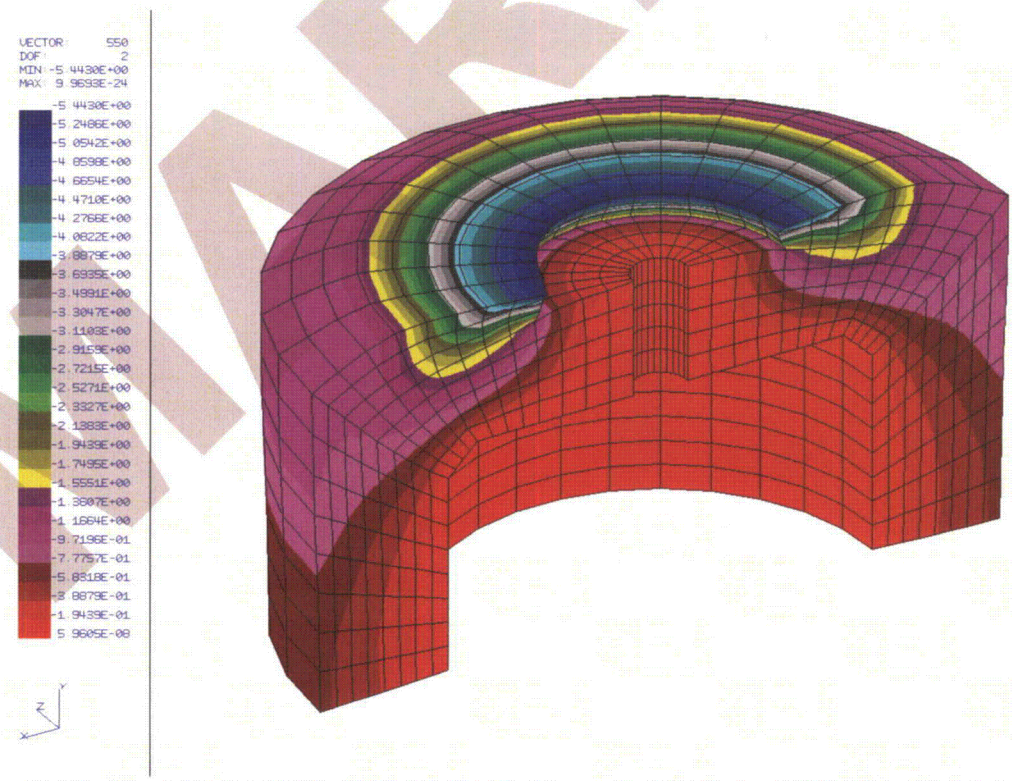

Figure 2-21. Head-On Drop, Maximum Foam Displacement (Deformed Model) – Model AOS-100

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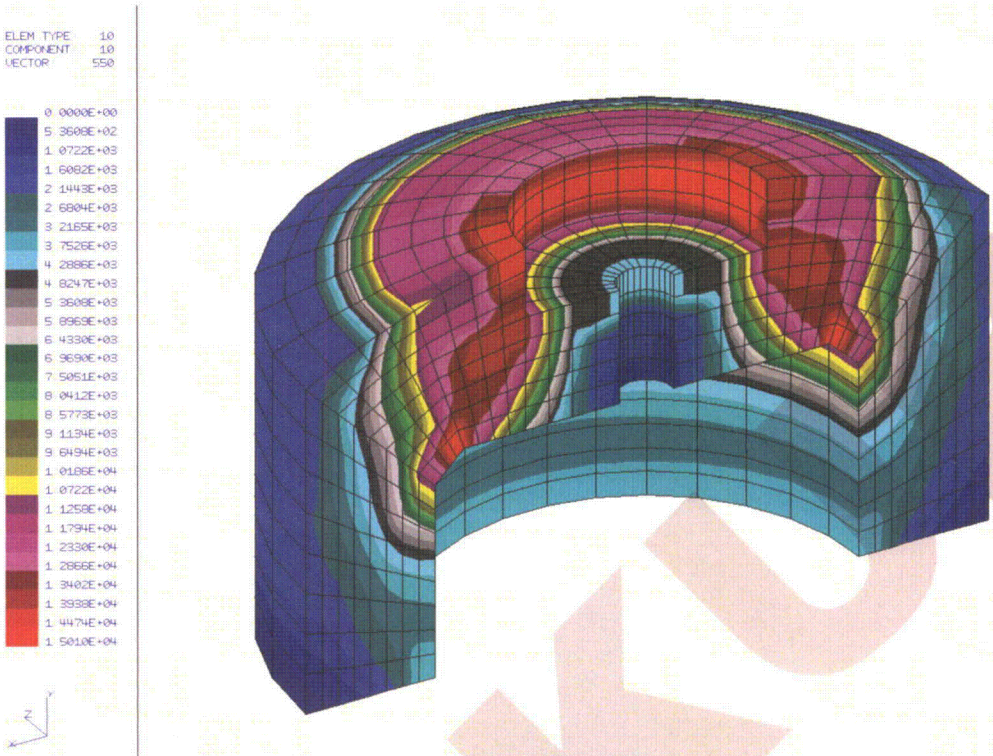

Figure 2-22. Head-On Drop, Maximum Equivalent Stress in Foam – Model AOS-100

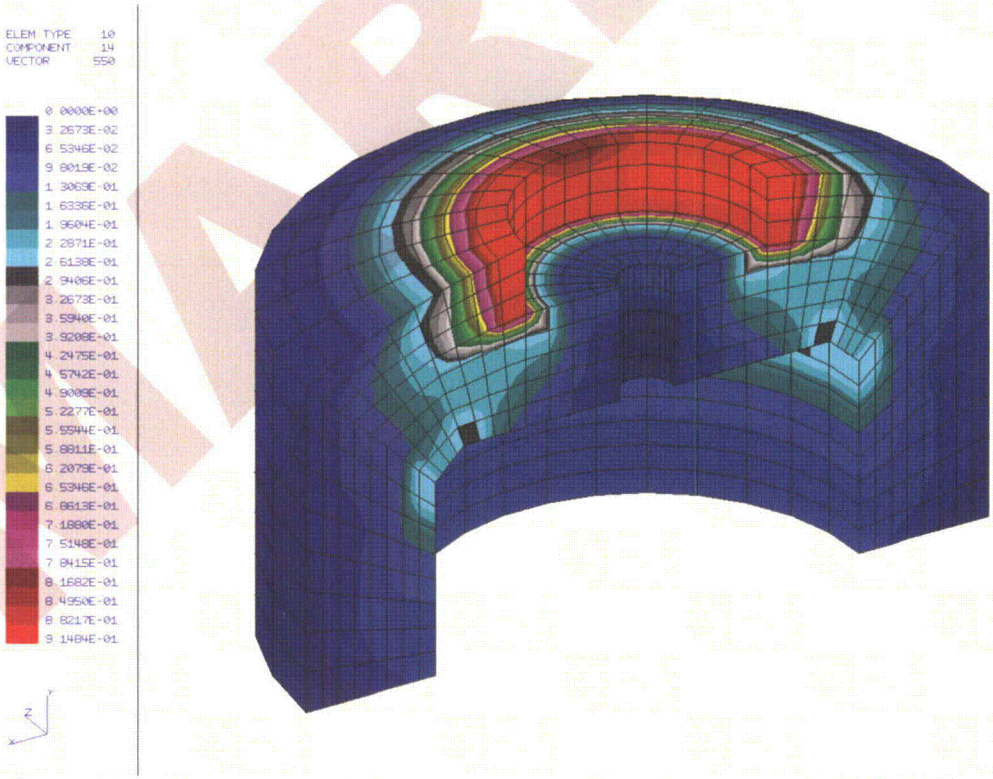

Figure 2-23. Head-On Drop, Maximum Principal Strain in Foam – Model AOS-100

2.7.1.1.2 Head-On Free-Drop Cask Analysis

A net force due to a 30-ft. head-on drop, Load Case 301, was determined from the impact limiter analysis presented in Paragraph 2.7.1.1.1. Stress due to head-on drop loads was analyzed by the 2D cask model. Figure 2-24 shows the assumed impact load distribution. With reference to Figure 2-24, for a total impact force P, the load intensity is given by:

$$q = P / \pi (R_1^2 - R_2^2)$$

Over section L, the load intensity in the *x* and *y* directions is:

$$q_x = q_y = q \cdot \sin(45°)$$

The LIBRA LE -4[a] loading function is used to apply pressure load q. In addition to the impact load, an opposing inertia body force is applied to the cask. Displacements are fixed along the cask base to account for non-equilibrium of pressure and inertia forces.

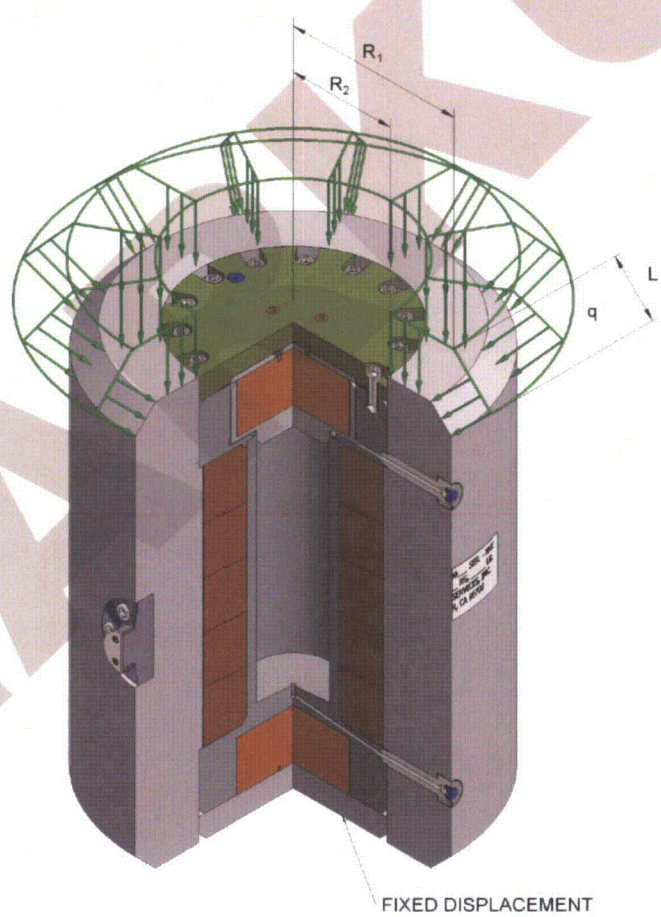

Figure 2-24. Head-On Drop Analysis Load Distribution – Model AOS-100

a. *Ibid.*

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2.7.1.1.3 Correlation of Head-On Drop Analysis and Test

A single cask with multiple impact limiters was subjected to three (3) 9.14-m (30-ft.) drop tests:

- Head-On Drop
- Side Drop
- Cg/Corner Drop

In the Cg/corner drop test, the cask was oriented with one end offset 25.4 cm (10 in.) above the other. Following all three (3) tests, the cask showed no measurable deformation, and passed all leak tests. The only notable structural problem encountered in the drop tests was the failure of a turnbuckle pin in the Side-Drop test. A larger diameter pin was successfully used in the subsequent Cg/corner Drop test.

Four (4) types of data were gathered before, during, and after each drop test:

- Acceleration data from three (3) accelerometers
- Laser dimensional readings
- High-speed photographs at 1-ms intervals during impact
- Photographs of the sectioned, deformed overpacks

The Dimensional Inspection report, presented in Chapter 8, Appendix 8.3.3, "Dimensional Inspection Report – Model AOS-165A," for the Head-On Drop test, does not provide a direct correlation with the LIBRA analysis, because the laser readings are of the cladding, and the cladding at the center of overpack separated significantly from the foam. A correlation of analysis and test results is obtained from the photo of the sectioned overpack shown in Figure 2-25. This photo provides a measurement of the compressed overpack height that can be compared directly to analysis. In Figure 2-25, Dimension A is used to scale the photo measures to design dimensions, and Dimension B is the overall height.

The scaled height change, δ, corresponds to the maximum displacement of 13.82 cm (5.44 in.). Analysis and test values differ by 19%.

In addition to correlating maximum displacements, a qualitative comparison of overall displacements is provided by Figure 2-26 and Figure 2-27. Figure 2-26 is a photo of the deformed overpack. Figure 2-27 is a LIBRA-rendered plot of the deformed model. A comparison of these two figures shows that the LIBRA deformed model qualitatively compares well with the deformed structure.

The test accelerometer data is dominated by ringing due to vibration of tungsten alloy cylinders, rendering it unsuitable for correlation with the analytical results. A comparison of analytical and test results for head-on, rigid body cask deceleration can be obtained using the time to achieve maximum displacement shown on the high-speed photographs, some of which are shown in Figure 2-28. In the Drop-Test report, presented in Chapter 8, Appendix 8.3.2, "Impact (Free-Drop) Test Report," the time to achieve maximum displacement is given as 0.021 sec. This time can be calculated by considering the cask and overpack to be a single degree of freedom spring-mass system, where the spring is approximated from Figure 2-20, and the mass is the total cask plus overpack mass. The time to achieve maximum displacement for an undamped, spring-mass system is:

$$k = (2)\ 2.9 * 10^6 / 5.4 = 1.07 * 10^6 \text{ lb/in}$$
$$m = 35{,}000 / 386.4 = 90.6 \text{ lb-sec/in}^2$$
$$\omega = \sqrt{k/m} = 108.7 \text{ rad/sec}$$
$$T/4 = \pi / 4f = 0.0145 \text{ sec}$$

The cask experienced high damping due to the combined effects of the foam and cask ringing. The amount of damping is given by the cask rebound. From the Drop-Test report (Chapter 8, Appendix 8.3.2), the rebound height was approximately 10% of the drop height, indicating that 90% of the kinetic energy was dissipated. From the LIBRA-AGS analysis shown in Figure 2-29, a 90% energy dissipation corresponds to a critical damping coefficient of $\xi = 0.06$.

$$T_D / 4 = (T / 4) / (1 - \xi^2) = 0.0145 / 0.64 = 0.0226 \text{ sec}$$

Calculated and observed times for achieving maximum displacement, 0.021 and 0.0226, differ by 7.6%.

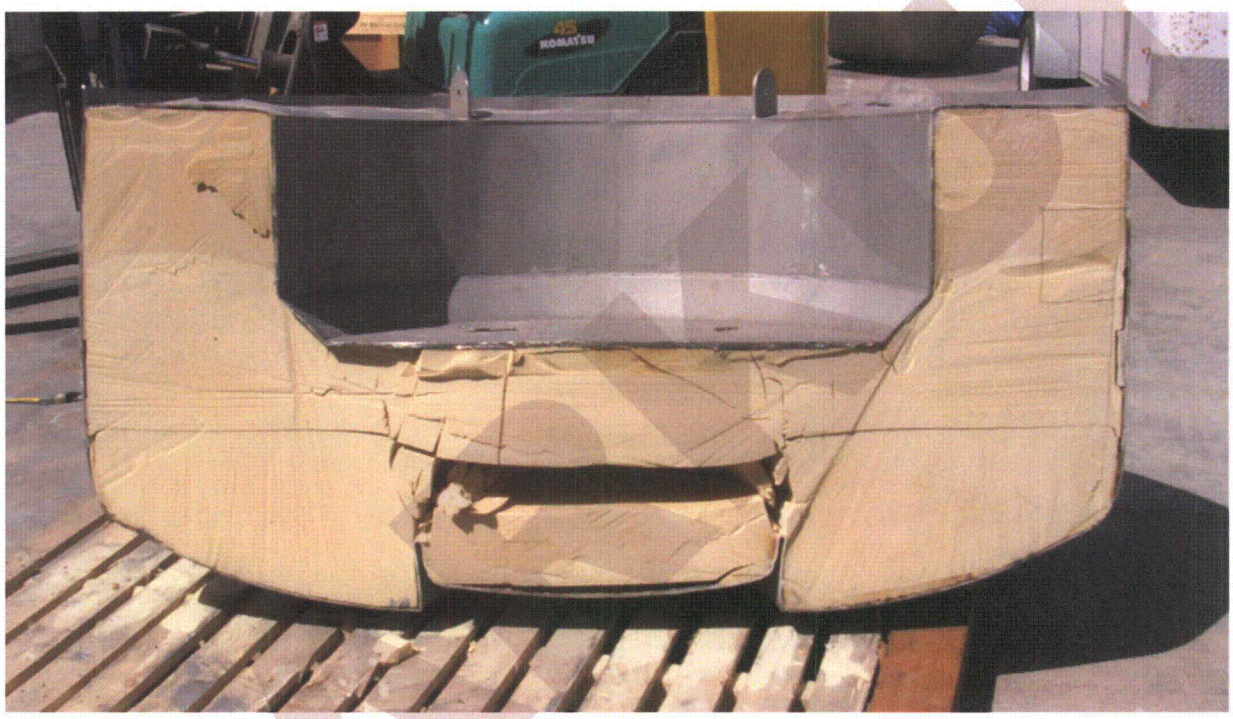


Figure 2-25. Sectioned Impact Limiter Used in Head-On Drop – Model AOS-100

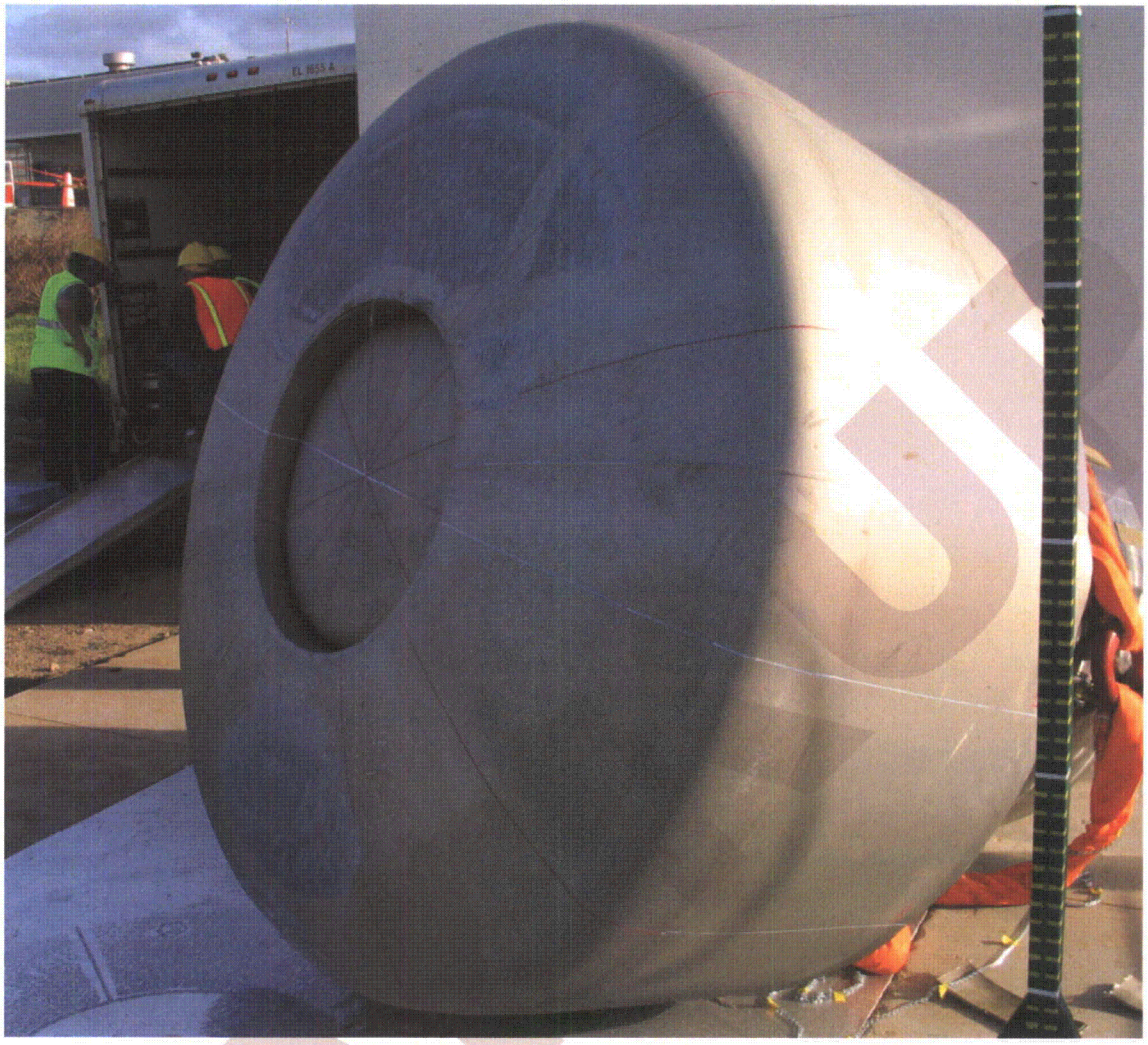


Figure 2-26. Impact Limiter after Head-On Drop – Model AOS-100

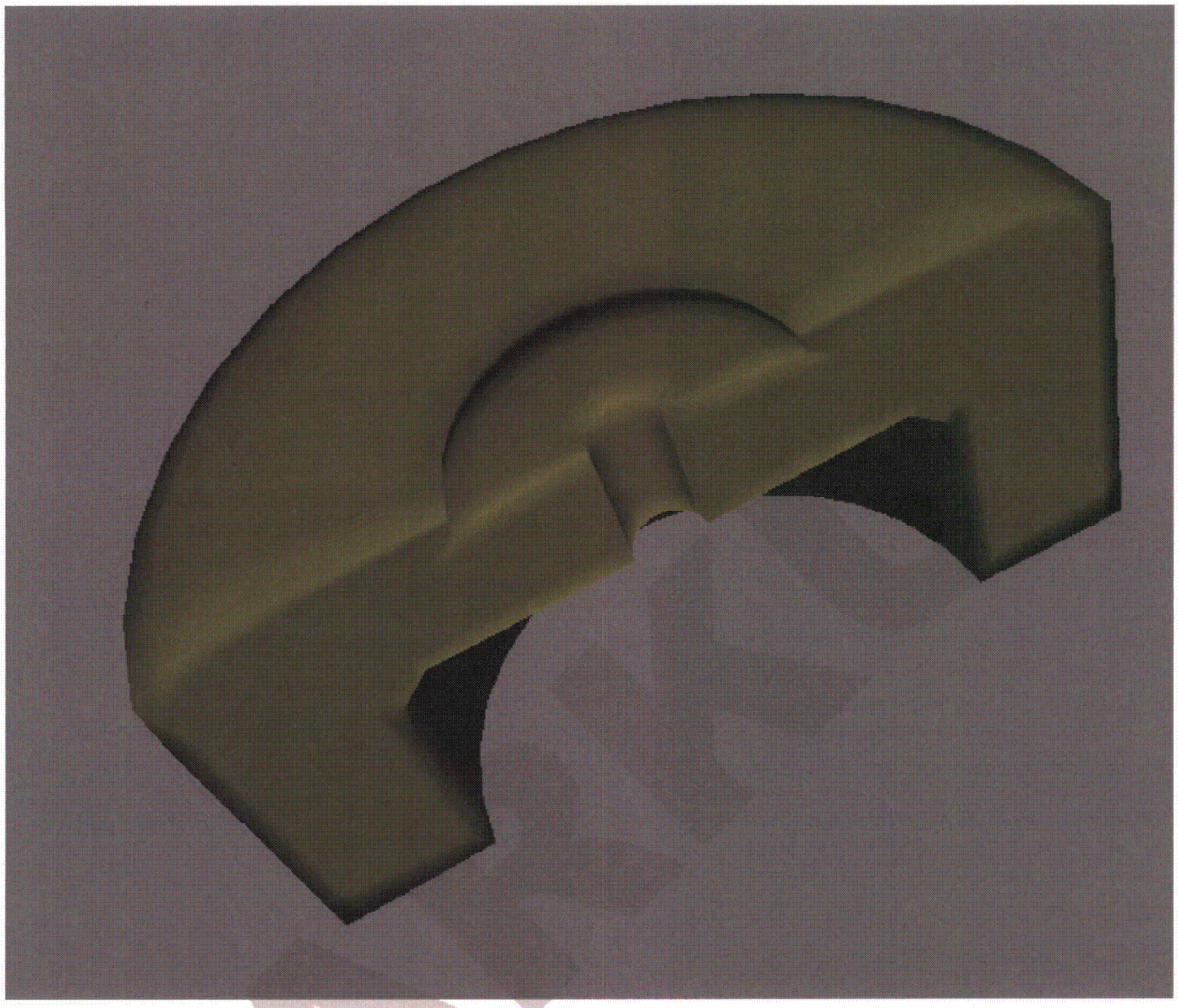


Figure 2-27. Rendered LIBRA Deformed Head-On Drop Model – Model AOS-100

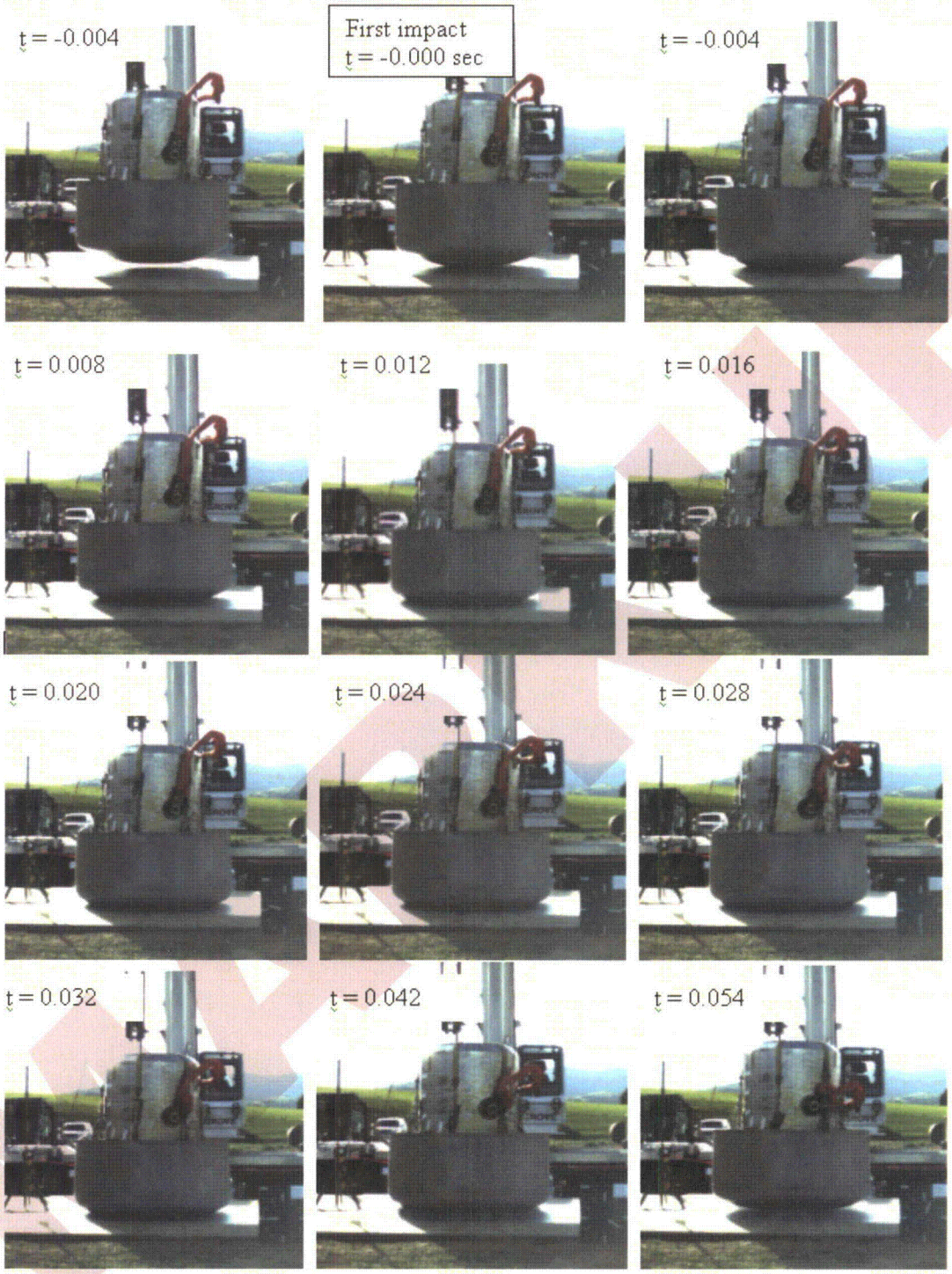


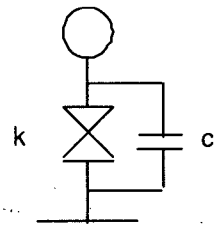
Figure 2-28. Photograph Frames from High-Speed Video of End Drop – Model AOS-100

```
ti   damping analysis
sc   300000,1.0E-6,   0,0.0114,   0,0,0
nd   1,90.0
,    2,1
el   1,1,1,2
pr   1,1.0E6
bc   2
iv   1,527
mo   1,1
end
```

$\omega = \sqrt{k/m} = 105.4$

$\xi = 0.06$

$\beta = 2 * \xi / \omega = 0.0114$



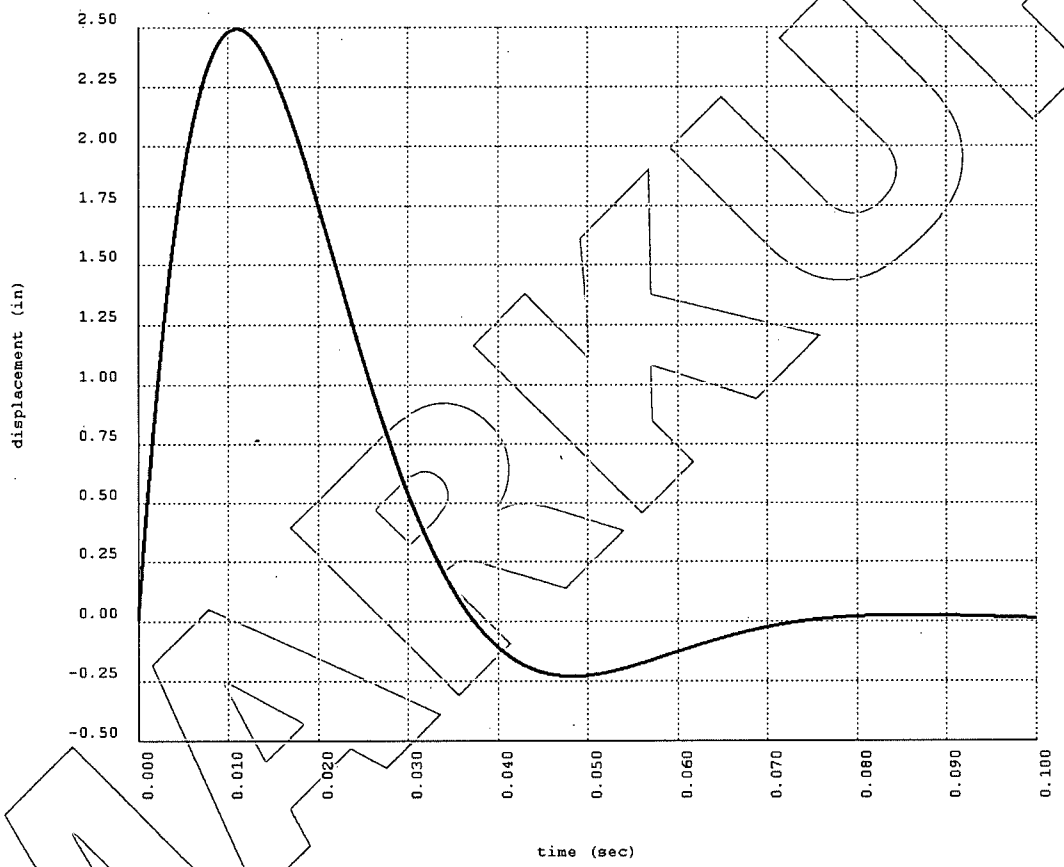


Figure 2-29. Impact Response for Damping, ξ = 0.06 – Model AOS-100

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2.7.1.2 Side Drop

2.7.1.2.1 Side Drop Impact Limiter Analysis

The FEA model shown in Figure 2-19 is also used for the side drop. As in the head-on drop analysis, a series of displacement fields, simulating the side impact of the overpack onto a rigid surface, is applied, with displacement steps corresponding to 0.25 mm (0.01 in.) displacements of the rigid surface, and geometric and constitutive element properties updated after each displacement step. Figure 2-30 shows the strain energy developed in the foam and total force applied by the rigid surface displacements as a function of surface displacement. For the 180° section of one impact limiter and a 35,000-lb. cask weight, the maximum displacement corresponds to the strain energy:

$$U = (1/4)\ 35{,}000 * 360 = 3.15 * 10^6 \text{ in.-lb.}$$

From Figure 2-30, the corresponding displacement is 13.7 cm (5.4 in.), the total force is 2.9 * 106 lbs., and the maximum acceleration is:

$$a = (4)\ 1.70 * 10^6 / 35{,}000 = 194.0g$$

Figure 2-31 illustrates the lateral foam displacements, where the displacement contours are plotted on the deformed geometry. The equivalent stress and strain at maximum displacement are plotted in Figure 2-32 and Figure 2-33, respectively.

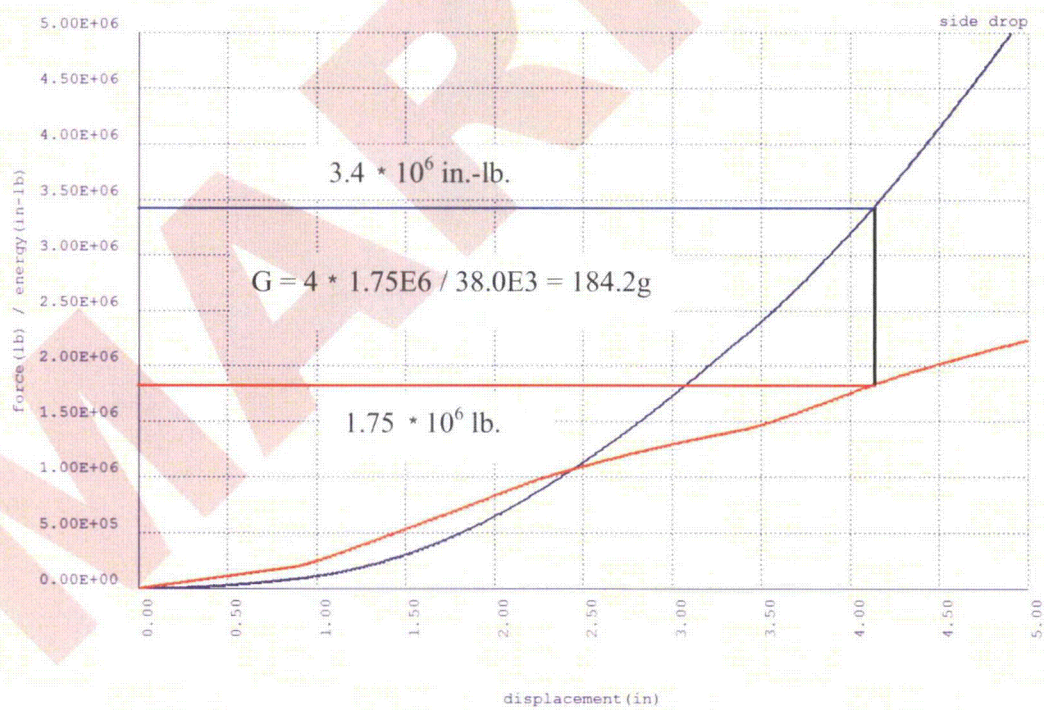

Figure 2-30. Side Drop Force and Energy – Model AOS-100

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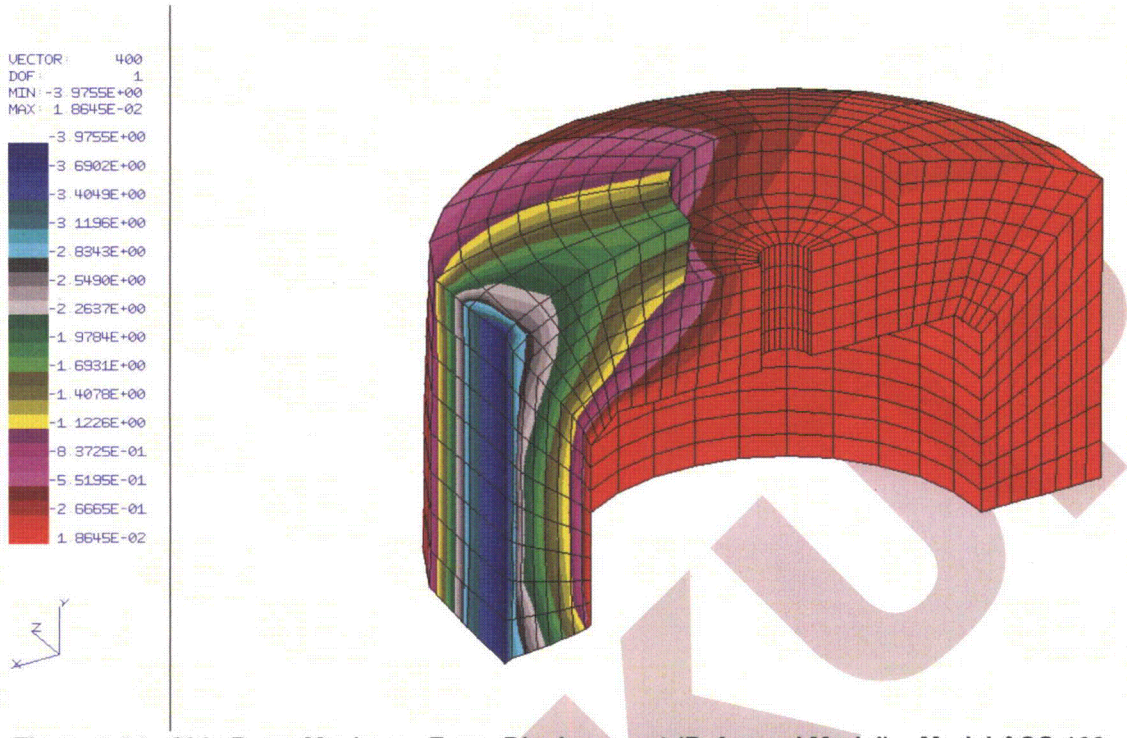

Figure 2-31. Side Drop, Maximum Foam Displacement (Deformed Model) – Model AOS-100

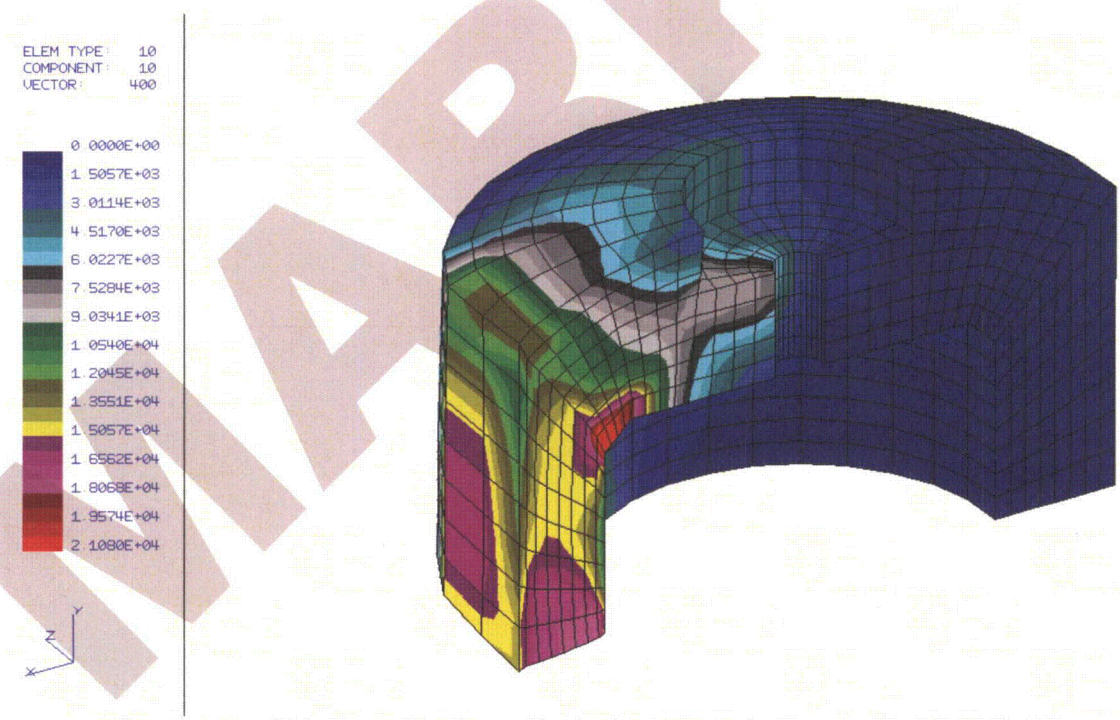

Figure 2-32. Side Drop, Maximum Equivalent Stress in Foam – Model AOS-100

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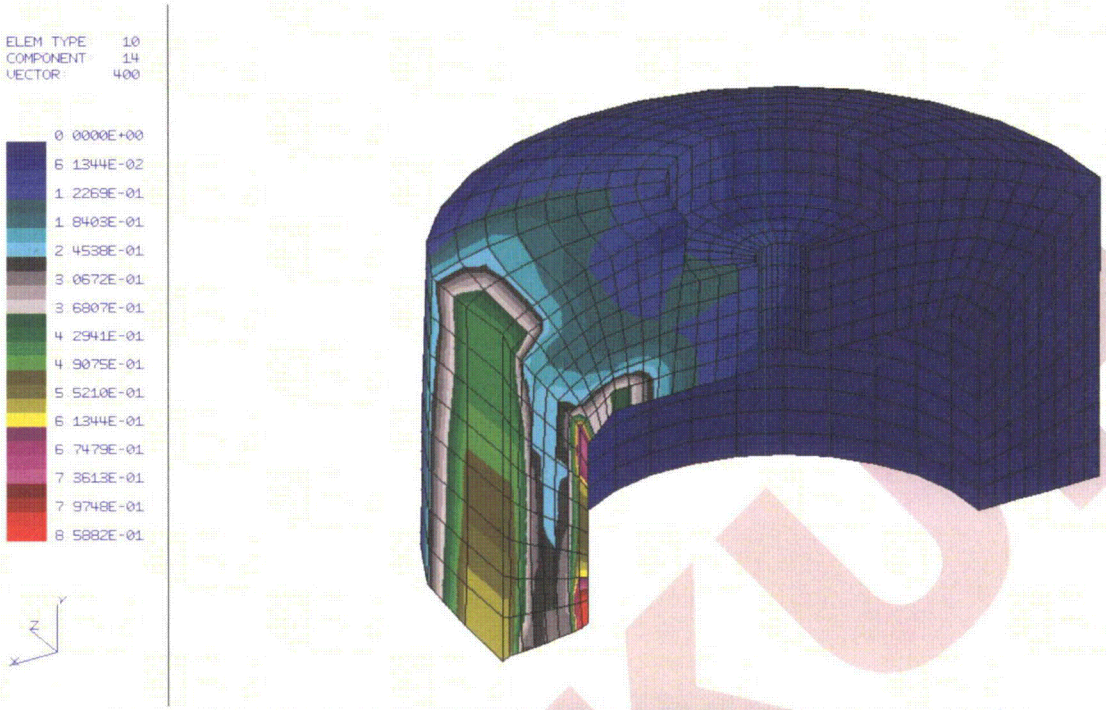

Figure 2-33. Side Drop, Maximum Principal Strain in Foam – Model AOS-100

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2.7.1.2.2 Side Drop Cask Analysis

Net force due to a 30-ft. side drop plus slap down, Load Case 302, is determined from the impact limiter analysis presented in Paragraph 2.7.1.2.1. Figure 2-34 illustrates the assumed impact load distribution. For impact force P, the load intensity distribution, as a function of the circumferential angle, is assumed to be:

$$q_x = -q * \cos^2\theta$$
$$q_z = q * \sin\theta * \cos\theta$$
$$P = 2L \int_{-\pi/2}^{\pi/2} -q * \cos^2\theta * r * d\theta$$
$$P = \pi * R * L * q$$
$$q = P / (\pi * R * L)$$

The LIBRA loading function, LE -5[a], applies impact traction q. This function applies surface tractions in 3D models generated from 2D models. Tractions are applied along nodal lines of the 2D model. The tractions can vary linearly along the 2D nodal lines, and as a sine or cosine harmonic in the circumferential direction. The above tractions, q_x and q_z, are applied with LE -5, using the trigonometric identities:

$$q_x * \cos^2\theta = 1/2 * q_x * (1 + \cos 2\theta)$$
$$q_z * \sin\theta * \cos\theta = 1/2 * q_z * \sin 2\theta$$

In addition to the impact load, an opposing inertia body force is applied to the cask. Radial displacements are fixed along the cask meridian 180° from center of loading, to account for non-equilibrium of pressure and inertia forces.

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a. *Ibid.*

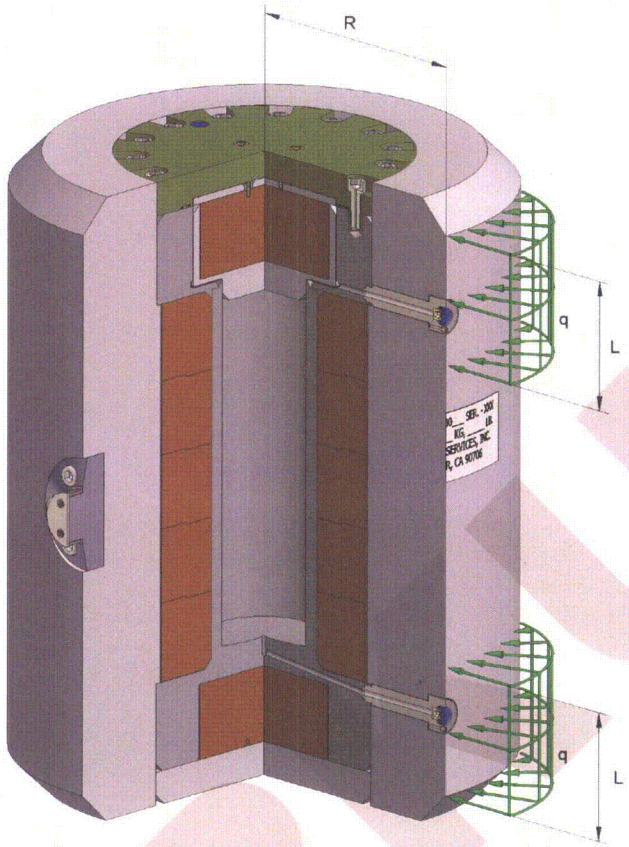

Figure 2-34. Side Drop Analysis Load Distribution – Model AOS-100

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2.7.1.2.3 Correlation of Side-Drop Analysis and Test

In the side drop, there is not a significant separation of foam and cladding. (Refer to Figure 2-31.) As a result, the dimensional inspection results are used to correlate test and analysis results. In the analysis, a uniform radial displacement is applied along the overpack structure. In the side-drop test, the overpack experienced small rotation, producing differences in radial displacement along the overpack. Consequently, the net average test radial displacement in each overpack is compared to the uniform analysis displacement. For the Model AOS-165 transport package, the net average test radial displacements at the two (2) overpacks are provided in Table 2-59 from the Dimensional Inspection report, presented in Chapter 8, Appendix 8.3.3, "Dimensional Inspection Report – Model AOS-165A."

The average of displacements is determined at three (3) locations along the overpack:

- **Point 1** – At the overpack base
- **Point 2** – Approximately halfway between the overpack base and crown
- **Point 3** – At the crown

The net displacement – the sum of all displacements, at the inside and outside of the overpack – is used at each point.

The average radial displacement at Overpack 1 is 8.91794 cm (3.511 in.). The average radial displacement at Overpack 2 is 7.56666 cm (2.979 in.). From Figure 2-30, the analytical radial displacement is 9.652 cm (3.8 in.). The analysis and test results differ by a maximum of 21.6%.

Table 2-59. Side-Drop Analysis and Test, Radial Displacement at Overpacks 1 and 2 – Model AOS-165

Overpack 1 (in.)				Overpack 2 (in.)			
Area	**Base**	**Mid**	**Crown**	**Area**	**Base**	**Mid**	**Crown**
Outside	3.969	2.239	2.080	Outside	4.027	2.057	1.892
Inside	0.547	1.247	0.451	Inside	0.000	0.650	0.311
Total	4.516	3.486	2.531	Total	4.027	2.707	2.203

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2.7.1.3 Cg/Corner Drop

2.7.1.3.1 Cg/Corner Drop Impact Limiter Analysis

The purpose of the Cg/Corner drop analysis is to determine cask orientation producing maximum impact. The force of this impact is determined by a series of direct integration, dynamic analyses involving different offset values, and the FEA model illustrated in Figure 2-35 that is used for these analyses. This model consists of a uniform block and two linear springs connected to the block by gap elements. Block geometry, total mass, and moment of inertia approximate cask values. The spring stiffness values approximate stiffness of the impact limiter subjected to a side drop. In each analysis, a null gap is modeled at one spring, and a gap equal to the offset modeled at the other spring. From Figure 2-30, approximate, linear stiffness of the impact limiter is:

$$k = (2)\ 1.70 * 10^6 / 4.0 = 0.85 * 10^6 \text{ lb./in.}$$

Figure 2-36 and Figure 2-37 graphically present the direct integration, dynamic analyses results for the Model AOS-165:

- Figure 2-36 presents the maximum offset spring displacement, plotted as a function of offset.
- Figure 2-37 presents the displacements at both springs, plotted as functions of time for an offset of approximately 25.4 cm (10 in.), the offset used in the drop test.

  Maximum values from Figure 2-37 are presented in Table 2-60.

Table 2-60. Support Displacements – Model AOS-165

Support	Maximum Displacement	
	cm	in.
1	8.89	3.500
2	10.82	4.260

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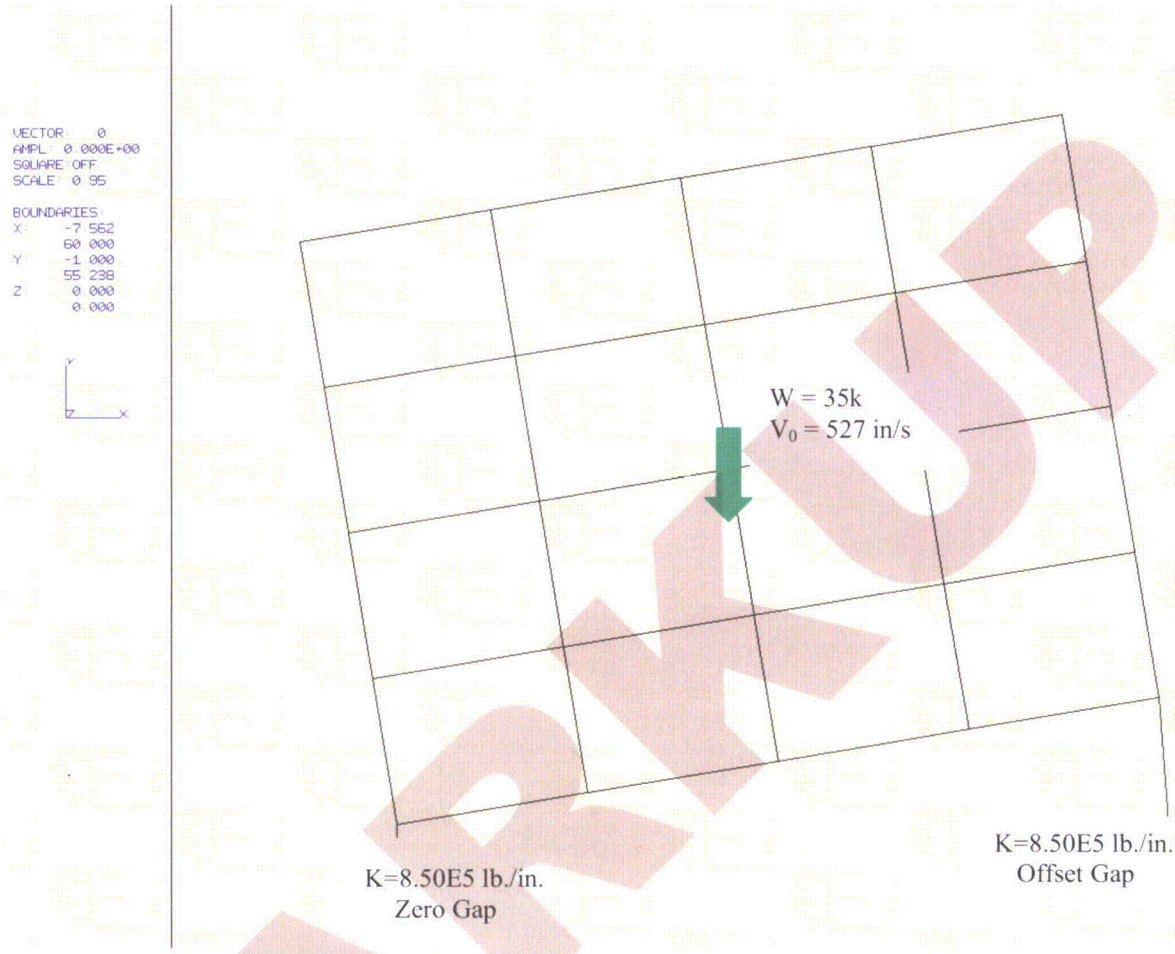

Figure 2-35. Cg/Corner Analysis Finite Element Model – Model AOS-165

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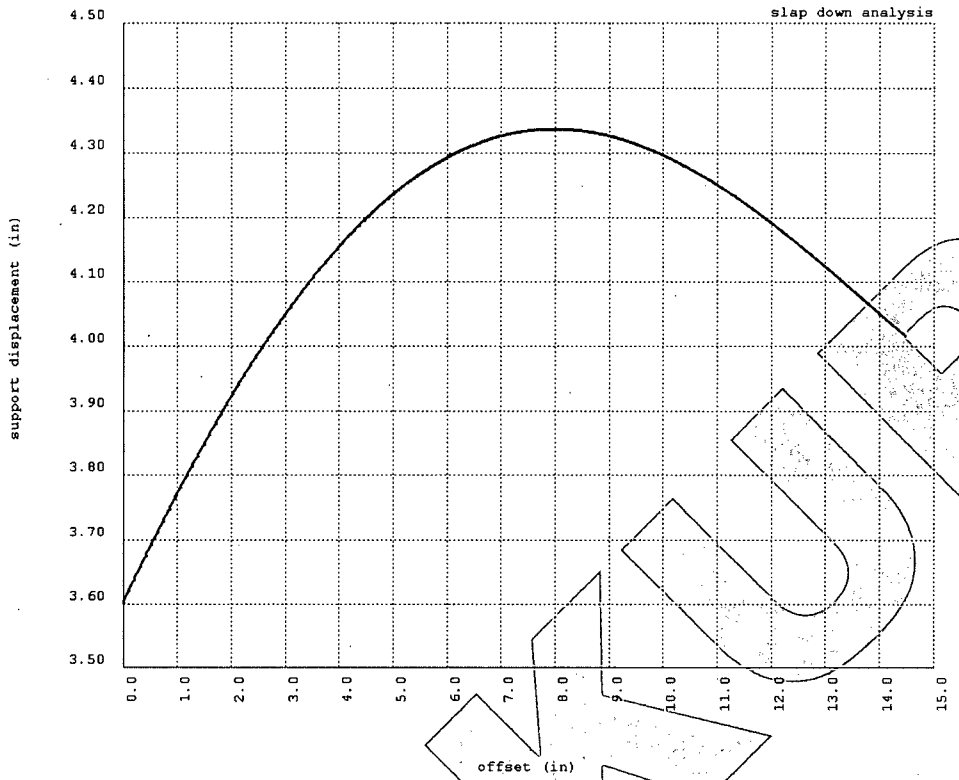

Figure 2-36. Cg/Corner Analysis Maximum Support Displacement versus Offset – Model AOS-165

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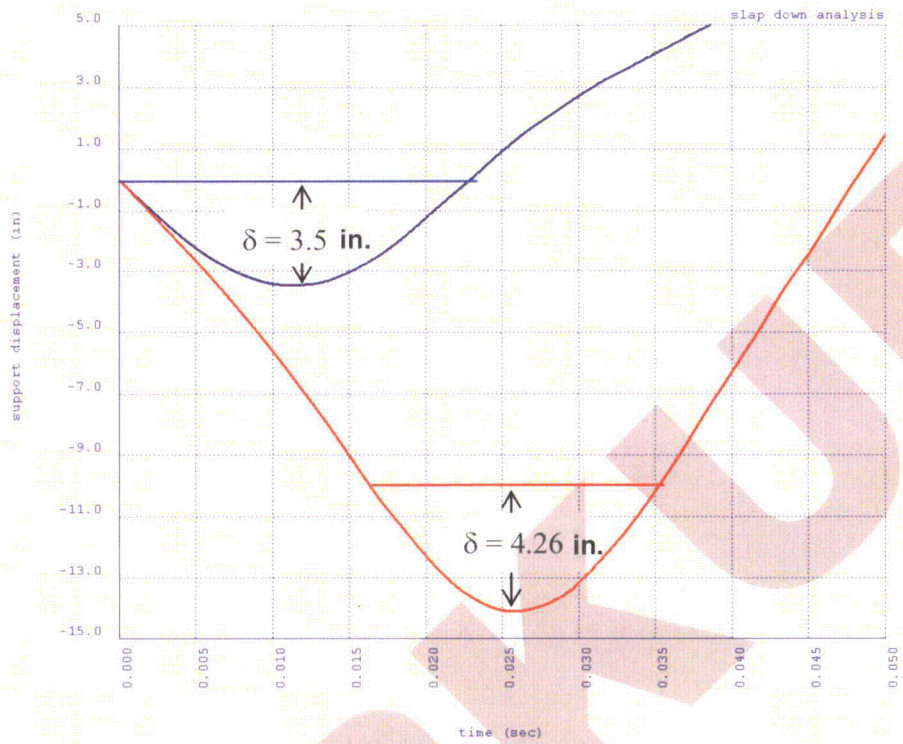

Figure 2-37. Cg/Corner Analysis Support Displacements versus Time – Model AOS-165

MARKUP

2.7.1.3.2 Cg/Corner Drop Cask Analysis

Net force due to a 30-ft. Cg/corner drop, Load Case 303, is determined from the impact limiter analysis presented in Paragraph 2.7.1.3.1. Figure 2-38 illustrates this force distributed over the entire cask surface. For impact forces P_x and P_y, the load intensity distribution, as a function of the circumferential angle θ, is assumed to be:

$$q_y = 2/\pi * P_y / (R_2^2 - R_3^2)$$

$$q_x = -q * \cos^2\theta$$

$$q_z = q * \sin\theta * \cos\theta$$

$$P_x = 2L \int_{-\pi/2}^{\pi/2} -q * \cos^2\theta * r * d\theta$$

$$q_x = 2 * P / (\pi * R_1 * L)$$

In addition to the impact load, an opposing inertia body force is applied to the cask. Radial displacements are fixed along the cask meridian 180° from center of loading, to account for non-equilibrium of pressure and inertia forces.

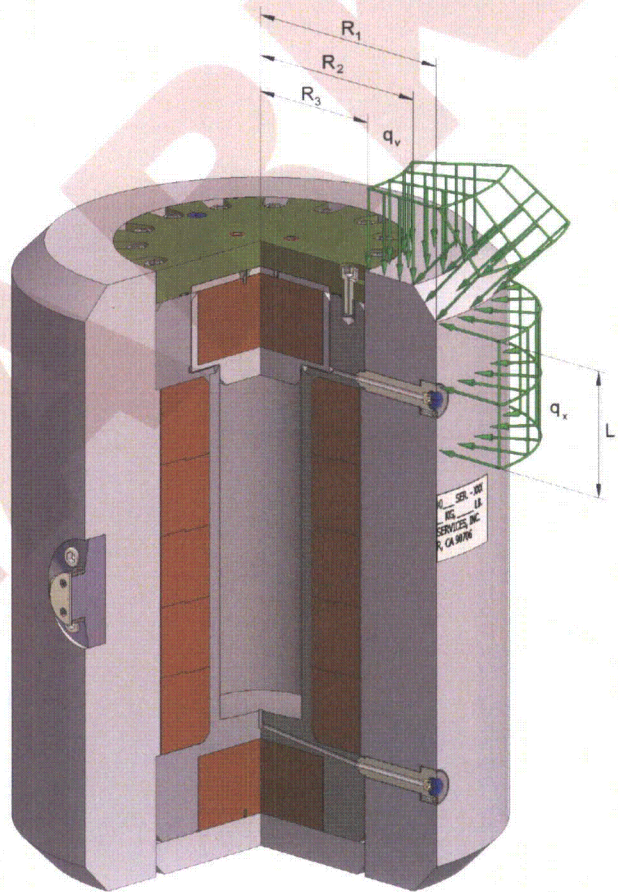

Figure 2-38. Cg/Corner Drop Analysis Load Distribution – Model AOS-100

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2.7.1.3.3 Correlation of Cg/Corner Drop Analysis and Test

The dimensional analysis results are used to correlate Cg/corner test and analysis results. In the analysis, a single radial displacement is assumed for each overpack structure. In the side-drop test, the overpack experienced small rotation, producing differences in radial displacement along the overpack. Consequently, the net average test radial displacement in each overpack is compared to the single analysis displacement. For the Model AOS-165 transport package, the net average test radial displacements at the two (2) overpacks are provided in Table 2-61, from the Dimensional Inspection report, presented in Chapter 8, Appendix 8.3.3, "Dimensional Inspection Report – Model AOS-165A."

The average of displacements is determined at three (3) locations along the overpack:

- **Point 1** – At the overpack base
- **Point 2** – Approximately halfway between the overpack base and crown
- **Point 3** – At the crown

The net displacement – the sum of all displacements, at the inside and outside of the overpack – is used at each point.

The average radial displacement at Overpack 1 is 7.14756 cm (2.814 in.). The average radial displacement at Overpack 2 is 9.53516 cm (3.754 in.). From Figure 2-37, the corresponding analytical radial displacements are 8.89 cm (3.50 in.) and 10.8204 cm (4.26 in.). The analysis and test results differ by a maximum of 19.6%. The test and analysis ratio of displacements at the two overpacks are 3.302 cm (1.30 in.) for the test and 3.0734 cm (1.21 in.) for the analysis.

Table 2-61. Cg/Corner Drop Analysis and Test, Radial Displacement at Overpacks 1 and 2 – Model AOS-165

Overpack 1 (in.)				Overpack 2 (in.)			
Area	**Base**	**Mid**	**Crown**	**Area**	**Base**	**Mid**	**Crown**
Outside	3.093	2.090	2.494	Outside	4.080	2.406	2.494
Inside	0.490	0.490	0.274	Inside	0.000	1.581	0.702
Total	3.583	2.580	2.768	Total	4.080	3.987	3.196

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2.7.1.4 Summary of Results

The preceding analytical evaluations, together with the results of the full-scale drop test presented in Chapter 8, Appendix 8.3.2, "Impact (Free-Drop) Test Report," and Appendix 8.3.3, "Dimensional Inspection Report – Model AOS-165A," demonstrate that the AOS Transport Packaging System models can survive the effects of the 9-m (30-ft.) free drop, without breaching containment nor suffering significant deformation on their cask components. In the Free-Drop test (Chapter 8, Appendix 8.3.2), the prototype cask was dropped three (3) times, in different orientations, without any significant deformation nor failure of the containment system.

2.7.2 Crush

The regulatory requirement for Crush is applicable **only** to the Model AOS-025A transport package, because all other models have an individual weight greater than 500 kg (1,100 lbs.).

The compression load of 5 times (5x) the cask weight, Load Case 215, is analyzed using the 2D model. The compression force is applied to the top of the cask, as a pressure loading using the LE -4[a] load function.

2.7.3 Puncture

The AOS Transport Packaging System's cask component is evaluated for accidental drops in Load Case 311. The Model AOS-025A, AOS-050A, and AOS-100A transport packages are analyzed for 121.92 cm (4-ft.) drops, while the Model AOS-165A transport package is analyzed for a 30.48 cm (1-ft.) drop onto a 15.24-cm (6-in.) diameter steel bar. Figure 2-39 illustrates the cask FEA model for a puncture drop. The impacted bar is modeled as fixed points, and the cask is given an initial velocity corresponding to the free-drop height. Figure 2-39 also illustrates the stress state at the time of maximum displacement, at the monitored node used for stress evaluation.

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a. *Ibid.*

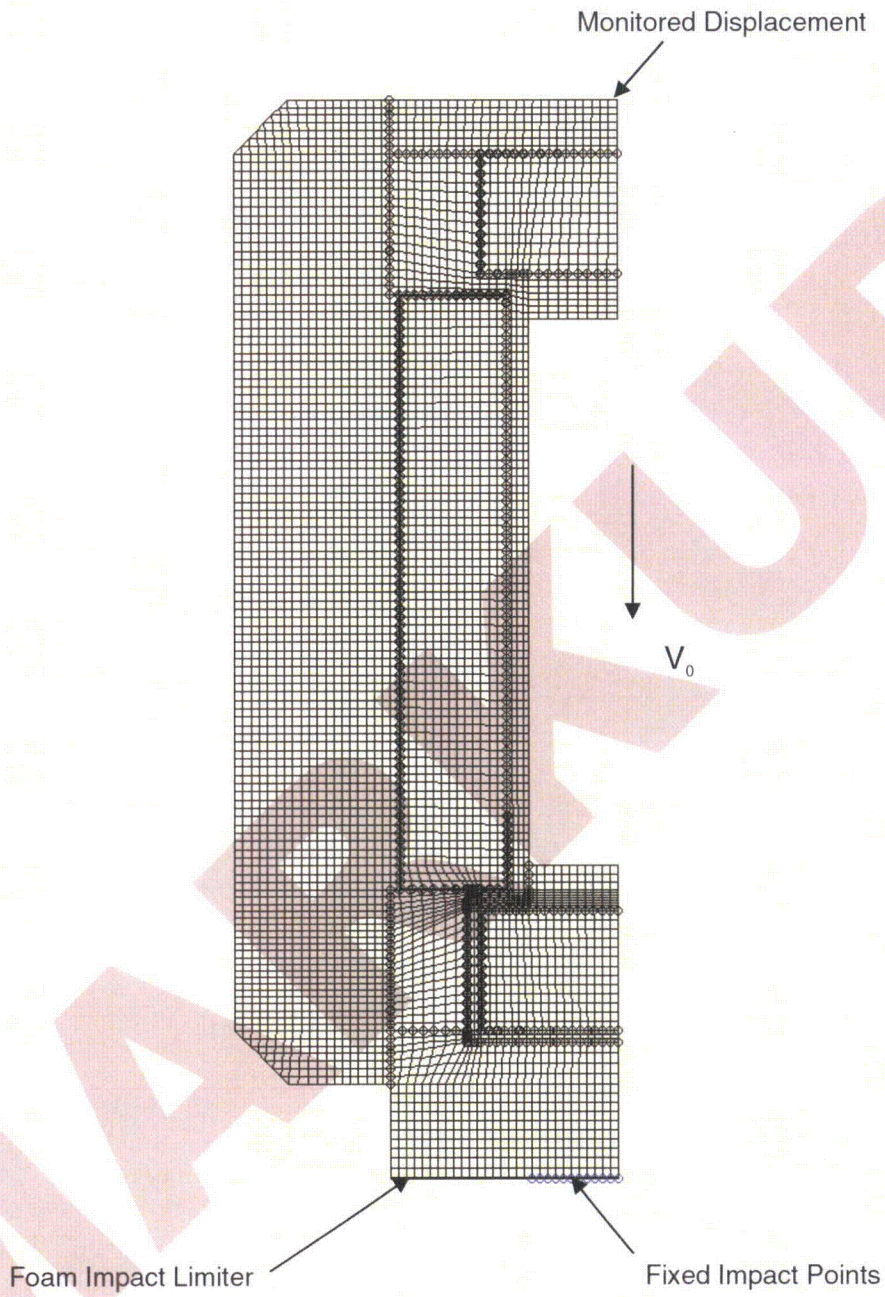

Figure 2-39. FEA Model of Puncture Drop

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2.7.4 Thermal

The Fire condition is analyzed in Chapter 3, Section 3.4, "Thermal Evaluation under Hypothetical Accident Conditions of Transport." In the following subsections, maximum values of temperature and pressure are provided for all AOS Transport Packaging System models. In addition, the Load Cases representing the Fire condition at different 0.5-hr. intervals throughout the fire event are identified. The resulting stresses are provided in Paragraph 2.7.4.2.

2.7.4.1 Summary of Temperatures and Pressures during Fire Conditions

Table 2-62 presents the maximum temperatures, throughout the transport package, resulting from Normal conditions of transport. The structural analyses are applied the temperature field generated by the thermal analysis, to determine the thermal stresses. Table 2-63 presents the pressure corresponding to the maximum temperature for each transport package model. This pressure value is based upon 100% relative humidity air occupying the entire cavity volume. These pressures do not exceed the design pressure, which is also listed in Table 2-63. Therefore, the transport package can withstand pressures and temperatures in excess of those encountered in Normal conditions of transport.

Pressure-related Load Cases 201 through 204 are analyzed by the 2D cask model. Pressure is applied to the model's inside cask cavity wall or outside cask surface. The LIBRA LE -4[a] loading function is used to apply pressure loads. This function generates nodal forces in 2D models due to surface tractions along edge nodal lines. The nodal lines are defined by terminal nodes.

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a. *The LIBRA program's LE feature defines several types of edge and surface loadings. The first entry is a negative integer that distinguishes the type of loading. The types of loadings and nodal specifications are listed below, with former record types in parentheses.*

Options Available when Applying the "LE" Command

Type -1 *– General loading on nodes specified by numbering sequence.*

Type -2 *– General loading on arc defined by control points (LE1).*

Type -3 *– Surface pressure on arc defined by control points (LEP).*

Type -4 *– Linearly varying pressure on line specified by end nodes.*

Type -5 *– Linearly varying harmonic pressure on 3D model generated from a 2D model.*

Further Details for Types -4 and -5

Type -4 *– This command generates nodal loads corresponding to linearly varying surface tractions along a line on a 2D model. The line is specified by the two (2) terminal nodes, and loads are applied to all nodes within a specified distance of the line. The linearly varying pressure is specified by the terminal values.*

Type -5 *– This command generates nodal loads corresponding to surface tractions over a 3D model generated from an axisymmetric (2D) model. The tractions may vary linearly along a radial line, and circumferentially as a Fourier harmonic. The loaded nodes are identified by specifying the two (2) terminal nodes on the zero meridian. The linearly varying pressure is specified by the corresponding terminal values on the zero meridian.*

Table 2-62. Temperature Summary of Fire Conditions of Transport – All Models

Package Component	Maximum Temperatures											
	AOS-025A		AOS-050A		AOS-100A AOS-100A-S		AOS-100B		AOS-165A		AOS-165B	
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
Cask Cavity	149	300	205	401	174	346	183	360	375	707	232	449
Shielding Materiall	149	299	218	425	204	400	202	396	348	658	227	441
Cask Seal Area	148	299	200	392	185	365	172	341	326	619	204	400
Cask Test Port	148	299	200	393	175	346	172	342	314	597	202	395
Cask Drain Port	147	297	201	393	175	346	172	342	315	598	200	393
Cask Vent Port	149	300	199	391	174	345	171	340	326	619	204	399
Cask Outside Surface	147	297	374	706	426	799	426	799	522	972	452	846
Impact Limiter Foam Material	214	417	289	553	618	1,145	618	1,145	652	1,206	631	1,167
Overpack Accessible Outside Surface[a]	797	1,467	799	1,471	799	1,471	799	1,471	798	1,469	798	1,469

a. Listed temperatures are on the overpack and cask surfaces, and not at the personnel barrier surface.

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Table 2-63. Maximum Cask Cavity Pressure Due to Fire Conditions – All Models

Model	Volume		Temperature[a]		Pressure			Design Pressure[b]	
	l	in^3	°C	°F	kPa	psia		kPa	psia
AOS-025	0.17	10	149	300	143	21	<	207	30
AOS-050	1.36	83	205	401	162	24	<	414	60
AOS-100A AOS-100A-S	11.21	684	174	346	155	23	<	1,931	280
AOS-100B	11.21	684	183	360	155	23	<	1,931	280
AOS-165A	49	2,978	375	707	220	32	<	1,517	220
AOS-165B	49	2,978	232	449	220	32	<	1,517	220

a. *Temperature listed is the maximum value obtained throughout Hypothetical Accident conditions of transport events.*

b. ***Model AOS-100 and AOS-165 transport packages*** *– Pressure value is based upon design conditions.*

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2.7.4.2 Comparison with Allowable Stresses

This section presents how the resulting stresses were compared with the allowable. Subsection 2.7.8 summarizes the damages suffered due to the Hypothetical Accident conditions of transport.

Similar data for the Model AOS-025 and AOS-050 transport packages is provided in Appendix 2.10.1.2 and Appendix 2.10.2.2, respectively. Similar data for the Model AOS-165A and AOS-165B transport packages is provided in Appendix 2.10.3.2 and Appendix 2.10.4.2, respectively.

Table 2-64. Load Cases Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-100

Load Case	Description	Data
111	Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat	Table 2-66
112	Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-67
113	Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-68
114	Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-69
115	Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-70
116	Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-71
301	30-ft. Head-On Drop	Table 2-72
302	30-ft. Side Drop + Slap-Down	Table 2-73
303	30-ft. Cg/Corner Drop	Table 2-74
304	30-ft. Head-On Drop at -40°F, Low Temperature	Table 2-75
305	30-ft. Side Drop + Slap-Down at -40°F, Low Temperature	Table 2-76
306	30-ft. Cg/Corner Drop at -40°F, Low Temperature	Table 2-77
311	4-ft. Drop onto Rod	Table 2-78

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Table 2-65. Load Combinations Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-100

Load Combination	Load Cases[a]	Description	Data
301	301, 102, 201, 211	Head-On Drop Orientation	Table 2-79
302	302, 102, 201, 211	Side Drop Orientation	Table 2-80
303	303, 102, 201, 211	Cg/Corner Drop Orientation	Table 2-81
304	304, 105, 202, 211	Head-On Drop Orientation at -40°F, Cold Environment	Table 2-82
305	305, 105, 202, 211	Side Drop Orientation at -40°F, Cold Environment	Table 2-83
306	306, 105, 202, 211	Cg/Corner Drop Orientation at -40°F, Cold Environment	Table 2-84
310	204, 101, 211	Additional Increased External Pressure (290 psi)	Table 2-85
311	311, 101, 201, 211	4-ft. Drop onto Rod	Table 2-86
312	311, 104, 201, 211	4-ft. Drop onto Rod at -40°F, Cold Environment	Table 2-87
350	111, 201, 211	Fire at 30 Minutes	Table 2-88
351	112, 201, 211	Fire at 60 Minutes	Table 2-89
352	113, 201, 211	Fire at 90 Minutes	Table 2-90
353	114, 201, 211	Fire at 120 Minutes	Table 2-91
354	115, 201, 211	Fire at 150 Minutes	Table 2-92
355	116, 201, 211	Fire at 180 Minutes	Table 2-93

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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2.7.5 Immersion – Fissile Material

Note: *Not applicable. Fuel is not an authorized content for the AOS Transport Packaging System.*

2.7.6 Immersion – All Transport Packages

This condition is less demanding to the transport packages than the Deep Water Immersion condition, and is therefore covered by the Deep Water condition. All AOS Transport Packaging System models are analyzed to the Deep Water condition.

2.7.7 Deep Water Immersion Test (for Type B Packages Containing More than 10^5 A_2)

A pressure load of 2 MPa (290 psia) is applied to the cask component of the AOS Transport Packaging System. This condition, represented by Load Case 204, is analyzed by the use of a 2D cask model. Pressure is applied to the model outside the cask surface. The LIBRA LE -4[a] loading function is used to apply pressure loads. This function generates nodal forces in 2D models due to surface tractions along edge nodal lines. Terminal nodes define the nodal lines.

Load Case 204 information is presented in Table 2-35, "Load Case 204, Additional Increased External Pressure, 2 MPa (290 psia), Normal Conditions of Transport – Model AOS-100."

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a. *Ibid.*

2.7.8 Summary of Damage (Stresses)

The evaluation presented in this section (Section 2.7, "Hypothetical Accident Conditions of Transport") demonstrates the ability of the AOS Transport Packaging System to meet the Hypothetical Accident conditions of transport specified in References **[2.1]** and **[2.2]**. All damages are confined to the impact limiter component, as designed. The integrity of the containment system is not affected by these events.

Vent, drain, and seal test ports also do not suffer any damage, as a consequence of the Hypothetical Accident conditions of transport. These cask component features are well-protected by the impact limiter's inside shell. The results of the Free-Drop test verify that the shell does not suffer damage that could negatively impact these features, protecting them from direct impact. Also, the analytical evaluation shows that these ports are located in areas of low-stress intensity, for all Normal and Hypothetical Accident conditions of transport.

A summary of stresses resulting from analyses for Hypothetical Accident conditions of transport are combined, following Reference **[2.4]** guidelines.

Table 2-66 through Table 2-78 present Model AOS-100 transport package test case output data, for the Load Cases listed in Table 2-64, "Load Cases Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-100." Comparisons with allowable stress limits are included for Load Cases 111, 112, 113, 114, 115, and 116.

Table 2-79 through Table 2-93 present Model AOS-100 transport package test case output data, for the Load Combinations listed in Table 2-65, "Load Combinations Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-100."

Similar data for the Model AOS-025 and AOS-050 transport packages is provided in Appendix 2.10.1.2 and Appendix 2.10.2.2, respectively. Similar data for the Model AOS-165A and AOS-165B transport packages is provided in Appendix 2.10.3.2 and Appendix 2.10.4.2, respectively.

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Table 2-66. Load Case 111, Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	8.7922E+03	-4.7666E+03	5.1546E+03	1.3559E+04	2.2287E+04
	6.0620E+01	-3.2864E+01	3.5540E+01	9.3484E+01	1.5366E+02
2	1.3856E+04	-4.4343E+03	4.8044E+03	1.8290E+04	3.7485E+04
	9.5535E+01	-3.0574E+01	3.3125E+01	1.2611E+02	2.5845E+02
3	8.9126E+03	-4.8383E+03	5.3020E+03	1.3751E+04	2.2738E+04
	6.1450E+01	-3.3359E+01	3.6556E+01	9.4809E+01	1.5677E+02
4	1.3246E+04	-6.6965E+03	2.1936E+03	1.9942E+04	3.8649E+04
	9.1326E+01	-4.6170E+01	1.5124E+01	1.3750E+02	2.6647E+02
5	1.4191E+04	-6.2108E+03	7.8990E+02	2.0401E+04	3.1585E+04
	9.7840E+01	-4.2822E+01	5.4461E+00	1.4066E+02	2.1777E+02
6	7.5627E+03	-9.3243E+02	2.9128E+03	8.4951E+03	1.2975E+04
	5.2143E+01	-6.4289E+00	2.0083E+01	5.8572E+01	8.9457E+01
7	2.6235E+03	-6.8059E+01	-6.8478E+02	2.6916E+03	1.1737E+01
	1.8088E+01	-4.6925E-01	-4.7214E+00	1.8558E+01	8.0921E-02
8	2.6205E+03	-7.3882E+01	-6.7403E+02	2.6943E+03	6.0805E+01
	1.8067E+01	-5.0940E-01	-4.6473E+00	1.8577E+01	4.1924E-01
9	2.6197E+03	-6.9207E+01	-6.0557E+02	2.6889E+03	7.7889E+01
	1.8062E+01	-4.7717E-01	-4.1752E+00	1.8539E+01	5.3703E-01
10	2.6148E+03	-8.5016E+00	4.4517E+02	2.6233E+03	4.7906E+02
	1.8028E+01	-5.8616E-02	3.0693E+00	1.8087E+01	3.3030E+00
11	1.1886E+03	-3.0145E+02	6.0606E+02	1.4901E+03	1.3227E+03
	8.1952E+00	-2.0784E+00	4.1786E+00	1.0274E+01	9.1196E+00
12	1.0841E+03	-3.3767E+01	1.0301E+03	1.1179E+03	1.3653E+03
	7.4746E+00	-2.3281E-01	7.1020E+00	7.7074E+00	9.4132E+00
13	4.5748E+03	-7.9214E+02	1.2188E+03	5.3670E+03	4.5466E+03
	3.1542E+01	-5.4616E+00	8.4036E+00	3.7004E+01	3.1348E+01
14	4.1783E+03	-7.5031E+02	1.6024E+03	4.9286E+03	5.1401E+03
	2.8808E+01	-5.1732E+00	1.1048E+01	3.3982E+01	3.5439E+01
15	1.2484E+01	-4.3783E+01	-5.4109E-02	5.6267E+01	9.6753E+01
	8.6074E-02	-3.0187E-01	-3.7307E-04	3.8795E-01	6.6708E-01

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16	1.0667E+01	-6.0561E+00	-2.7767E+01	1.6723E+01	1.9421E+00
	7.3548E-02	-4.1755E-02	-1.9145E-01	1.1530E-01	1.3391E-02
17	8.8245E+00	-1.4369E+01	-6.1935E+01	2.3193E+01	1.4048E+01
	6.0843E-02	-9.9067E-02	-4.2703E-01	1.5991E-01	9.6861E-02
18	1.0997E+02	-1.1822E+02	5.2609E+02	2.2819E+02	2.6799E+02
	7.5824E-01	-8.1510E-01	3.6273E+00	1.5733E+00	1.8478E+00
19	5.4132E+00	-1.9215E+02	4.8626E+02	1.9756E+02	3.2893E+01
	3.7323E-02	-1.3248E+00	3.3527E+00	1.3621E+00	2.2679E-01
20	1.0084E+01	-3.7311E+02	-1.2662E+02	3.8320E+02	1.3401E+02
	6.9527E-02	-2.5725E+00	-8.7299E-01	2.6420E+00	9.2396E-01
21	1.2554E+02	-1.3003E+03	-1.1916E+03	1.4258E+03	2.1764E+03
	8.6557E-01	-8.9650E+00	-8.2155E+00	9.8306E+00	1.5006E+01
22	1.3737E+02	-5.6553E+02	-4.2329E+02	7.0291E+02	1.2150E+03
	9.4716E-01	-3.8992E+00	-2.9185E+00	4.8464E+00	8.3771E+00

Allowable Stress for Load Case 111

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	314.03	280.18	20.00	23.60	66.30
2	781.46	518.16	17.40	19.40	59.20
3	314.73	279.78	20.00	23.60	66.30
4	236.10	233.77	20.00	25.00	66.30
5	238.96	237.81	20.00	25.00	66.30
6	240.45	239.19	20.00	25.00	66.30
7	262.42	261.54	20.00	23.60	66.30
8	268.15	267.34	20.00	23.60	66.30
9	262.35	261.47	20.00	23.60	66.30
10	245.23	242.50	20.00	25.00	66.30
11	239.40	233.29	20.00	25.00	66.30
12	233.86	230.76	20.00	25.00	66.30
13	233.66	230.89	20.00	25.00	66.30
14	231.87	229.39	20.00	25.00	66.30
15	219.89	219.65	20.00	25.00	66.30
16	220.10	219.77	20.00	25.00	66.30
17	220.40	220.09	20.00	25.00	66.30
18	224.72	223.97	20.00	25.00	66.30
19	226.34	225.64	20.00	25.00	66.30
20	230.26	229.12	20.00	25.00	66.30
21	217.67	217.05	20.00	25.00	66.30
22	216.72	216.45	20.00	25.00	66.30

Table 2-67. Load Case 112, Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	8.1040E+02	-6.4607E+02	2.0629E+03	1.4565E+03	3.2000E+02
	5.5875E+00	-4.4545E+00	1.4223E+01	1.0042E+01	2.2063E+00
2	2.0908E+03	-2.5882E+03	-2.3132E+03	4.6790E+03	7.6436E+03
	1.4415E+01	-1.7845E+01	-1.5949E+01	3.2261E+01	5.2701E+01
3	8.0804E+02	-5.8843E+02	2.1518E+03	1.3965E+03	1.1588E+02
	5.5713E+00	-4.0571E+00	1.4836E+01	9.6283E+00	7.9895E-01
4	8.5988E+01	-2.9970E+03	-1.3250E+03	3.0830E+03	5.2907E+03
	5.9287E-01	-2.0664E+01	-9.1357E+00	2.1257E+01	3.6478E+01
5	5.1682E+02	-3.6835E+03	-3.8581E+03	4.2003E+03	6.7543E+03
	3.5634E+00	-2.5397E+01	-2.6601E+01	2.8960E+01	4.6570E+01
6	1.6024E+02	-1.7797E+03	-3.4614E+03	1.9400E+03	1.6808E+03
	1.1048E+00	-1.2271E+01	-2.3866E+01	1.3376E+01	1.1589E+01
7	-1.8147E+02	-5.2276E+02	-1.9514E+03	3.4129E+02	3.8293E+02
	-1.2512E+00	-3.6043E+00	-1.3455E+01	2.3531E+00	2.6402E+00
8	-1.6952E+02	-5.5794E+02	-2.1831E+03	3.8842E+02	5.0032E+02
	-1.1688E+00	-3.8469E+00	-1.5052E+01	2.6781E+00	3.4496E+00
9	-1.4931E+02	-5.5967E+02	-1.8890E+03	4.1036E+02	5.0464E+02
	-1.0294E+00	-3.8588E+00	-1.3024E+01	2.8294E+00	3.4794E+00
10	1.1592E+03	-9.7804E+02	-2.8502E+03	2.1372E+03	2.1473E+03
	7.9923E+00	-6.7434E+00	-1.9651E+01	1.4736E+01	1.4805E+01
11	1.1796E+03	-1.4739E+02	-8.9769E+02	1.3270E+03	1.5829E+03
	8.1331E+00	-1.0162E+00	-6.1893E+00	9.1493E+00	1.0914E+01
12	1.2178E+03	-1.1913E+02	1.0793E+03	1.3369E+03	1.8166E+03
	8.3962E+00	-8.2138E-01	7.4412E+00	9.2175E+00	1.2525E+01
13	1.5386E+02	-1.6419E+03	-1.3848E+03	1.7957E+03	3.5379E+03
	1.0608E+00	-1.1320E+01	-9.5479E+00	1.2381E+01	2.4393E+01
14	2.5843E+02	-1.1883E+03	-2.8898E+02	1.4467E+03	1.6662E+03
	1.7818E+00	-8.1931E+00	-1.9925E+00	9.9749E+00	1.1488E+01
15	3.5584E+02	-1.9961E+02	1.5991E+02	5.5544E+02	8.8261E+02
	2.4534E+00	-1.3762E+00	1.1025E+00	3.8297E+00	6.0854E+00

WITHDRAWN

16	8.1514E+01	-5.4834E+01	-3.1592E+02	1.3635E+02	2.1541E+02
	5.6202E-01	-3.7806E-01	-2.1782E+00	9.4009E-01	1.4852E+00
17	3.7854E+01	-7.7608E+01	-3.4572E+02	1.1546E+02	1.8842E+02
	2.6099E-01	-5.3509E-01	-2.3836E+00	7.9608E-01	1.2991E+00
18	2.5713E+02	-2.8677E+02	9.0731E+02	5.4390E+02	4.7729E+02
	1.7729E+00	-1.9772E+00	6.2557E+00	3.7500E+00	3.2908E+00
19	1.9110E+01	-4.1027E+02	3.8625E+02	4.2938E+02	2.8649E+02
	1.3176E-01	-2.8287E+00	2.6631E+00	2.9605E+00	1.9752E+00
20	5.3796E+01	-3.5427E+02	-1.0384E+03	4.0806E+02	2.7069E+02
	3.7091E-01	-2.4426E+00	-7.1592E+00	2.8135E+00	1.8664E+00
21	2.3562E+02	-9.2735E+00	2.3643E+02	2.4490E+02	1.0417E+02
	1.6246E+00	-6.3938E-02	1.6301E+00	1.6885E+00	7.1824E-01
22	9.4717E+02	-4.3754E+01	9.3245E+02	9.9093E+02	1.1324E+03
	6.5305E+00	-3.0167E-01	6.4290E+00	6.8322E+00	7.8079E+00

Allowable Stress for Load Case 112

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	318.43	314.13	20.00	22.40	61.80
2	453.81	436.36	18.70	20.70	59.70
3	318.98	313.68	20.00	22.40	61.80
4	293.37	288.05	20.00	23.60	66.30
5	301.89	298.41	20.00	23.60	66.30
6	307.11	302.96	20.00	22.40	61.80
7	360.54	359.14	20.00	22.40	61.80
8	371.29	370.52	20.00	22.40	61.80
9	359.41	357.95	20.00	22.40	61.80
10	317.16	310.15	20.00	22.40	61.80
11	301.01	285.52	20.00	23.60	66.30
12	276.64	272.58	20.00	23.60	66.30
13	287.63	280.43	20.00	23.60	66.30
14	282.39	276.11	20.00	23.60	66.30
15	232.09	231.21	20.00	25.00	66.30
16	234.78	233.74	20.00	25.00	66.30
17	235.71	235.02	20.00	25.00	66.30
18	253.54	250.16	20.00	23.60	66.30
19	258.22	255.93	20.00	23.60	66.30
20	264.49	262.23	20.00	23.60	66.30
21	232.63	228.68	20.00	25.00	66.30
22	221.89	221.07	20.00	25.00	66.30

Table 2-68. Load Case 113, Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	8.9854E+02	-1.2401E+03	9.7358E+02	2.1387E+03	2.2934E+03
	6.1952E+00	-8.5503E+00	6.7126E+00	1.4746E+01	1.5812E+01
2	1.6468E+03	-2.5991E+03	-1.5218E+03	4.2459E+03	8.2337E+03
	1.1354E+01	-1.7920E+01	-1.0492E+01	2.9274E+01	5.6769E+01
3	8.7198E+02	-1.1583E+03	1.0545E+03	2.0303E+03	2.1014E+03
	6.0121E+00	-7.9864E+00	7.2706E+00	1.3998E+01	1.4489E+01
4	1.9713E+03	-6.4046E+03	-1.4614E+03	8.3759E+03	1.6369E+04
	1.3591E+01	-4.4158E+01	-1.0076E+01	5.7750E+01	1.1286E+02
5	2.1685E+03	-7.2580E+03	-3.6516E+03	9.4265E+03	1.5031E+04
	1.4951E+01	-5.0042E+01	-2.5177E+01	6.4993E+01	1.0364E+02
6	3.1491E+02	-3.7707E+03	-4.2609E+03	4.0856E+03	5.3014E+03
	2.1712E+00	-2.5998E+01	-2.9378E+01	2.8169E+01	3.6552E+01
7	-2.7424E+02	-1.2170E+03	-2.1643E+03	9.4276E+02	5.7893E+02
	-1.8908E+00	-8.3909E+00	-1.4923E+01	6.5001E+00	3.9916E+00
8	-2.8706E+02	-1.2176E+03	-2.3597E+03	9.3053E+02	6.0966E+02
	-1.9792E+00	-8.3950E+00	-1.6270E+01	6.4158E+00	4.2035E+00
9	-2.7212E+02	-1.2198E+03	-2.1513E+03	9.4764E+02	6.3024E+02
	-1.8762E+00	-8.4099E+00	-1.4833E+01	6.5338E+00	4.3453E+00
10	4.0937E+02	-1.3862E+03	-2.7219E+03	1.7956E+03	1.0677E+03
	2.8225E+00	-9.5575E+00	-1.8767E+01	1.2380E+01	7.3615E+00
11	6.0890E+02	-7.8020E+02	-1.2997E+03	1.3891E+03	8.4201E+02
	4.1982E+00	-5.3793E+00	-8.9608E+00	9.5775E+00	5.8054E+00
12	2.3116E+02	-3.2179E+02	-1.0919E+02	5.5295E+02	9.8461E+02
	1.5938E+00	-2.2187E+00	-7.5282E-01	3.8125E+00	6.7886E+00
13	-3.6482E+01	-2.9457E+03	-1.4534E+03	2.9092E+03	3.9518E+03
	-2.5153E-01	-2.0310E+01	-1.0021E+01	2.0058E+01	2.7247E+01
14	6.8865E+01	-2.4611E+03	-4.1875E+02	2.5300E+03	6.0758E+02
	4.7481E-01	-1.6969E+01	-2.8872E+00	1.7443E+01	4.1891E+00
15	7.7688E+02	-6.1013E+02	2.4417E+02	1.3870E+03	2.2709E+03
	5.3564E+00	-4.2067E+00	1.6835E+00	9.5631E+00	1.5657E+01

WITHDRAWN

16	2.0722E+02	-2.4334E+02	-5.0755E+02	4.5055E+02	7.3258E+02
	1.4287E+00	-1.6778E+00	-3.4994E+00	3.1065E+00	5.0509E+00
17	9.8138E+01	-2.3794E+02	-4.6479E+02	3.3608E+02	5.7933E+02
	6.7664E-01	-1.6405E+00	-3.2046E+00	2.3172E+00	3.9943E+00
18	2.1591E+02	-3.2972E+02	1.1032E+03	5.4563E+02	2.9415E+02
	1.4886E+00	-2.2734E+00	7.6061E+00	3.7620E+00	2.0281E+00
19	2.4350E+01	-5.5784E+02	6.5213E+02	5.8219E+02	6.5258E+02
	1.6789E-01	-3.8462E+00	4.4963E+00	4.0141E+00	4.4994E+00
20	-2.4610E+01	-5.7541E+02	-8.9650E+02	5.5080E+02	1.7972E+02
	-1.6968E-01	-3.9673E+00	-6.1811E+00	3.7976E+00	1.2391E+00
21	4.0448E+02	-2.2732E+01	3.9355E+02	4.2721E+02	3.7752E+02
	2.7888E+00	-1.5673E-01	2.7134E+00	2.9455E+00	2.6029E+00
22	1.6780E+03	-9.2196E+01	1.6711E+03	1.7702E+03	1.8434E+03
	1.1569E+01	-6.3567E-01	1.1522E+01	1.2205E+01	1.2710E+01

Allowable Stress for Load Case 113

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	327.09	318.72	20.00	22.40	61.80
2	392.76	389.55	20.00	22.40	61.80
3	326.01	318.24	20.00	22.40	61.80
4	315.49	311.26	20.00	22.40	61.80
5	324.32	321.04	20.00	22.40	61.80
6	329.33	325.86	20.00	22.40	61.80
7	373.08	371.35	20.00	22.40	61.80
8	380.27	378.96	20.00	22.40	61.80
9	371.85	370.08	20.00	22.40	61.80
10	338.58	334.03	20.00	22.40	61.80
11	327.77	315.50	20.00	22.40	61.80
12	311.91	307.68	20.00	22.40	61.80
13	315.08	308.70	20.00	22.40	61.80
14	309.12	303.91	20.00	22.40	61.80
15	257.04	255.78	20.00	23.60	66.30
16	261.20	259.85	20.00	23.60	66.30
17	262.40	261.56	20.00	23.60	66.30
18	280.17	276.97	20.00	23.60	66.30
19	284.63	282.43	20.00	23.60	66.30
20	292.50	289.99	20.00	23.60	66.30
21	261.18	256.17	20.00	23.60	66.30
22	241.20	239.86	20.00	25.00	66.30

Table 2-69. Load Case 114, Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.1896E+02	-1.0830E+03	5.4078E+02	1.8019E+03	2.1483E+03
	4.9571E+00	-7.4667E+00	3.7285E+00	1.2424E+01	1.4812E+01
2	1.2096E+03	-2.0313E+03	-1.0193E+03	3.2409E+03	6.4496E+03
	8.3398E+00	-1.4005E+01	-7.0278E+00	2.2345E+01	4.4468E+01
3	6.9309E+02	-1.0156E+03	6.0565E+02	1.7086E+03	1.9882E+03
	4.7787E+00	-7.0020E+00	4.1758E+00	1.1781E+01	1.3708E+01
4	2.0511E+03	-5.8595E+03	-1.1977E+03	7.9106E+03	1.5471E+04
	1.4142E+01	-4.0400E+01	-8.2580E+00	5.4541E+01	1.0667E+02
5	2.0886E+03	-6.4717E+03	-2.8883E+03	8.5602E+03	1.3565E+04
	1.4400E+01	-4.4620E+01	-1.9914E+01	5.9021E+01	9.3531E+01
6	2.8109E+02	-3.4365E+03	-3.7450E+03	3.7176E+03	5.0046E+03
	1.9380E+00	-2.3694E+01	-2.5821E+01	2.5632E+01	3.4505E+01
7	-2.6291E+02	-1.1281E+03	-2.0699E+03	8.6523E+02	5.5914E+02
	-1.8127E+00	-7.7782E+00	-1.4271E+01	5.9656E+00	3.8551E+00
8	-2.7117E+02	-1.1275E+03	-2.2106E+03	8.5634E+02	5.5831E+02
	-1.8697E+00	-7.7739E+00	-1.5242E+01	5.9042E+00	3.8494E+00
9	-2.6185E+02	-1.1287E+03	-2.0854E+03	8.6682E+02	5.7358E+02
	-1.8054E+00	-7.7819E+00	-1.4378E+01	5.9765E+00	3.9547E+00
10	-4.3192E+01	-1.1631E+03	-2.1225E+03	1.1199E+03	2.2713E+02
	-2.9780E-01	-8.0192E+00	-1.4634E+01	7.7214E+00	1.5660E+00
11	1.9614E+02	-9.1523E+02	-1.1902E+03	1.1114E+03	2.5774E+02
	1.3523E+00	-6.3103E+00	-8.2061E+00	7.6626E+00	1.7771E+00
12	5.3137E+00	-6.4703E+02	-6.5413E+02	6.5234E+02	3.2150E+02
	3.6637E-02	-4.4611E+00	-4.5101E+00	4.4977E+00	2.2167E+00
13	-9.3030E+01	-2.6584E+03	-1.0715E+03	2.5654E+03	2.9309E+03
	-6.4142E-01	-1.8329E+01	-7.3877E+00	1.7688E+01	2.0208E+01
14	-5.2389E-02	-2.3132E+03	-3.0409E+02	2.3131E+03	1.2365E+03
	-3.6121E-04	-1.5949E+01	-2.0966E+00	1.5948E+01	8.5254E+00
15	7.3677E+02	-5.9661E+02	2.1532E+02	1.3334E+03	2.1899E+03
	5.0798E+00	-4.1135E+00	1.4846E+00	9.1933E+00	1.5099E+01

WITHDRAWN

16	1.9934E+02	-2.4459E+02	-4.4538E+02	4.4394E+02	7.2388E+02
	1.3744E+00	-1.6864E+00	-3.0708E+00	3.0608E+00	4.9910E+00
17	9.6963E+01	-2.3478E+02	-3.9682E+02	3.3175E+02	5.7463E+02
	6.6854E-01	-1.6188E+00	-2.7360E+00	2.2873E+00	3.9620E+00
18	1.5910E+02	-2.7396E+02	9.9940E+02	4.3307E+02	1.9294E+02
	1.0970E+00	-1.8889E+00	6.8906E+00	2.9859E+00	1.3303E+00
19	1.2850E+01	-4.9526E+02	7.2288E+02	5.0811E+02	6.1530E+02
	8.8599E-02	-3.4147E+00	4.9841E+00	3.5033E+00	4.2423E+00
20	-4.4133E+01	-6.1976E+02	-5.7294E+02	5.7562E+02	3.0273E+02
	-3.0429E-01	-4.2731E+00	-3.9503E+00	3.9688E+00	2.0872E+00
21	2.5661E+02	-4.1061E+01	2.2449E+02	2.9767E+02	3.9351E+02
	1.7692E+00	-2.8311E-01	1.5478E+00	2.0524E+00	2.7131E+00
22	1.4541E+03	-8.5193E+01	1.4519E+03	1.5393E+03	1.5485E+03
	1.0026E+01	-5.8739E-01	1.0010E+01	1.0613E+01	1.0677E+01

Allowable Stress for Load Case 114

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	327.77	319.76	20.00	22.40	61.80
2	365.36	363.77	20.00	22.40	61.80
3	327.38	319.62	20.00	22.40	61.80
4	321.90	318.97	20.00	22.40	61.80
5	329.16	326.67	20.00	22.40	61.80
6	332.94	330.59	20.00	22.40	61.80
7	363.99	362.33	20.00	22.40	61.80
8	368.68	367.30	20.00	22.40	61.80
9	363.25	361.58	20.00	22.40	61.80
10	340.37	337.90	20.00	22.40	61.80
11	334.35	325.97	20.00	22.40	61.80
12	326.33	322.46	20.00	22.40	61.80
13	324.44	319.81	20.00	22.40	61.80
14	319.52	315.92	20.00	22.40	61.80
15	279.49	278.36	20.00	23.60	66.30
16	283.14	281.95	20.00	23.60	66.30
17	284.21	283.44	20.00	23.60	66.30
18	297.42	295.17	20.00	23.60	66.30
19	300.80	299.17	20.00	23.60	66.30
20	308.09	305.94	20.00	22.40	61.80
21	284.99	281.08	20.00	23.60	66.30
22	264.73	263.44	20.00	23.60	66.30

Table 2-70. Load Case 115, Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.4212E+02	-8.5760E+02	3.2638E+02	1.3997E+03	1.7489E+03
	3.7378E+00	-5.9129E+00	2.2503E+00	9.6507E+00	1.2058E+01
2	8.8324E+02	-1.5435E+03	-7.2667E+02	2.4267E+03	4.8806E+03
	6.0897E+00	-1.0642E+01	-5.0102E+00	1.6732E+01	3.3651E+01
3	5.1920E+02	-8.0400E+02	3.7408E+02	1.3232E+03	1.6207E+03
	3.5798E+00	-5.5434E+00	2.5792E+00	9.1231E+00	1.1174E+01
4	1.7878E+03	-4.8906E+03	-1.0036E+03	6.6784E+03	1.3073E+04
	1.2326E+01	-3.3720E+01	-6.9195E+00	4.6046E+01	9.0136E+01
5	1.7559E+03	-5.3072E+03	-2.3404E+03	7.0631E+03	1.1153E+04
	1.2107E+01	-3.6592E+01	-1.6136E+01	4.8699E+01	7.6898E+01
6	2.2174E+02	-2.8667E+03	-3.2476E+03	3.0885E+03	4.2190E+03
	1.5288E+00	-1.9765E+01	-2.2392E+01	2.1294E+01	2.9089E+01
7	-2.4779E+02	-9.4709E+02	-1.9556E+03	6.9931E+02	5.1723E+02
	-1.7084E+00	-6.5300E+00	-1.3483E+01	4.8216E+00	3.5662E+00
8	-2.5332E+02	-9.4610E+02	-2.0565E+03	6.9277E+02	5.0616E+02
	-1.7466E+00	-6.5231E+00	-1.4179E+01	4.7765E+00	3.4899E+00
9	-2.4751E+02	-9.4674E+02	-1.9866E+03	6.9923E+02	5.1553E+02
	-1.7065E+00	-6.5275E+00	-1.3697E+01	4.8210E+00	3.5544E+00
10	-2.6531E+02	-9.5208E+02	-1.6604E+03	6.8677E+02	2.7420E+02
	-1.8292E+00	-6.5643E+00	-1.1448E+01	4.7351E+00	1.8906E+00
11	-5.5679E-01	-9.6334E+02	-1.0365E+03	9.6278E+02	1.1673E+02
	-3.8389E-03	-6.6420E+00	-7.1461E+00	6.6381E+00	8.0484E-01
12	2.1199E+00	-8.9223E+02	-8.9766E+02	8.9435E+02	1.0265E+02
	1.4616E-02	-6.1517E+00	-6.1891E+00	6.1663E+00	7.0773E-01
13	-9.0359E+01	-2.2385E+03	-7.5522E+02	2.1481E+03	2.0776E+03
	-6.2300E-01	-1.5434E+01	-5.2070E+00	1.4811E+01	1.4324E+01
14	-3.4084E+01	-1.9817E+03	-2.0439E+02	1.9476E+03	1.3838E+03
	-2.3500E-01	-1.3663E+01	-1.4092E+00	1.3428E+01	9.5409E+00
15	6.7930E+02	-6.1070E+02	1.4155E+02	1.2900E+03	2.1403E+03
	4.6836E+00	-4.2106E+00	9.7594E-01	8.8943E+00	1.4757E+01

WITHDRAWN

16	1.8725E+02	-2.6045E+02	-3.4534E+02	4.4770E+02	7.3623E+02
	1.2911E+00	-1.7957E+00	-2.3811E+00	3.0868E+00	5.0761E+00
17	9.0420E+01	-2.2971E+02	-2.8711E+02	3.2013E+02	5.5769E+02
	6.2342E-01	-1.5838E+00	-1.9796E+00	2.2072E+00	3.8451E+00
18	1.0999E+02	-2.2315E+02	8.6841E+02	3.3314E+02	1.0232E+02
	7.5835E-01	-1.5386E+00	5.9875E+00	2.2969E+00	7.0545E-01
19	5.5377E+00	-4.2848E+02	7.2170E+02	4.3402E+02	5.6444E+02
	3.8181E-02	-2.9543E+00	4.9760E+00	2.9924E+00	3.8917E+00
20	-5.4797E+01	-6.1305E+02	-3.2564E+02	5.5825E+02	3.9331E+02
	-3.7781E-01	-4.2268E+00	-2.2452E+00	3.8490E+00	2.7118E+00
21	1.3068E+02	-5.9107E+01	7.7584E+01	1.8979E+02	3.2852E+02
	9.0104E-01	-4.0753E-01	5.3492E-01	1.3086E+00	2.2651E+00
22	1.0125E+03	-8.0792E+01	1.0135E+03	1.0933E+03	1.0544E+03
	6.9807E+00	-5.5704E-01	6.9878E+00	7.5378E+00	7.2700E+00

Allowable Stress for Load Case 115

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	326.12	319.34	20.00	22.40	61.80
2	349.68	347.37	20.00	22.40	61.80
3	326.42	319.72	20.00	22.40	61.80
4	323.73	321.76	20.00	22.40	61.80
5	329.69	327.85	20.00	22.40	61.80
6	332.46	330.97	20.00	22.40	61.80
7	354.14	352.58	20.00	22.40	61.80
8	357.28	355.90	20.00	22.40	61.80
9	353.85	352.29	20.00	22.40	61.80
10	338.92	337.03	20.00	22.40	61.80
11	335.25	329.57	20.00	22.40	61.80
12	332.20	328.69	20.00	22.40	61.80
13	327.56	324.29	20.00	22.40	61.80
14	323.67	321.26	20.00	22.40	61.80
15	295.48	294.60	20.00	23.60	66.30
16	298.15	297.21	20.00	23.60	66.30
17	299.00	298.36	20.00	23.60	66.30
18	308.07	306.62	20.00	22.40	61.80
19	310.56	309.40	20.00	22.40	61.80
20	317.00	315.23	20.00	22.40	61.80
21	300.55	297.84	20.00	23.60	66.30
22	283.77	282.71	20.00	23.60	66.30

Table 2-71. Load Case 116, Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.1188E+02	-6.8125E+02	2.0368E+02	1.0931E+03	1.4147E+03
	2.8398E+00	-4.6970E+00	1.4043E+00	7.5368E+00	9.7539E+00
2	6.5810E+02	-1.1963E+03	-5.4452E+02	1.8544E+03	3.7620E+03
	4.5375E+00	-8.2483E+00	-3.7543E+00	1.2786E+01	2.5938E+01
3	3.9045E+02	-6.3950E+02	2.3817E+02	1.0299E+03	1.3174E+03
	2.6921E+00	-4.4092E+00	1.6422E+00	7.1012E+00	9.0828E+00
4	1.5383E+03	-4.1201E+03	-8.7942E+02	5.6584E+03	1.1088E+04
	1.0606E+01	-2.8407E+01	-6.0634E+00	3.9013E+01	7.6452E+01
5	1.4722E+03	-4.4032E+03	-1.9807E+03	5.8754E+03	9.2511E+03
	1.0151E+01	-3.0359E+01	-1.3657E+01	4.0510E+01	6.3784E+01
6	1.7509E+02	-2.4149E+03	-2.8925E+03	2.5900E+03	3.5676E+03
	1.2072E+00	-1.6650E+01	-1.9943E+01	1.7858E+01	2.4597E+01
7	-2.3524E+02	-8.0010E+02	-1.8626E+03	5.6486E+02	4.8351E+02
	-1.6219E+00	-5.5165E+00	-1.2842E+01	3.8946E+00	3.3337E+00
8	-2.3925E+02	-7.9880E+02	-1.9366E+03	5.5954E+02	4.6877E+02
	-1.6496E+00	-5.5075E+00	-1.3352E+01	3.8579E+00	3.2321E+00
9	-2.3564E+02	-7.9917E+02	-1.9024E+03	5.6353E+02	4.7410E+02
	-1.6247E+00	-5.5101E+00	-1.3117E+01	3.8854E+00	3.2688E+00
10	-3.4633E+02	-8.4139E+02	-1.3462E+03	4.9506E+02	5.8779E+02
	-2.3878E+00	-5.8012E+00	-9.2819E+00	3.4133E+00	4.0527E+00
11	-9.1853E+01	-1.0052E+03	-9.2469E+02	9.1331E+02	3.4420E+02
	-6.3330E-01	-6.9303E+00	-6.3755E+00	6.2970E+00	2.3732E+00
12	1.7400E+00	-1.0269E+03	-1.0294E+03	1.0286E+03	3.6096E+02
	1.1997E-02	-7.0799E+00	-7.0972E+00	7.0919E+00	2.4888E+00
13	-7.7293E+01	-1.9312E+03	-5.5137E+02	1.8540E+03	1.5031E+03
	-5.3291E-01	-1.3315E+01	-3.8016E+00	1.2783E+01	1.0364E+01
14	-5.5344E+01	-1.7234E+03	-1.4902E+02	1.6680E+03	1.3932E+03
	-3.8158E-01	-1.1882E+01	-1.0275E+00	1.1501E+01	9.6058E+00
15	6.0883E+02	-5.9997E+02	7.7338E+01	1.2088E+03	2.0198E+03
	4.1977E+00	-4.1366E+00	5.3322E-01	8.3344E+00	1.3926E+01

WATERMARK

16	1.7070E+02	-2.6280E+02	-2.5675E+02	4.3350E+02	7.1674E+02
	1.1770E+00	-1.8119E+00	-1.7702E+00	2.9889E+00	4.9417E+00
17	8.1411E+01	-2.1640E+02	-1.9522E+02	2.9781E+02	5.2063E+02
	5.6131E-01	-1.4920E+00	-1.3460E+00	2.0533E+00	3.5896E+00
18	7.8028E+01	-1.8577E+02	7.6572E+02	2.6380E+02	4.7079E+01
	5.3798E-01	-1.2808E+00	5.2795E+00	1.8188E+00	3.2460E-01
19	-4.6817E-01	-3.7323E+02	7.0977E+02	3.7276E+02	5.0920E+02
	-3.2279E-03	-2.5733E+00	4.8937E+00	2.5701E+00	3.5108E+00
20	-5.8422E+01	-5.9819E+02	-1.5531E+02	5.3977E+02	4.3330E+02
	-4.0280E-01	-4.1244E+00	-1.0708E+00	3.7216E+00	2.9875E+00
21	6.0777E+01	-7.6255E+01	-1.1576E+01	1.3703E+02	2.7264E+02
	4.1904E-01	-5.2576E-01	-7.9811E-02	9.4480E-01	1.8798E+00
22	6.3157E+02	-7.5404E+01	6.3403E+02	7.0698E+02	6.4815E+02
	4.3545E+00	-5.1989E-01	4.3715E+00	4.8744E+00	4.4688E+00

Allowable Stress for Load Case 116

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	324.04	318.24	20.00	22.40	61.80
2	339.65	336.14	20.00	22.40	61.80
3	324.85	319.11	20.00	22.40	61.80
4	323.92	322.60	20.00	22.40	61.80
5	328.97	327.58	20.00	22.40	61.80
6	331.03	330.14	20.00	22.40	61.80
7	346.32	344.84	20.00	22.40	61.80
8	348.46	347.10	20.00	22.40	61.80
9	346.35	344.87	20.00	22.40	61.80
10	336.75	335.06	20.00	22.40	61.80
11	334.42	330.49	20.00	22.40	61.80
12	334.49	331.23	20.00	22.40	61.80
13	328.24	325.88	20.00	22.40	61.80
14	325.09	323.47	20.00	22.40	61.80
15	305.95	305.29	20.00	22.40	61.80
16	307.76	307.03	20.00	22.40	61.80
17	308.42	307.89	20.00	22.40	61.80
18	314.46	313.59	20.00	22.40	61.80
19	316.32	315.49	20.00	22.40	61.80
20	322.09	320.61	20.00	22.40	61.80
21	309.88	308.05	20.00	22.40	61.80
22	297.01	296.17	20.00	23.60	66.30

Table 2-72. Load Case 301, 30-ft. Head-On Drop, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-3.0092E+01	-2.5574E+03	-4.8006E+02	2.5273E+03	1.1058E+03
	-2.0748E-01	-1.7632E+01	-3.3099E+00	1.7425E+01	7.6243E+00
2	2.8472E+01	-1.4352E+03	-4.8562E+01	1.4637E+03	1.8944E+01
	1.9631E-01	-9.8956E+00	-3.3482E-01	1.0092E+01	1.3062E-01
3	2.0600E+01	-7.9057E+02	-2.7782E+01	8.1117E+02	1.6968E+01
	1.4203E-01	-5.4508E+00	-1.9155E-01	5.5928E+00	1.1699E-01
4	1.0984E+03	-4.3333E+03	-1.3619E+03	5.4317E+03	5.5830E+03
	7.5731E+00	-2.9877E+01	-9.3899E+00	3.7450E+01	3.8493E+01
5	4.3468E+02	-2.0344E+03	-7.9729E+02	2.4691E+03	3.7713E+03
	2.9970E+00	-1.4027E+01	-5.4971E+00	1.7024E+01	2.6002E+01
6	-2.9688E+02	-1.0790E+03	-7.5051E+02	7.8216E+02	8.1807E+02
	-2.0469E+00	-7.4397E+00	-5.1746E+00	5.3928E+00	5.6404E+00
7	-2.6070E+00	-5.6373E+02	-1.7295E+01	5.6112E+02	1.6555E+01
	-1.7975E-02	-3.8868E+00	-1.1924E-01	3.8688E+00	1.1414E-01
8	-1.0873E+00	-5.0143E+02	-1.2727E+01	5.0034E+02	5.6708E-01
	-7.4966E-03	-3.4572E+00	-8.7753E-02	3.4497E+00	3.9098E-03
9	-9.6910E-01	-4.8180E+02	-1.4042E+01	4.8083E+02	1.5807E+00
	-6.6817E-03	-3.3219E+00	-9.6814E-02	3.3152E+00	1.0899E-02
10	-8.9191E+01	-6.8781E+02	-1.7445E+01	5.9861E+02	3.9311E+02
	-6.1495E-01	-4.7423E+00	-1.2028E-01	4.1273E+00	2.7104E+00
11	1.5654E+02	-3.4360E+02	1.5059E+01	5.0015E+02	2.2877E+02
	1.0793E+00	-2.3691E+00	1.0383E-01	3.4484E+00	1.5773E+00
12	1.1623E+02	-1.9258E+02	8.8082E+01	3.0881E+02	6.0429E+02
	8.0136E-01	-1.3278E+00	6.0730E-01	2.1292E+00	4.1664E+00
13	2.3073E+02	-2.8648E+02	5.4960E+01	5.1721E+02	2.5715E+02
	1.5908E+00	-1.9752E+00	3.7893E-01	3.5661E+00	1.7730E+00
14	2.1879E+02	-1.8731E+02	9.8904E+01	4.0609E+02	1.9581E+02
	1.5085E+00	-1.2914E+00	6.8192E-01	2.7999E+00	1.3500E+00
15	9.6990E+02	5.3562E+01	-3.3987E+01	9.1634E+02	5.2361E+00
	6.6872E+00	3.6929E-01	-2.3433E-01	6.3179E+00	3.6102E-02

WITHDRAWN

16	3.4358E+02	-6.1244E+02	-2.8281E+02	9.5602E+02	6.8334E+02
	2.3689E+00	-4.2226E+00	-1.9499E+00	6.5916E+00	4.7114E+00
17	4.8838E+02	-5.2748E+02	-3.6079E+02	1.0159E+03	1.0989E+03
	3.3673E+00	-3.6368E+00	-2.4875E+00	7.0041E+00	7.5766E+00
18	5.5594E+02	-1.1095E+03	-1.2168E+02	1.6655E+03	2.2055E+03
	3.8331E+00	-7.6501E+00	-8.3898E-01	1.1483E+01	1.5206E+01
19	3.6225E+02	-1.2165E+03	-5.0314E+02	1.5788E+03	1.4326E+03
	2.4976E+00	-8.3875E+00	-3.4690E+00	1.0885E+01	9.8772E+00
20	1.1611E+02	-9.1057E+02	-5.0779E+02	1.0267E+03	1.8660E+03
	8.0052E-01	-6.2781E+00	-3.5011E+00	7.0787E+00	1.2866E+01
21	6.8813E+02	6.1670E+01	5.6289E+01	6.2646E+02	2.1555E+02
	4.7445E+00	4.2520E-01	3.8810E-01	4.3193E+00	1.4862E+00
22	5.7422E+02	3.1566E+01	2.8429E+02	5.4265E+02	5.4632E+02
	3.9591E+00	2.1764E-01	1.9601E+00	3.7415E+00	3.7667E+00

MARKUP

Table 2-73. Load Case 302, 30-ft. Side Drop + Slap-Down, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.7498E+02	-6.5930E+02	-3.1180E+03	4.4657E+03	1.5320E+03
	1.8960E+00	-4.5457E+00	-2.1498E+01	3.0790E+01	1.0563E+01
2	1.0664E+03	-1.0015E+03	-2.1545E+03	1.9423E+03	1.3688E+03
	7.3527E+00	-6.9049E+00	-1.4855E+01	1.3392E+01	9.4378E+00
3	2.7450E+02	-6.5586E+02	-3.1251E+03	4.4753E+03	1.5214E+03
	1.8926E+00	-4.5220E+00	-2.1547E+01	3.0856E+01	1.0490E+01
4	9.3772E+02	8.2950E+01	-2.1093E+03	3.8740E+03	8.5795E+02
	6.4654E+00	5.7192E-01	-1.4543E+01	2.6710E+01	5.9154E+00
5	1.2912E+03	-4.7767E+01	-2.6308E+03	3.9773E+03	1.1344E+02
	8.9027E+00	-3.2934E-01	-1.8139E+01	2.7423E+01	7.8215E-01
6	1.4524E+03	-1.9140E+02	-2.5623E+03	3.6447E+03	2.4558E+02
	1.0014E+01	-1.3197E+00	-1.7666E+01	2.5129E+01	1.6932E+00
7	9.7547E+02	5.6710E+02	1.1733E+01	2.4373E+03	2.1736E+02
	6.7256E+00	3.9100E+00	8.0896E-02	1.6804E+01	1.4986E+00
8	9.8163E+02	5.2561E+02	3.6420E+01	1.8424E+03	2.1151E+02
	6.7681E+00	3.6239E+00	2.5111E-01	1.2703E+01	1.4583E+00
9	9.6789E+02	5.6647E+02	1.1310E+01	2.4447E+03	2.2016E+02
	6.6734E+00	3.9057E+00	7.7978E-02	1.6855E+01	1.5179E+00
10	1.6146E+03	1.8469E+02	-2.3465E+03	2.9483E+03	7.8132E+02
	1.1132E+01	1.2734E+00	-1.6178E+01	2.0328E+01	5.3870E+00
11	7.0303E+02	-3.9769E+02	-2.8531E+03	2.8941E+03	1.1256E+03
	4.8472E+00	-2.7420E+00	-1.9672E+01	1.9954E+01	7.7606E+00
12	7.2985E+01	-3.3833E+02	-2.0813E+03	2.1542E+03	2.3612E+02
	5.0322E-01	-2.3327E+00	-1.4350E+01	1.4853E+01	1.6280E+00
13	1.3363E+03	-7.7073E+01	-2.4606E+03	3.8347E+03	1.4761E+02
	9.2133E+00	-5.3140E-01	-1.6965E+01	2.6439E+01	1.0178E+00
14	1.0283E+03	-9.1060E+01	-2.3515E+03	3.7252E+03	7.3363E+02
	7.0900E+00	-6.2783E-01	-1.6213E+01	2.5684E+01	5.0582E+00
15	8.2804E+01	-3.9718E+02	-1.8500E+03	1.9328E+03	7.6794E+01
	5.7091E-01	-2.7384E+00	-1.2755E+01	1.3326E+01	5.2948E-01

WITHDRAWN

16	2.8112E+02	-9.2653E+01	-2.3651E+03	3.5968E+03	3.3390E+02
	1.9383E+00	-6.3882E-01	-1.6307E+01	2.4799E+01	2.3021E+00
17	5.1681E+02	-1.1655E+02	-2.1131E+03	3.5655E+03	3.3965E+02
	3.5633E+00	-8.0356E-01	-1.4569E+01	2.4583E+01	2.3418E+00
18	1.1093E+03	-9.2904E+01	-2.1561E+03	3.8751E+03	2.5572E+02
	7.6483E+00	-6.4055E-01	-1.4865E+01	2.6718E+01	1.7631E+00
19	9.6061E+02	-1.9960E+02	-2.7320E+03	4.1805E+03	2.9290E+02
	6.6231E+00	-1.3762E+00	-1.8837E+01	2.8823E+01	2.0195E+00
20	9.7348E+02	-2.3051E+02	-2.3345E+03	3.2379E+03	2.7531E+02
	6.7119E+00	-1.5893E+00	-1.6096E+01	2.2324E+01	1.8982E+00
21	-3.7191E+01	-1.9386E+02	-2.0911E+03	2.1184E+03	2.3253E+02
	-2.5642E-01	-1.3366E+00	-1.4418E+01	1.4606E+01	1.6032E+00
22	-3.1583E+01	-2.2073E+02	-2.1791E+03	2.2073E+03	1.9352E+02
	-2.1776E-01	-1.5219E+00	-1.5024E+01	1.5219E+01	1.3342E+00

MARKUP

Table 2-74. Load Case 303, 30-ft. Cg/Corner Drop, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.6920E+02	1.1481E+02	-1.5409E+03	2.0335E+03	7.2298E+02
	1.8561E+00	7.9162E-01	-1.0624E+01	1.4020E+01	4.9848E+00
2	2.1313E+02	-1.2449E+02	-9.0011E+02	1.1819E+03	1.5587E+02
	1.4695E+00	-8.5834E-01	-6.2061E+00	8.1492E+00	1.0747E+00
3	4.0755E+02	-8.4344E+01	-3.6032E+02	7.6787E+02	1.9584E+02
	2.8100E+00	-5.8153E-01	-2.4843E+00	5.2943E+00	1.3503E+00
4	2.4893E+02	4.3785E+00	-1.3886E+03	3.5980E+03	4.1928E+02
	1.7163E+00	3.0189E-02	-9.5740E+00	2.4808E+01	2.8908E+00
5	3.3562E+02	-3.2281E+02	-1.8781E+03	2.0879E+03	2.4261E+02
	2.3140E+00	-2.2257E+00	-1.2949E+01	1.4395E+01	1.6727E+00
6	3.1085E+02	-5.7381E+02	-2.0477E+03	2.2981E+03	4.2942E+02
	2.1433E+00	-3.9563E+00	-1.4118E+01	1.5845E+01	2.9607E+00
7	3.7159E+02	6.1094E+01	-2.0747E+02	2.2476E+03	5.8763E+01
	2.5620E+00	4.2123E-01	-1.4305E+00	1.5497E+01	4.0515E-01
8	2.7142E+02	2.8170E+01	-2.6655E+02	1.7269E+03	3.7476E+01
	1.8714E+00	1.9422E-01	-1.8378E+00	1.1907E+01	2.5838E-01
9	2.7905E+02	5.9074E+00	-2.8352E+02	1.1923E+03	2.9092E+01
	1.9240E+00	4.0730E-02	-1.9548E+00	8.2204E+00	2.0058E-01
10	2.3170E+02	-8.5270E+01	-2.9611E+02	1.0203E+03	5.4050E+02
	1.5975E+00	-5.8792E-01	-2.0416E+00	7.0344E+00	3.7266E+00
11	3.5041E+02	6.2013E+01	-9.7151E+01	7.5721E+02	2.4201E+02
	2.4160E+00	4.2756E-01	-6.6983E-01	5.2208E+00	1.6686E+00
12	2.4900E+02	1.1138E+02	-1.6355E+01	2.6536E+02	1.1343E+02
	1.7168E+00	7.6792E-01	-1.1277E-01	1.8296E+00	7.8207E-01
13	2.6972E+02	-1.1497E+02	-3.2576E+02	6.9525E+02	5.9204E+01
	1.8597E+00	-7.9269E-01	-2.2460E+00	4.7936E+00	4.0820E-01
14	2.6073E+02	-1.2450E+02	-3.6114E+02	6.4880E+02	3.7619E+01
	1.7977E+00	-8.5838E-01	-2.4900E+00	4.4733E+00	2.5937E-01
15	3.2129E+02	8.1178E+01	-9.2788E+02	1.2817E+03	2.9344E+01
	2.2152E+00	5.5971E-01	-6.3975E+00	8.8373E+00	2.0232E-01

WITHDRAWN

16	4.2881E+02	2.1534E+01	-1.0174E+03	2.6925E+03	2.3148E+02
	2.9565E+00	1.4847E-01	-7.0147E+00	1.8564E+01	1.5960E+00
17	3.9572E+02	8.6526E+01	-9.5610E+02	2.5725E+03	4.5819E+02
	2.7284E+00	5.9658E-01	-6.5921E+00	1.7737E+01	3.1591E+00
18	3.4428E+02	-9.5488E+01	-1.4098E+03	2.1022E+03	4.0314E+02
	2.3738E+00	-6.5837E-01	-9.7199E+00	1.4494E+01	2.7796E+00
19	3.7340E+02	-2.0875E+02	-1.8479E+03	1.9451E+03	4.6681E+02
	2.5745E+00	-1.4393E+00	-1.2741E+01	1.3411E+01	3.2186E+00
20	2.2097E+02	-3.6130E+02	-1.7839E+03	1.9492E+03	1.7779E+02
	1.5235E+00	-2.4911E+00	-1.2300E+01	1.3439E+01	1.2258E+00
21	9.3091E+01	-4.9330E+01	-5.7940E+01	1.4639E+02	2.2391E+01
	6.4184E-01	-3.4012E-01	-3.9948E-01	1.0093E+00	1.5438E-01
22	4.7500E+02	3.2392E+01	-9.1485E+02	1.4225E+03	1.1725E+02
	3.2750E+00	2.2333E-01	-6.3077E+00	9.8081E+00	8.0843E-01

MARKUP

Table 2-75. Load Case 304, 30-ft. Head-On Drop at -40°F, Low Temperature, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-4.9196E+01	-4.2432E+03	-7.9709E+02	4.1940E+03	1.8381E+03
	-3.3919E-01	-2.9256E+01	-5.4957E+00	2.8917E+01	1.2673E+01
2	4.7293E+01	-2.3628E+03	-7.9901E+01	2.4101E+03	2.9562E+01
	3.2607E-01	-1.6291E+01	-5.5090E-01	1.6617E+01	2.0382E-01
3	3.2215E+01	-1.2716E+03	-4.7932E+01	1.3038E+03	1.6435E+01
	2.2211E-01	-8.7675E+00	-3.3048E-01	8.9896E+00	1.1332E-01
4	1.8245E+03	-7.2079E+03	-2.2685E+03	9.0325E+03	9.2816E+03
	1.2580E+01	-4.9697E+01	-1.5641E+01	6.2277E+01	6.3994E+01
5	7.2077E+02	-3.3817E+03	-1.3276E+03	4.1024E+03	6.2669E+03
	4.9696E+00	-2.3316E+01	-9.1537E+00	2.8285E+01	4.3208E+01
6	-4.8874E+02	-1.7851E+03	-1.2462E+03	1.2963E+03	1.3665E+03
	-3.3698E+00	-1.2308E+01	-8.5924E+00	8.9380E+00	9.4215E+00
7	-4.2645E+00	-9.2686E+02	-2.8441E+01	9.2259E+02	2.7483E+01
	-2.9403E-02	-6.3905E+00	-1.9610E-01	6.3611E+00	1.8949E-01
8	-1.7394E+00	-8.2005E+02	-2.0829E+01	8.1831E+02	9.5257E-01
	-1.1993E-02	-5.6541E+00	-1.4361E-01	5.6421E+00	6.5677E-03
9	-1.5096E+00	-7.7800E+02	-2.2639E+01	7.7649E+02	2.2908E+00
	-1.0408E-02	-5.3641E+00	-1.5609E-01	5.3537E+00	1.5794E-02
10	-1.4300E+02	-1.0912E+03	-2.2829E+01	9.4818E+02	6.3306E+02
	-9.8592E-01	-7.5234E+00	-1.5740E-01	6.5375E+00	4.3648E+00
11	2.5461E+02	-5.4884E+02	2.8500E+01	8.0345E+02	3.6121E+02
	1.7555E+00	-3.7841E+00	1.9650E-01	5.5396E+00	2.4905E+00
12	1.9297E+02	-2.9519E+02	1.4701E+02	4.8817E+02	9.5920E+02
	1.3305E+00	-2.0353E+00	1.0136E+00	3.3658E+00	6.6134E+00
13	3.7500E+02	-4.3449E+02	9.8169E+01	8.0949E+02	3.6603E+02
	2.5855E+00	-2.9957E+00	6.7685E-01	5.5812E+00	2.5237E+00
14	3.5645E+02	-2.7493E+02	1.7019E+02	6.3138E+02	2.8954E+02
	2.4576E+00	-1.8956E+00	1.1734E+00	4.3532E+00	1.9963E+00
15	1.6248E+03	9.4547E+01	-5.2074E+01	1.5303E+03	8.7457E+00
	1.1203E+01	6.5188E-01	-3.5904E-01	1.0551E+01	6.0299E-02

WITHDRAWN

16	5.7799E+02	-1.0200E+03	-4.6670E+02	1.5980E+03	1.1450E+03
	3.9851E+00	-7.0326E+00	-3.2178E+00	1.1018E+01	7.8942E+00
17	8.2003E+02	-8.7978E+02	-5.9769E+02	1.6998E+03	1.8381E+03
	5.6539E+00	-6.0658E+00	-4.1209E+00	1.1720E+01	1.2673E+01
18	9.3224E+02	-1.8464E+03	-2.0091E+02	2.7787E+03	3.6756E+03
	6.4276E+00	-1.2731E+01	-1.3852E+00	1.9158E+01	2.5342E+01
19	6.0177E+02	-2.0240E+03	-8.3884E+02	2.6258E+03	2.3790E+03
	4.1491E+00	-1.3955E+01	-5.7836E+00	1.8104E+01	1.6402E+01
20	1.8994E+02	-1.5129E+03	-8.4433E+02	1.7028E+03	3.0986E+03
	1.3096E+00	-1.0431E+01	-5.8215E+00	1.1741E+01	2.1364E+01
21	1.2385E+03	1.1166E+02	1.0202E+02	1.1268E+03	3.9201E+02
	8.5392E+00	7.6990E-01	7.0340E-01	7.7693E+00	2.7028E+00
22	9.6475E+02	5.6068E+01	4.8259E+02	9.0868E+02	9.1458E+02
	6.6517E+00	3.8658E-01	3.3274E+00	6.2651E+00	6.3058E+00

MARKUP

Table 2-76. Load Case 305, 30-ft. Side Drop + Slap-Down at -40°F, Low Temperature, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.8487E+02	-9.2263E+02	-4.3632E+03	6.2448E+03	2.1424E+03
	2.6536E+00	-6.3613E+00	-3.0084E+01	4.3057E+01	1.4772E+01
2	1.4912E+03	-1.4012E+03	-3.0158E+03	2.7190E+03	1.9141E+03
	1.0282E+01	-9.6612E+00	-2.0793E+01	1.8747E+01	1.3197E+01
3	3.8418E+02	-9.1780E+02	-4.3732E+03	6.2583E+03	2.1276E+03
	2.6489E+00	-6.3280E+00	-3.0152E+01	4.3149E+01	1.4669E+01
4	1.3114E+03	1.1612E+02	-2.9508E+03	5.4177E+03	1.1999E+03
	9.0417E+00	8.0060E-01	-2.0345E+01	3.7354E+01	8.2727E+00
5	1.8057E+03	-6.6639E+01	-3.6801E+03	5.5624E+03	1.5866E+02
	1.2450E+01	-4.5946E-01	-2.5373E+01	3.8351E+01	1.0939E+00
6	2.0312E+03	-2.6756E+02	-3.5841E+03	5.0972E+03	3.4349E+02
	1.4004E+01	-1.8447E+00	-2.4712E+01	3.5144E+01	2.3683E+00
7	1.3650E+03	7.9345E+02	1.6422E+01	3.4093E+03	3.0409E+02
	9.4114E+00	5.4707E+00	1.1323E-01	2.3506E+01	2.0966E+00
8	1.3737E+03	7.3545E+02	5.0944E+01	2.5776E+03	2.9591E+02
	9.4711E+00	5.0707E+00	3.5125E-01	1.7772E+01	2.0402E+00
9	1.3544E+03	7.9258E+02	1.5829E+01	3.4064E+03	3.0800E+02
	9.3383E+00	5.4646E+00	1.0914E-01	2.3487E+01	2.1236E+00
10	2.2579E+03	2.5859E+02	-3.2821E+03	4.1238E+03	1.0926E+03
	1.5568E+01	1.7829E+00	-2.2629E+01	2.8433E+01	7.5329E+00
11	9.8307E+02	-5.5617E+02	-3.9909E+03	4.0476E+03	1.5744E+03
	6.7781E+00	-3.8347E+00	-2.7516E+01	2.7907E+01	1.0855E+01
12	1.0214E+02	-4.7298E+02	-2.9110E+03	3.0132E+03	3.3025E+02
	7.0421E-01	-3.2611E+00	-2.0071E+01	2.0775E+01	2.2770E+00
13	1.8687E+03	-1.0764E+02	-3.4420E+03	5.3629E+03	2.0648E+02
	1.2884E+01	-7.4213E-01	-2.3732E+01	3.6976E+01	1.4236E+00
14	1.4381E+03	-1.2723E+02	-3.2894E+03	5.2097E+03	1.0260E+03
	9.9151E+00	-8.7723E-01	-2.2680E+01	3.5920E+01	7.0738E+00
15	1.1586E+02	-5.5536E+02	-2.5874E+03	2.7033E+03	1.0740E+02
	7.9881E-01	-3.8290E+00	-1.7840E+01	1.8639E+01	7.4049E-01

WATERMARK

16	3.9337E+02	-1.2956E+02	-3.3084E+03	5.0302E+03	4.6695E+02
	2.7122E+00	-8.9331E-01	-2.2811E+01	3.4682E+01	3.2195E+00
17	7.2274E+02	-1.6298E+02	-2.9559E+03	4.9864E+03	4.7498E+02
	4.9831E+00	-1.1237E+00	-2.0380E+01	3.4380E+01	3.2749E+00
18	1.5513E+03	-1.2983E+02	-3.0161E+03	5.4194E+03	3.5761E+02
	1.0696E+01	-8.9518E-01	-2.0795E+01	3.7365E+01	2.4656E+00
19	1.3434E+03	-2.7906E+02	-3.8218E+03	5.8464E+03	4.0960E+02
	9.2621E+00	-1.9240E+00	-2.6350E+01	4.0310E+01	2.8241E+00
20	1.3613E+03	-3.2230E+02	-3.2656E+03	4.5283E+03	3.8504E+02
	9.3860E+00	-2.2222E+00	-2.2515E+01	3.1221E+01	2.6548E+00
21	-5.2015E+01	-2.7092E+02	-2.9247E+03	2.9628E+03	3.2520E+02
	-3.5863E-01	-1.8679E+00	-2.0165E+01	2.0428E+01	2.2421E+00
22	-4.4172E+01	-3.0849E+02	-3.0477E+03	3.0870E+03	2.7063E+02
	-3.0455E-01	-2.1270E+00	-2.1013E+01	2.1284E+01	1.8660E+00

MARKUP

Table 2-77. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Low Temperature, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.7877E+02	1.5745E+02	-2.1516E+03	2.8459E+03	1.0114E+03
	2.6116E+00	1.0856E+00	-1.4835E+01	1.9622E+01	6.9731E+00
2	2.9794E+02	-1.7361E+02	-1.2589E+03	1.6550E+03	2.1789E+02
	2.0542E+00	-1.1970E+00	-8.6795E+00	1.1411E+01	1.5023E+00
3	5.7270E+02	-1.1800E+02	-5.0537E+02	1.0781E+03	2.7557E+02
	3.9486E+00	-8.1361E-01	-3.4844E+00	7.4330E+00	1.9000E+00
4	3.4795E+02	5.5039E+00	-1.9415E+03	5.0346E+03	5.8618E+02
	2.3991E+00	3.7948E-02	-1.3386E+01	3.4712E+01	4.0416E+00
5	4.6905E+02	-4.5259E+02	-2.6264E+03	2.9206E+03	3.3953E+02
	3.2340E+00	-3.1205E+00	-1.8108E+01	2.0137E+01	2.3410E+00
6	4.3429E+02	-8.0368E+02	-2.8642E+03	3.2148E+03	6.0096E+02
	2.9943E+00	-5.5412E+00	-1.9748E+01	2.2165E+01	4.1435E+00
7	5.1862E+02	8.5220E+01	-2.9166E+02	3.1450E+03	8.1991E+01
	3.5758E+00	5.8757E-01	-2.0109E+00	2.1684E+01	5.6531E-01
8	3.8001E+02	3.9287E+01	-3.7469E+02	2.4173E+03	5.2242E+01
	2.6201E+00	2.7087E-01	-2.5834E+00	1.6666E+01	3.6020E-01
9	3.9101E+02	8.1044E+00	-3.9878E+02	1.6698E+03	4.0746E+01
	2.6959E+00	5.5878E-02	-2.7495E+00	1.1513E+01	2.8094E-01
10	3.2363E+02	-1.2029E+02	-4.1792E+02	1.4316E+03	7.5852E+02
	2.2313E+00	-8.2937E-01	-2.8814E+00	9.8709E+00	5.2298E+00
11	4.9128E+02	8.6830E+01	-1.3779E+02	1.0634E+03	3.3845E+02
	3.3872E+00	5.9868E-01	-9.5006E-01	7.3320E+00	2.3335E+00
12	3.4986E+02	1.5664E+02	-2.2830E+01	3.7269E+02	1.5967E+02
	2.4122E+00	1.0800E+00	-1.5741E-01	2.5696E+00	1.1009E+00
13	3.7829E+02	-1.6166E+02	-4.5926E+02	9.7555E+02	8.3314E+01
	2.6082E+00	-1.1146E+00	-3.1665E+00	6.7262E+00	5.7443E-01
14	3.6575E+02	-1.7482E+02	-5.0857E+02	9.1046E+02	5.2874E+01
	2.5217E+00	-1.2053E+00	-3.5065E+00	6.2774E+00	3.6456E-01
15	4.4922E+02	1.1353E+02	-1.2979E+03	1.7927E+03	4.1062E+01
	3.0972E+00	7.8273E-01	-8.9486E+00	1.2360E+01	2.8311E-01

WITHDRAWN

16	5.9962E+02	2.9980E+01	-1.4219E+03	3.7666E+03	3.2391E+02
	4.1343E+00	2.0670E-01	-9.8037E+00	2.5970E+01	2.2333E+00
17	5.5330E+02	1.2075E+02	-1.3362E+03	3.5988E+03	6.4119E+02
	3.8149E+00	8.3256E-01	-9.2125E+00	2.4813E+01	4.4209E+00
18	4.8116E+02	-1.3436E+02	-1.9710E+03	2.9409E+03	5.6401E+02
	3.3175E+00	-9.2641E-01	-1.3590E+01	2.0277E+01	3.8887E+00
19	5.2188E+02	-2.9257E+02	-2.5837E+03	2.7210E+03	6.5318E+02
	3.5983E+00	-2.0172E+00	-1.7814E+01	1.8761E+01	4.5035E+00
20	3.0856E+02	-5.0580E+02	-2.4952E+03	2.7265E+03	2.4863E+02
	2.1275E+00	-3.4874E+00	-1.7204E+01	1.8799E+01	1.7143E+00
21	1.2945E+02	-7.2856E+01	-8.2973E+01	2.0600E+02	3.1658E+01
	8.9250E-01	-5.0233E-01	-5.7208E-01	1.4203E+00	2.1828E-01
22	6.6429E+02	4.5281E+01	-1.2796E+03	1.9897E+03	1.6405E+02
	4.5801E+00	3.1220E-01	-8.8226E+00	1.3718E+01	1.1311E+00

MARKUP

Table 2-78. Load Case 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-100

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.8570E+02	-4.4957E+02	4.6939E+02	6.3528E+02	3.6202E+00
	1.2804E+00	-3.0997E+00	3.2363E+00	4.3801E+00	2.4961E-02
2	8.7509E+00	-2.9889E+02	2.0089E+01	3.0764E+02	1.0017E+02
	6.0335E-02	-2.0608E+00	1.3851E-01	2.1211E+00	6.9067E-01
3	-1.4739E+00	-1.1450E+02	-1.2603E+00	1.1302E+02	1.3165E+01
	-1.0162E-02	-7.8942E-01	-8.6894E-03	7.7926E-01	9.0770E-02
4	8.9828E+02	-2.6892E+02	8.3385E+02	1.1672E+03	3.4326E+02
	6.1935E+00	-1.8541E+00	5.7492E+00	8.0476E+00	2.3667E+00
5	8.0734E+02	-6.5833E+02	7.2895E+02	1.4657E+03	1.1137E+03
	5.5664E+00	-4.5390E+00	5.0259E+00	1.0105E+01	7.6787E+00
6	-1.4567E+02	-1.3922E+03	1.9994E+02	1.2465E+03	9.1819E+01
	-1.0044E+00	-9.5988E+00	1.3786E+00	8.5944E+00	6.3307E-01
7	-6.8159E-01	-8.7017E+02	-1.0375E+01	8.6949E+02	1.1453E+01
	-4.6994E-03	-5.9996E+00	-7.1531E-02	5.9949E+00	7.8965E-02
8	-9.2872E-02	-4.9931E+02	-7.2470E+00	4.9922E+02	1.0060E-01
	-6.4033E-04	-3.4426E+00	-4.9966E-02	3.4420E+00	6.9359E-04
9	1.2888E+00	-2.2077E+02	-8.6375E+00	2.2206E+02	4.1568E+00
	8.8863E-03	-1.5221E+00	-5.9553E-02	1.5310E+00	2.8660E-02
10	8.7533E+01	-1.2343E+02	1.6600E+02	2.1097E+02	2.8366E+02
	6.0352E-01	-8.5103E-01	1.1445E+00	1.4546E+00	1.9557E+00
11	1.4579E+02	-1.3938E+02	9.3407E+01	2.8518E+02	3.4037E+01
	1.0052E+00	-9.6101E-01	6.4402E-01	1.9662E+00	2.3468E-01
12	1.1033E+02	-2.5783E+02	9.3488E+01	3.6816E+02	5.4830E+02
	7.6070E-01	-1.7777E+00	6.4458E-01	2.5384E+00	3.7804E+00
13	5.4048E+02	-6.0012E+01	1.7522E+02	6.0049E+02	6.2070E+02
	3.7265E+00	-4.1377E-01	1.2081E+00	4.1402E+00	4.2796E+00
14	5.5242E+02	-7.7189E+01	1.9785E+02	6.2961E+02	5.3397E+02
	3.8088E+00	-5.3220E-01	1.3641E+00	4.3410E+00	3.6816E+00
15	-7.0673E+03	-3.6523E+04	-2.9439E+03	2.9456E+04	7.8200E+02
	-4.8728E+01	-2.5182E+02	-2.0297E+01	2.0309E+02	5.3917E+00

WATERMARK

16	2.0199E+03	-4.0862E+03	-1.6914E+02	6.1061E+03	8.7261E+03
	1.3926E+01	-2.8173E+01	-1.1662E+00	4.2100E+01	6.0165E+01
17	-2.7804E+02	-3.7828E+03	4.1513E+02	3.5048E+03	6.1299E+03
	-1.9170E+00	-2.6082E+01	2.8622E+00	2.4165E+01	4.2264E+01
18	-2.4316E+02	-1.5257E+03	-2.8479E+02	1.2825E+03	3.8798E+02
	-1.6766E+00	-1.0519E+01	-1.9636E+00	8.8427E+00	2.6750E+00
19	6.6975E+02	-9.5432E+02	-1.1939E+02	1.6241E+03	1.9912E+03
	4.6178E+00	-6.5798E+00	-8.2317E-01	1.1198E+01	1.3729E+01
20	9.9771E+02	-1.0648E+03	-2.9139E+02	2.0625E+03	3.1296E+03
	6.8790E+00	-7.3413E+00	-2.0091E+00	1.4220E+01	2.1578E+01
21	7.8385E+01	-1.1277E+02	-2.3596E+01	1.9115E+02	3.6162E+02
	5.4045E-01	-7.7752E-01	-1.6269E-01	1.3180E+00	2.4933E+00
22	-1.0359E+03	-1.3475E+04	-3.8145E+03	1.2439E+04	9.3188E+03
	-7.1422E+00	-9.2909E+01	-2.6300E+01	8.5767E+01	6.4251E+01

MARKUP

Table 2-79. Load Combination 301, Head-On Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 301, 102, 201, 211
30-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	3.13	1.97	5.09	20.00	66.30	>10
	21.56	13.55	35.12	137.90	457.12	
2	1.50	0.05	1.55	20.00	66.30	>10
	10.38	0.32	10.69	137.90	457.12	
3	0.84	0.04	0.88	20.00	66.30	>10
	5.77	0.28	6.04	137.90	457.12	
4	10.38	14.30	24.67	20.00	66.30	1.69
	71.54	98.58	170.13	137.90	457.12	
5	6.74	10.74	17.48	20.00	66.30	2.79
	46.50	74.05	120.55	137.90	457.12	
6	2.44	3.09	5.53	20.00	66.30	>10
	16.84	21.29	38.13	137.90	457.12	
7	0.85	0.02	0.87	20.00	66.30	>10
	5.83	0.17	6.00	137.90	457.12	
8	0.78	0.00	0.79	20.00	66.30	>10
	5.41	0.01	5.42	137.90	457.12	
9	0.77	0.01	0.78	20.00	66.30	>10
	5.28	0.09	5.37	137.90	457.12	
10	1.58	1.40	2.98	20.00	66.30	>10
	10.89	9.66	20.55	137.90	457.12	
11	1.11	0.51	1.63	20.00	66.30	>10
	7.67	3.54	11.21	137.90	457.12	
12	0.82	1.02	1.84	20.00	66.30	>10
	5.68	7.00	12.68	137.90	457.12	
13	1.56	1.17	2.73	20.00	66.30	>10
	10.74	8.10	18.84	137.90	457.12	

MARKUP

14	1.39	1.18	2.56	20.00	66.30	>10
	9.56	8.13	17.68	137.90	457.12	
15	4.75	5.46	10.21	20.00	66.30	5.50
	32.76	37.61	70.37	137.90	457.12	
16	3.28	4.08	7.36	20.00	66.30	8.01
	22.60	28.12	50.71	137.90	457.12	
17	2.66	3.56	6.21	20.00	66.30	9.67
	18.32	24.52	42.84	137.90	457.12	
18	3.61	5.21	8.82	20.00	66.30	6.52
	24.89	35.89	60.78	137.90	457.12	
19	4.69	6.23	10.93	20.00	66.30	5.07
	32.35	42.98	75.34	137.90	457.12	
20	3.57	6.58	10.15	20.00	66.30	5.54
	24.61	45.34	69.95	137.90	457.12	
21	0.85	0.68	1.53	20.00	66.30	>10
	5.87	4.70	10.56	137.90	457.12	
22	2.51	2.89	5.40	20.00	66.30	>10
	17.33	19.90	37.23	137.90	457.12	

Min MS: 1.687, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-80. Load Combination 302, Side Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 302, 102, 201, 211
30-ft. Side Drop + Slap-Down
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	5.07	2.39	7.46	20.00	66.30	7.89
	34.93	16.49	51.42	137.90	457.12	
2	1.98	1.40	3.38	20.00	66.30	>10
	13.68	9.63	23.30	137.90	457.12	
3	4.50	1.54	6.04	20.00	66.30	9.31
	31.03	10.65	41.68	137.90	457.12	
4	8.82	9.57	18.39	20.00	66.30	2.60
	60.80	66.00	126.81	137.90	457.12	
5	8.25	7.08	15.33	20.00	66.30	3.32
	56.90	48.83	105.73	137.90	457.12	
6	5.30	2.52	7.82	20.00	66.30	7.48
	36.58	17.34	53.92	137.90	457.12	
7	2.72	0.23	2.95	20.00	66.30	>10
	18.77	1.55	20.32	137.90	457.12	
8	2.13	0.21	2.34	20.00	66.30	>10
	14.66	1.46	16.13	137.90	457.12	
9	2.73	0.23	2.96	20.00	66.30	>10
	18.82	1.60	20.42	137.90	457.12	
10	3.93	1.79	5.72	20.00	66.30	>10
	27.09	12.34	39.43	137.90	457.12	
11	3.51	1.41	4.92	20.00	66.30	>10
	24.18	9.72	33.90	137.90	457.12	
12	2.67	0.65	3.32	20.00	66.30	>10
	18.41	4.46	22.87	137.90	457.12	
13	4.88	1.06	5.94	20.00	66.30	8.52
	33.61	7.34	40.95	137.90	457.12	

MARKUP

14	4.71	1.72	6.42	20.00	66.30	8.86
	32.44	11.83	44.28	137.90	457.12	
15	5.77	5.53	11.29	20.00	66.30	4.87
	39.77	38.11	77.87	137.90	457.12	
16	5.92	3.73	9.65	20.00	66.30	5.87
	40.81	25.71	66.51	137.90	457.12	
17	5.21	2.80	8.00	20.00	66.30	7.28
	35.90	19.28	55.18	137.90	457.12	
18	5.82	3.26	9.08	20.00	66.30	6.31
	40.13	22.44	62.57	137.90	457.12	
19	7.29	5.09	12.39	20.00	66.30	4.35
	50.29	35.12	85.42	137.90	457.12	
20	5.78	4.99	10.77	20.00	66.30	5.16
	39.86	34.37	74.23	137.90	457.12	
21	2.34	0.70	3.04	20.00	66.30	>10
	16.15	4.81	20.97	137.90	457.12	
22	4.18	2.53	6.71	20.00	66.30	8.88
	28.81	17.47	46.27	137.90	457.12	

Min MS: 2.605, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-81. Load Combination 303, Cg/Corner Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 303, 102, 201, 211
30-ft. Cg/Corner Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	2.63	1.58	4.22	20.00	66.30	>10
	18.16	10.91	29.07	137.90	457.12	
2	1.22	0.18	1.41	20.00	66.30	>10
	8.43	1.26	9.70	137.90	457.12	
3	0.79	0.22	1.01	20.00	66.30	>10
	5.47	1.51	6.98	137.90	457.12	
4	8.54	9.13	17.68	20.00	66.30	2.75
	58.90	62.98	121.88	137.90	457.12	
5	6.36	7.21	13.57	20.00	66.30	3.88
	43.87	49.72	93.59	137.90	457.12	
6	3.96	2.70	6.66	20.00	66.30	8.96
	27.29	18.61	45.90	137.90	457.12	
7	2.53	0.07	2.60	20.00	66.30	>10
	17.46	0.46	17.92	137.90	457.12	
8	2.01	0.04	2.05	20.00	66.30	>10
	13.87	0.26	14.13	137.90	457.12	
9	1.48	0.04	1.52	20.00	66.30	>10
	10.19	0.28	10.47	137.90	457.12	
10	2.00	1.55	3.55	20.00	66.30	>10
	13.80	10.68	24.48	137.90	457.12	
11	1.37	0.53	1.90	20.00	66.30	>10
	9.44	3.63	13.07	137.90	457.12	
12	0.78	0.52	1.31	20.00	66.30	>10
	5.38	3.61	9.00	137.90	457.12	
13	1.74	0.98	2.71	20.00	66.30	>10
	11.97	6.73	18.70	137.90	457.12	

MARKUP

14	1.63	1.02	2.65	20.00	66.30	>10
	11.23	7.04	18.27	137.90	457.12	
15	5.12	5.48	10.60	20.00	66.30	5.26
	35.28	37.78	73.06	137.90	457.12	
16	5.01	3.63	8.64	20.00	66.30	6.67
	34.57	25.00	59.57	137.90	457.12	
17	4.21	2.92	7.13	20.00	66.30	8.30
	29.05	20.10	49.15	137.90	457.12	
18	4.05	3.40	7.45	20.00	66.30	7.90
	27.90	23.46	51.36	137.90	457.12	
19	5.06	5.27	10.33	20.00	66.30	5.42
	34.88	36.32	71.20	137.90	457.12	
20	4.49	4.89	9.38	20.00	66.30	6.07
	30.97	33.70	64.67	137.90	457.12	
21	0.37	0.49	0.86	20.00	66.30	>10
	2.56	3.37	5.92	137.90	457.12	
22	3.39	2.46	5.85	20.00	66.30	>10
	23.40	16.94	40.34	137.90	457.12	

Min MS: 2.751, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-82. Load Combination 304, Head-On Drop Orientation at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-100

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	4.78	2.69	7.47	20.00	70.00	8.37
	32.97	18.51	51.48	137.90	482.63	
2	2.44	0.06	2.50	20.00	70.00	>10
	16.84	0.39	17.23	137.90	482.63	
3	1.32	0.02	1.34	20.00	70.00	>10
	9.07	0.14	9.21	137.90	482.63	
4	9.94	10.87	20.81	20.00	70.00	2.36
	68.57	74.93	143.50	137.90	482.63	
5	5.05	7.74	12.79	20.00	70.00	4.47
	34.84	53.33	88.17	137.90	482.63	
6	1.69	2.01	3.70	20.00	70.00	>10
	11.64	13.88	25.52	137.90	482.63	
7	1.08	0.03	1.11	20.00	70.00	>10
	7.42	0.20	7.62	137.90	482.63	
8	0.97	0.00	0.97	20.00	70.00	>10
	6.70	0.01	6.71	137.90	482.63	
9	0.93	0.00	0.93	20.00	70.00	>10
	6.41	0.02	6.43	137.90	482.63	
10	1.15	0.72	1.87	20.00	70.00	>10
	7.91	4.96	12.87	137.90	482.63	
11	0.91	0.43	1.34	20.00	70.00	>10
	6.29	2.96	9.24	137.90	482.63	
12	0.56	0.97	1.53	20.00	70.00	>10
	3.89	6.67	10.56	137.90	482.63	
13	1.16	0.73	1.89	20.00	70.00	>10
	8.02	5.00	13.03	137.90	482.63	

MARKUP

14	0.97	0.58	1.55	20.00	70.00	>10
	6.69	4.03	10.71	137.90	482.63	
15	2.02	0.29	2.31	20.00	70.00	>10
	13.92	2.01	15.94	137.90	482.63	
16	1.74	1.35	3.09	20.00	70.00	>10
	12.00	9.30	21.30	137.90	482.63	
17	1.80	1.99	3.80	20.00	70.00	>10
	12.43	13.75	26.18	137.90	482.63	
18	2.96	3.98	6.94	20.00	70.00	9.08
	20.44	27.45	47.88	137.90	482.63	
19	2.90	2.75	5.65	20.00	70.00	>10
	19.98	18.99	38.97	137.90	482.63	
20	1.97	3.55	5.52	20.00	70.00	>10
	13.62	24.45	38.07	137.90	482.63	
21	1.18	0.48	1.66	20.00	70.00	>10
	8.14	3.33	11.47	137.90	482.63	
22	1.25	1.00	2.25	20.00	70.00	>10
	8.65	6.87	15.52	137.90	482.63	

Min MS: 2.363, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-83. Load Combination 305, Side Drop Orientation at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-100

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	6.83	2.99	9.82	20.00	70.00	6.03
	47.11	20.61	67.72	137.90	482.63	
2	2.75	1.94	4.69	20.00	70.00	>10
	18.97	13.38	32.35	137.90	482.63	
3	6.27	2.13	8.40	20.00	70.00	6.66
	43.23	14.70	57.93	137.90	482.63	
4	6.33	2.79	9.12	20.00	70.00	6.58
	43.64	19.21	62.85	137.90	482.63	
5	6.51	1.63	8.14	20.00	70.00	6.37
	44.90	11.22	56.12	137.90	482.63	
6	5.49	0.99	6.48	20.00	70.00	7.75
	37.84	6.83	44.67	137.90	482.63	
7	3.56	0.31	3.87	20.00	70.00	>10
	24.57	2.11	26.68	137.90	482.63	
8	2.73	0.30	3.03	20.00	70.00	>10
	18.83	2.04	20.87	137.90	482.63	
9	3.56	0.31	3.87	20.00	70.00	>10
	24.55	2.13	26.67	137.90	482.63	
10	4.32	1.18	5.50	20.00	70.00	>10
	29.81	8.13	37.94	137.90	482.63	
11	4.16	1.64	5.80	20.00	70.00	>10
	28.66	11.32	39.98	137.90	482.63	
12	3.09	0.34	3.43	20.00	70.00	>10
	21.30	2.34	23.63	137.90	482.63	
13	5.72	0.57	6.28	20.00	70.00	7.40
	39.42	3.90	43.32	137.90	482.63	

MARKUP

14	5.55	1.32	6.87	20.00	70.00	7.65
	38.25	9.10	47.36	137.90	482.63	
15	3.19	0.39	3.58	20.00	70.00	>10
	22.01	2.69	24.70	137.90	482.63	
16	5.17	0.67	5.84	20.00	70.00	8.28
	35.67	4.62	40.29	137.90	482.63	
17	5.09	0.63	5.72	20.00	70.00	8.43
	35.09	4.35	39.44	137.90	482.63	
18	5.60	0.66	6.27	20.00	70.00	7.56
	38.64	4.57	43.21	137.90	482.63	
19	6.12	0.79	6.90	20.00	70.00	6.85
	42.18	5.41	47.60	137.90	482.63	
20	4.80	0.83	5.63	20.00	70.00	9.00
	33.10	5.74	38.84	137.90	482.63	
21	3.02	0.42	3.43	20.00	70.00	>10
	20.80	2.87	23.66	137.90	482.63	
22	3.43	0.35	3.78	20.00	70.00	>10
	23.67	2.43	26.10	137.90	482.63	

Min MS: 6.025, Location: 1, Combination: Pm

MARKUP

Table 2-84. Load Combination 306, Cg/Corner Drop Orientation at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-100

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	3.43	1.86	5.29	20.00	70.00	>10
	23.67	12.81	36.49	137.90	482.63	
2	1.69	0.24	1.93	20.00	70.00	>10
	11.64	1.68	13.32	137.90	482.63	
3	1.09	0.28	1.37	20.00	70.00	>10
	7.51	1.93	9.44	137.90	482.63	
4	5.95	2.17	8.12	20.00	70.00	7.07
	41.00	14.98	55.98	137.90	482.63	
5	3.87	1.81	5.68	20.00	70.00	>10
	26.69	12.47	39.16	137.90	482.63	
6	3.61	1.25	4.85	20.00	70.00	>10
	24.87	8.60	33.47	137.90	482.63	
7	3.30	0.08	3.38	20.00	70.00	>10
	22.74	0.58	23.32	137.90	482.63	
8	2.57	0.05	2.62	20.00	70.00	>10
	17.73	0.36	18.09	137.90	482.63	
9	1.82	0.04	1.86	20.00	70.00	>10
	12.57	0.28	12.86	137.90	482.63	
10	1.63	0.85	2.48	20.00	70.00	>10
	11.24	5.83	17.07	137.90	482.63	
11	1.17	0.41	1.58	20.00	70.00	>10
	8.08	2.80	10.88	137.90	482.63	
12	0.45	0.17	0.62	20.00	70.00	>10
	3.09	1.16	4.25	137.90	482.63	
13	1.33	0.44	1.77	20.00	70.00	>10
	9.17	3.05	12.22	137.90	482.63	

MARKUP

14	1.25	0.35	1.60	20.00	70.00	>10
	8.61	2.39	11.00	137.90	482.63	
15	2.28	0.32	2.61	20.00	70.00	>10
	15.73	2.23	17.97	137.90	482.63	
16	3.91	0.53	4.44	20.00	70.00	>10
	26.95	3.64	30.59	137.90	482.63	
17	3.70	0.80	4.50	20.00	70.00	>10
	25.52	5.50	31.02	137.90	482.63	
18	3.13	0.87	4.00	20.00	70.00	>10
	21.55	5.99	27.55	137.90	482.63	
19	2.99	1.03	4.02	20.00	70.00	>10
	20.63	7.09	27.73	137.90	482.63	
20	3.00	0.70	3.69	20.00	70.00	>10
	20.67	4.80	25.47	137.90	482.63	
21	0.26	0.12	0.38	20.00	70.00	>10
	1.79	0.84	2.63	137.90	482.63	
22	2.34	0.25	2.58	20.00	70.00	>10
	16.10	1.70	17.80	137.90	482.63	

Min MS: 7.071, Location: 4, Combination: Pm

MARKUP

Table 2-85. Load Combination 310, Additional Increased External Pressure (290 psi), Hypothetical Accident Conditions of Transport – Model AOS-100

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

Loc	Stress (ksi/MPa) Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	0.95	1.70	20.00	70.00	>10
	5.19	6.56	11.75	137.90	482.63	
2	0.19	0.03	0.22	20.00	70.00	>10
	1.29	0.21	1.51	137.90	482.63	
3	0.18	0.12	0.30	20.00	70.00	>10
	1.25	0.82	2.07	137.90	482.63	
4	6.25	11.56	17.80	20.00	70.00	2.93
	43.06	79.68	122.74	137.90	482.63	
5	6.38	9.75	16.13	20.00	70.00	3.34
	43.98	67.20	111.18	137.90	482.63	
6	2.50	4.07	6.57	20.00	70.00	9.66
	17.22	28.06	45.27	137.90	482.63	
7	1.26	0.02	1.28	20.00	70.00	>10
	8.69	0.14	8.83	137.90	482.63	
8	1.26	0.00	1.26	20.00	70.00	>10
	8.68	0.00	8.69	137.90	482.63	
9	1.26	0.02	1.28	20.00	70.00	>10
	8.68	0.12	8.80	137.90	482.63	
10	1.18	0.71	1.89	20.00	70.00	>10
	8.13	4.89	13.02	137.90	482.63	
11	0.76	0.47	1.23	20.00	70.00	>10
	5.25	3.23	8.48	137.90	482.63	
12	1.67	2.42	4.09	20.00	70.00	>10
	11.53	16.70	28.23	137.90	482.63	
13	1.29	1.36	2.64	20.00	70.00	>10
	8.87	9.35	18.22	137.90	482.63	

MARKUP

14	0.97	0.62	1.58	20.00	70.00	>10
	6.66	4.25	10.91	137.90	482.63	
15	4.03	0.08	4.11	20.00	70.00	>10
	27.78	0.57	28.35	137.90	482.63	
16	0.80	1.16	1.96	20.00	70.00	>10
	5.50	8.02	13.53	137.90	482.63	
17	0.57	1.01	1.58	20.00	70.00	>10
	3.94	6.96	10.91	137.90	482.63	
18	0.67	1.18	1.85	20.00	70.00	>10
	4.62	8.13	12.75	137.90	482.63	
19	0.95	1.13	2.08	20.00	70.00	>10
	6.52	7.81	14.33	137.90	482.63	
20	1.01	1.27	2.29	20.00	70.00	>10
	6.98	8.78	15.77	137.90	482.63	
21	1.91	0.95	2.87	20.00	70.00	>10
	13.19	6.58	19.77	137.90	482.63	
22	1.83	0.90	2.73	20.00	70.00	>10
	12.64	6.19	18.83	137.90	482.63	

Min MS: 2.932, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-86. Load Combination 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 311, 101, 201, 211
4-ft. Drop onto Rod
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.24	0.86	2.10	20.00	70.00	>10
	8.52	5.95	14.47	137.90	482.63	
2	0.35	0.13	0.48	20.00	70.00	>10
	2.41	0.88	3.28	137.90	482.63	
3	0.14	0.04	0.17	20.00	70.00	>10
	0.95	0.25	1.20	137.90	482.63	
4	6.11	9.06	15.17	20.00	70.00	3.61
	42.14	62.46	104.60	137.90	482.63	
5	5.74	8.08	13.82	20.00	70.00	4.06
	39.58	55.73	95.31	137.90	482.63	
6	2.91	2.36	5.27	20.00	70.00	>10
	20.04	16.28	36.32	137.90	482.63	
7	1.15	0.02	1.17	20.00	70.00	>10
	7.96	0.13	8.09	137.90	482.63	
8	0.78	0.00	0.78	20.00	70.00	>10
	5.40	0.00	5.41	137.90	482.63	
9	0.51	0.02	0.52	20.00	70.00	>10
	3.50	0.11	3.60	137.90	482.63	
10	1.19	1.29	2.48	20.00	70.00	>10
	8.22	8.91	17.13	137.90	482.63	
11	0.90	0.32	1.22	20.00	70.00	>10
	6.19	2.20	8.39	137.90	482.63	
12	0.88	0.96	1.84	20.00	70.00	>10
	6.09	6.61	12.71	137.90	482.63	
13	1.64	1.54	3.18	20.00	70.00	>10
	11.31	10.60	21.92	137.90	482.63	

MARKUP

14	1.61	1.52	3.13	20.00	70.00	>10
	11.10	10.46	21.56	137.90	482.63	
15	33.29	6.23	39.52	20.00	70.00	0.44
	229.53	42.97	272.50	137.90	482.63	
16	8.43	12.12	20.55	20.00	70.00	2.41
	58.11	83.57	141.68	137.90	482.63	
17	5.15	8.59	13.73	20.00	70.00	4.10
	35.48	59.21	94.69	137.90	482.63	
18	3.23	3.39	6.61	20.00	70.00	9.58
	22.25	23.36	45.61	137.90	482.63	
19	4.74	6.79	11.53	20.00	70.00	5.07
	32.67	46.83	79.50	137.90	482.63	
20	4.61	7.84	12.44	20.00	70.00	4.62
	31.75	54.05	85.80	137.90	482.63	
21	0.42	0.83	1.24	20.00	70.00	>10
	2.86	5.70	8.57	137.90	482.63	
22	14.41	11.66	26.07	20.00	70.00	1.69
	99.35	80.38	179.74	137.90	482.63	

Min MS: 0.442, Location: 15, Combination: Pm

MARKUP

Table 2-87. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 311, 104, 201, 211
4-ft. Drop onto Rod
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	1.24	0.86	2.10	20.00	70.00	>10
	8.52	5.95	14.47	137.90	482.63	
2	0.35	0.13	0.48	20.00	70.00	>10
	2.41	0.88	3.28	137.90	482.63	
3	0.14	0.04	0.17	20.00	70.00	>10
	0.95	0.25	1.20	137.90	482.63	
4	6.11	9.06	15.17	20.00	70.00	3.61
	42.14	62.46	104.60	137.90	482.63	
5	5.74	8.08	13.82	20.00	70.00	4.06
	39.58	55.73	95.31	137.90	482.63	
6	2.91	2.36	5.27	20.00	70.00	>10
	20.04	16.28	36.32	137.90	482.63	
7	1.15	0.02	1.17	20.00	70.00	>10
	7.96	0.13	8.09	137.90	482.63	
8	0.78	0.00	0.78	20.00	70.00	>10
	5.40	0.00	5.41	137.90	482.63	
9	0.51	0.02	0.52	20.00	70.00	>10
	3.50	0.11	3.60	137.90	482.63	
10	1.19	1.29	2.48	20.00	70.00	>10
	8.22	8.91	17.13	137.90	482.63	
11	0.90	0.32	1.22	20.00	70.00	>10
	6.19	2.20	8.39	137.90	482.63	
12	0.88	0.96	1.84	20.00	70.00	>10
	6.09	6.61	12.71	137.90	482.63	
13	1.64	1.54	3.18	20.00	70.00	>10
	11.31	10.60	21.92	137.90	482.63	

MARKUP

14	1.61	1.52	3.13	20.00	70.00	>10
	11.10	10.46	21.56	137.90	482.63	
15	33.29	6.23	39.52	20.00	70.00	0.44
	229.53	42.97	272.50	137.90	482.63	
16	8.43	12.12	20.55	20.00	70.00	2.41
	58.11	83.57	141.68	137.90	482.63	
17	5.15	8.59	13.73	20.00	70.00	4.10
	35.48	59.21	94.69	137.90	482.63	
18	3.23	3.39	6.61	20.00	70.00	9.58
	22.25	23.36	45.61	137.90	482.63	
19	4.74	6.79	11.53	20.00	70.00	5.07
	32.67	46.83	79.50	137.90	482.63	
20	4.61	7.84	12.44	20.00	70.00	4.62
	31.75	54.05	85.80	137.90	482.63	
21	0.42	0.83	1.24	20.00	70.00	>10
	2.86	5.70	8.57	137.90	482.63	
22	14.41	11.66	26.07	20.00	70.00	1.69
	99.35	80.38	179.74	137.90	482.63	

Min MS: 0.442, Location: 15, Combination: Pm

MARKUP

Table 2-88. Load Combination 350, Fire at 30 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 111, 201, 211
Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.60	0.86	1.46	20.00	66.30	>10
	4.14	5.93	10.07	137.90	457.12	
2	0.04	0.03	0.07	17.40	59.20	>10
	0.28	0.19	0.47	119.97	408.17	
3	0.03	0.02	0.05	20.00	66.30	>10
	0.17	0.16	0.33	137.90	457.12	
4	4.94	8.72	13.66	20.00	66.30	3.85
	34.09	60.09	94.18	137.90	457.12	
5	4.28	6.97	11.24	20.00	66.30	4.90
	29.48	48.05	77.52	137.90	457.12	
6	1.66	2.27	3.93	20.00	66.30	>10
	11.45	15.65	27.10	137.90	457.12	
7	0.29	0.01	0.29	20.00	66.30	>10
	1.97	0.05	2.02	137.90	457.12	
8	0.28	0.00	0.28	20.00	66.30	>10
	1.96	0.00	1.96	137.90	457.12	
9	0.28	0.01	0.30	20.00	66.30	>10
	1.96	0.08	2.04	137.90	457.12	
10	0.98	1.01	1.99	20.00	66.30	>10
	6.76	6.95	13.72	137.90	457.12	
11	0.61	0.28	0.90	20.00	66.30	>10
	4.22	1.96	6.18	137.90	457.12	
12	0.52	0.41	0.93	20.00	66.30	>10
	3.55	2.83	6.39	137.90	457.12	
13	1.04	0.92	1.96	20.00	66.30	>10
	7.17	6.32	13.50	137.90	457.12	

MARKUP

14	0.98	0.98	1.96	20.00	66.30	>10
	6.76	6.78	13.53	137.90	457.12	
15	3.84	5.45	9.29	20.00	66.30	6.14
	26.44	37.58	64.02	137.90	457.12	
16	2.32	3.39	5.72	20.00	66.30	>10
	16.01	23.40	39.41	137.90	457.12	
17	1.64	2.46	4.10	20.00	66.30	>10
	11.32	16.94	28.26	137.90	457.12	
18	1.94	3.00	4.94	20.00	66.30	>10
	13.41	20.68	34.09	137.90	457.12	
19	3.11	4.80	7.92	20.00	66.30	7.38
	21.47	33.11	54.57	137.90	457.12	
20	2.54	4.71	7.25	20.00	66.30	8.14
	17.53	32.47	50.00	137.90	457.12	
21	0.22	0.47	0.69	20.00	66.30	>10
	1.55	3.21	4.76	137.90	457.12	
22	1.97	2.34	4.31	20.00	66.30	>10
	13.59	16.13	29.72	137.90	457.12	

Min MS: 3.854, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-89. Load Combination 351, Fire at 60 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 112, 201, 211
Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.60	0.86	1.46	20.00	61.80	>10
	4.14	5.93	10.07	137.90	426.10	
2	0.04	0.03	0.07	18.70	59.70	>10
	0.28	0.19	0.47	128.93	411.62	
3	0.03	0.02	0.05	20.00	61.80	>10
	0.17	0.16	0.33	137.90	426.10	
4	4.94	8.72	13.66	20.00	66.30	3.85
	34.09	60.09	94.18	137.90	457.12	
5	4.28	6.97	11.24	20.00	66.30	4.90
	29.48	48.05	77.52	137.90	457.12	
6	1.66	2.27	3.93	20.00	61.80	>10
	11.45	15.65	27.10	137.90	426.10	
7	0.29	0.01	0.29	20.00	61.80	>10
	1.97	0.05	2.02	137.90	426.10	
8	0.28	0.00	0.28	20.00	61.80	>10
	1.96	0.00	1.96	137.90	426.10	
9	0.28	0.01	0.30	20.00	61.80	>10
	1.96	0.08	2.04	137.90	426.10	
10	0.98	1.01	1.99	20.00	61.80	>10
	6.76	6.95	13.72	137.90	426.10	
11	0.61	0.28	0.90	20.00	66.30	>10
	4.22	1.96	6.18	137.90	457.12	
12	0.52	0.41	0.93	20.00	66.30	>10
	3.55	2.83	6.39	137.90	457.12	
13	1.04	0.92	1.96	20.00	66.30	>10
	7.17	6.32	13.50	137.90	457.12	

MARKUP

14	0.98	0.98	1.96	20.00	66.30	>10
	6.76	6.78	13.53	137.90	457.12	
15	3.84	5.45	9.29	20.00	66.30	6.14
	26.44	37.58	64.02	137.90	457.12	
16	2.32	3.39	5.72	20.00	66.30	>10
	16.01	23.40	39.41	137.90	457.12	
17	1.64	2.46	4.10	20.00	66.30	>10
	11.32	16.94	28.26	137.90	457.12	
18	1.94	3.00	4.94	20.00	66.30	>10
	13.41	20.68	34.09	137.90	457.12	
19	3.11	4.80	7.92	20.00	66.30	7.38
	21.47	33.11	54.57	137.90	457.12	
20	2.54	4.71	7.25	20.00	66.30	8.14
	17.53	32.47	50.00	137.90	457.12	
21	0.22	0.47	0.69	20.00	66.30	>10
	1.55	3.21	4.76	137.90	457.12	
22	1.97	2.34	4.31	20.00	66.30	>10
	13.59	16.13	29.72	137.90	457.12	

Min MS: 3.854, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-90. Load Combination 352, Fire at 90 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 113, 201, 211
Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.60	0.86	1.46	20.00	61.80	>10
	4.14	5.93	10.07	137.90	426.10	
2	0.04	0.03	0.07	20.00	61.80	>10
	0.28	0.19	0.47	137.90	426.10	
3	0.03	0.02	0.05	20.00	61.80	>10
	0.17	0.16	0.33	137.90	426.10	
4	4.94	8.72	13.66	20.00	61.80	3.52
	34.09	60.09	94.18	137.90	426.10	
5	4.28	6.97	11.24	20.00	61.80	4.50
	29.48	48.05	77.52	137.90	426.10	
6	1.66	2.27	3.93	20.00	61.80	>10
	11.45	15.65	27.10	137.90	426.10	
7	0.29	0.01	0.29	20.00	61.80	>10
	1.97	0.05	2.02	137.90	426.10	
8	0.28	0.00	0.28	20.00	61.80	>10
	1.96	0.00	1.96	137.90	426.10	
9	0.28	0.01	0.30	20.00	61.80	>10
	1.96	0.08	2.04	137.90	426.10	
10	0.98	1.01	1.99	20.00	61.80	>10
	6.76	6.95	13.72	137.90	426.10	
11	0.61	0.28	0.90	20.00	61.80	>10
	4.22	1.96	6.18	137.90	426.10	
12	0.52	0.41	0.93	20.00	61.80	>10
	3.55	2.83	6.39	137.90	426.10	
13	1.04	0.92	1.96	20.00	61.80	>10
	7.17	6.32	13.50	137.90	426.10	

MARKUP

14	0.98	0.98	1.96	20.00	61.80	>10
	6.76	6.78	13.53	137.90	426.10	
15	3.84	5.45	9.29	20.00	66.30	6.14
	26.44	37.58	64.02	137.90	457.12	
16	2.32	3.39	5.72	20.00	66.30	>10
	16.01	23.40	39.41	137.90	457.12	
17	1.64	2.46	4.10	20.00	66.30	>10
	11.32	16.94	28.26	137.90	457.12	
18	1.94	3.00	4.94	20.00	66.30	>10
	13.41	20.68	34.09	137.90	457.12	
19	3.11	4.80	7.92	20.00	66.30	7.38
	21.47	33.11	54.57	137.90	457.12	
20	2.54	4.71	7.25	20.00	66.30	8.14
	17.53	32.47	50.00	137.90	457.12	
21	0.22	0.47	0.69	20.00	66.30	>10
	1.55	3.21	4.76	137.90	457.12	
22	1.97	2.34	4.31	20.00	66.30	>10
	13.59	16.13	29.72	137.90	457.12	

Min MS: 3.524, Location: 4, Combination: Pm+Pb

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Table 2-91. Load Combination 353, Fire at 120 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 114, 201, 211
Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.60	0.86	1.46	20.00	61.80	>10
	4.14	5.93	10.07	137.90	426.10	
2	0.04	0.03	0.07	20.00	61.80	>10
	0.28	0.19	0.47	137.90	426.10	
3	0.03	0.02	0.05	20.00	61.80	>10
	0.17	0.16	0.33	137.90	426.10	
4	4.94	8.72	13.66	20.00	61.80	3.52
	34.09	60.09	94.18	137.90	426.10	
5	4.28	6.97	11.24	20.00	61.80	4.50
	29.48	48.05	77.52	137.90	426.10	
6	1.66	2.27	3.93	20.00	61.80	>10
	11.45	15.65	27.10	137.90	426.10	
7	0.29	0.01	0.29	20.00	61.80	>10
	1.97	0.05	2.02	137.90	426.10	
8	0.28	0.00	0.28	20.00	61.80	>10
	1.96	0.00	1.96	137.90	426.10	
9	0.28	0.01	0.30	20.00	61.80	>10
	1.96	0.08	2.04	137.90	426.10	
10	0.98	1.01	1.99	20.00	61.80	>10
	6.76	6.95	13.72	137.90	426.10	
11	0.61	0.28	0.90	20.00	61.80	>10
	4.22	1.96	6.18	137.90	426.10	
12	0.52	0.41	0.93	20.00	61.80	>10
	3.55	2.83	6.39	137.90	426.10	
13	1.04	0.92	1.96	20.00	61.80	>10
	7.17	6.32	13.50	137.90	426.10	

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14	0.98	0.98	1.96	20.00	61.80	>10
	6.76	6.78	13.53	137.90	426.10	
15	3.84	5.45	9.29	20.00	66.30	6.14
	26.44	37.58	64.02	137.90	457.12	
16	2.32	3.39	5.72	20.00	66.30	>10
	16.01	23.40	39.41	137.90	457.12	
17	1.64	2.46	4.10	20.00	66.30	>10
	11.32	16.94	28.26	137.90	457.12	
18	1.94	3.00	4.94	20.00	66.30	>10
	13.41	20.68	34.09	137.90	457.12	
19	3.11	4.80	7.92	20.00	66.30	7.38
	21.47	33.11	54.57	137.90	457.12	
20	2.54	4.71	7.25	20.00	61.80	7.52
	17.53	32.47	50.00	137.90	426.10	
21	0.22	0.47	0.69	20.00	66.30	>10
	1.55	3.21	4.76	137.90	457.12	
22	1.97	2.34	4.31	20.00	66.30	>10
	13.59	16.13	29.72	137.90	457.12	

Min MS: 3.524, Location: 4, Combination: Pm+Pb

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Table 2-92. Load Combination 354, Fire at 150 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 115, 201, 211
Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.60	0.86	1.46	20.00	61.80	>10
	4.14	5.93	10.07	137.90	426.10	
2	0.04	0.03	0.07	20.00	61.80	>10
	0.28	0.19	0.47	137.90	426.10	
3	0.03	0.02	0.05	20.00	61.80	>10
	0.17	0.16	0.33	137.90	426.10	
4	4.94	8.72	13.66	20.00	61.80	3.52
	34.09	60.09	94.18	137.90	426.10	
5	4.28	6.97	11.24	20.00	61.80	4.50
	29.48	48.05	77.52	137.90	426.10	
6	1.66	2.27	3.93	20.00	61.80	>10
	11.45	15.65	27.10	137.90	426.10	
7	0.29	0.01	0.29	20.00	61.80	>10
	1.97	0.05	2.02	137.90	426.10	
8	0.28	0.00	0.28	20.00	61.80	>10
	1.96	0.00	1.96	137.90	426.10	
9	0.28	0.01	0.30	20.00	61.80	>10
	1.96	0.08	2.04	137.90	426.10	
10	0.98	1.01	1.99	20.00	61.80	>10
	6.76	6.95	13.72	137.90	426.10	
11	0.61	0.28	0.90	20.00	61.80	>10
	4.22	1.96	6.18	137.90	426.10	
12	0.52	0.41	0.93	20.00	61.80	>10
	3.55	2.83	6.39	137.90	426.10	
13	1.04	0.92	1.96	20.00	61.80	>10
	7.17	6.32	13.50	137.90	426.10	

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14	0.98	0.98	1.96	20.00	61.80	>10
	6.76	6.78	13.53	137.90	426.10	
15	3.84	5.45	9.29	20.00	66.30	6.14
	26.44	37.58	64.02	137.90	457.12	
16	2.32	3.39	5.72	20.00	66.30	>10
	16.01	23.40	39.41	137.90	457.12	
17	1.64	2.46	4.10	20.00	66.30	>10
	11.32	16.94	28.26	137.90	457.12	
18	1.94	3.00	4.94	20.00	61.80	>10
	13.41	20.68	34.09	137.90	426.10	
19	3.11	4.80	7.92	20.00	61.80	6.81
	21.47	33.11	54.57	137.90	426.10	
20	2.54	4.71	7.25	20.00	61.80	7.52
	17.53	32.47	50.00	137.90	426.10	
21	0.22	0.47	0.69	20.00	66.30	>10
	1.55	3.21	4.76	137.90	457.12	
22	1.97	2.34	4.31	20.00	66.30	>10
	13.59	16.13	29.72	137.90	457.12	

Min MS: 3.524, Location: 4, Combination: Pm+Pb

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Table 2-93. Load Combination 355, Fire at 180 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-100

Load Cases: 116, 201, 211
Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure 1,931 kPa (280 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.60	0.86	1.46	20.00	61.80	>10
	4.14	5.93	10.07	137.90	426.10	
2	0.04	0.03	0.07	20.00	61.80	>10
	0.28	0.19	0.47	137.90	426.10	
3	0.03	0.02	0.05	20.00	61.80	>10
	0.17	0.16	0.33	137.90	426.10	
4	4.94	8.72	13.66	20.00	61.80	3.52
	34.09	60.09	94.18	137.90	426.10	
5	4.28	6.97	11.24	20.00	61.80	4.50
	29.48	48.05	77.52	137.90	426.10	
6	1.66	2.27	3.93	20.00	61.80	>10
	11.45	15.65	27.10	137.90	426.10	
7	0.29	0.01	0.29	20.00	61.80	>10
	1.97	0.05	2.02	137.90	426.10	
8	0.28	0.00	0.28	20.00	61.80	>10
	1.96	0.00	1.96	137.90	426.10	
9	0.28	0.01	0.30	20.00	61.80	>10
	1.96	0.08	2.04	137.90	426.10	
10	0.98	1.01	1.99	20.00	61.80	>10
	6.76	6.95	13.72	137.90	426.10	
11	0.61	0.28	0.90	20.00	61.80	>10
	4.22	1.96	6.18	137.90	426.10	
12	0.52	0.41	0.93	20.00	61.80	>10
	3.55	2.83	6.39	137.90	426.10	
13	1.04	0.92	1.96	20.00	61.80	>10
	7.17	6.32	13.50	137.90	426.10	

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14	0.98	0.98	1.96	20.00	61.80	>10
	6.76	6.78	13.53	137.90	426.10	
15	3.84	5.45	9.29	20.00	61.80	5.66
	26.44	37.58	64.02	137.90	426.10	
16	2.32	3.39	5.72	20.00	61.80	9.81
	16.01	23.40	39.41	137.90	426.10	
17	1.64	2.46	4.10	20.00	61.80	>10
	11.32	16.94	28.26	137.90	426.10	
18	1.94	3.00	4.94	20.00	61.80	>10
	13.41	20.68	34.09	137.90	426.10	
19	3.11	4.80	7.92	20.00	61.80	6.81
	21.47	33.11	54.57	137.90	426.10	
20	2.54	4.71	7.25	20.00	61.80	7.52
	17.53	32.47	50.00	137.90	426.10	
21	0.22	0.47	0.69	20.00	61.80	>10
	1.55	3.21	4.76	137.90	426.10	
22	1.97	2.34	4.31	20.00	66.30	>10
	13.59	16.13	29.72	137.90	457.12	

Min MS: 3.524, Location: 4, Combination: Pm+Pb

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2.7.9 Hypothetical Accident Conditions for Air Transport of Plutonium

Note: *Not applicable. Plutonium is not an authorized content for the AOS Transport Packaging System.*

2.7.10 Hypothetical Accident Conditions for Fissile Material Package for Air Transport

Note: *Not applicable. Fuel is not an authorized content for the AOS Transport Packaging System.*

2.8 SPECIAL FORM

This section does not apply to the AOS Transport Packaging System.

2.9 FUEL RODS

This section does not apply to the AOS Transport Packaging System.

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2.10 APPENDIX

This appendix presents Load Case, Load Combination, Minimum Margins of Safety (Min MS), and Free Drop structural evaluation for the following AOS Transport Packaging System models:

- Model AOS-025 Transport Package
- Model AOS-050 Transport Package
- Model AOS-165A Transport Package
- Model AOS-165B Transport Package

This appendix also presents the following information:

- LIBRA Finite Element Analysis Program and Verification Problems
- Description of LIBRA Files and Post-Processors: AOS Safety Analysis Report
- Properties of Materials References
- Data CDs

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2.10.1 Model AOS-025 Transport Package

This appendix presents the following information, specific to the Model AOS-025 transport package:

- Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-025
- Hypothetical Accident Conditions of Transport, Summary of Damages (Stresses) – Model AOS-025
- Minimum Margins of Safety – Model AOS-025
- Free Drop – Model AOS-025

2.10.1.1 Normal Conditions of Transport Stress Summary and Comparisons with Allowable – Model AOS-025

Table 2-94 and Table 2-95 present Model AOS-025 transport package Load Cases and Load Combinations, respectively, under Normal conditions of transport:

- Table 2-96 through Table 2-113 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 2-114 through Table 2-128 present Load Combination test case output data.

Table 2-94. Load Cases Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-025

Load Case	Description	Data
101	100°F Ambient, Maximum Decay Heat	Table 2-96
102	100°F Ambient, Maximum Decay Heat, Maximum Insolation	Table 2-97
103	-20°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-98
104	-40°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-99
105	-40°F Ambient, Maximum Decay Heat	Table 2-100
106	-20°F Ambient, Maximum Decay Heat	Table 2-101
201	Maximum Internal Pressure, 207 kPa (30 psia)	Table 2-102
202	Minimum External Pressure, 24 kPa (3.5 psia)	Table 2-103
203	Maximum Increased External Pressure, 140 kPa (20 psia)	Table 2-104
204	Additional Increased External Pressure, 2 MPa (290 psia)	Table 2-105
211	Fabrication Stress	Table 2-106
215	Compression Load (5x weight)	Table 2-107
216	Rod Drop onto Cask	Table 2-108
221	Forward 5g Vibration Inertia Load	Table 2-109
222	Lateral 5g Vibration Inertia Load	Table 2-110
223	Vertical 10g Vibration Inertia Load	Table 2-111
231	4-ft. Head-On Drop	Table 2-112
232	30-ft. Head-On Drop Impact Test, Normal Conditions	Table 2-113

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Table 2-95. Load Combinations Associated with Allowable Stresses under Normal Conditions of Transport – Model AOS-025

Load Combination	Load Cases	Description	Data
101	102, 201, 211	Hot Environment	Table 2-114
102	104, 201, 211	Cold Environment	Table 2-115
103	103, 201, 211	Increased External Pressure	Table 2-116
104	101, 201, 202, 211	Minimum External Pressure	Table 2-117
105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat	Table 2-118
106	101, 201, 203, 211	Maximum Pressure, Hot Environment	Table 2-119
107	105, 201, 203, 211	Maximum Pressure, Cold Environment	Table 2-120
215	215, 101, 201, 211	Compression Load	Table 2-121
216	216, 101, 201, 211	Rod Drop	Table 2-122
217	216, 104, 201, 211	Rod Drop, Cold Environment	Table 2-123
221	221, 101, 201, 211	Forward Vibration	Table 2-124
222	222, 101, 201, 211	Lateral Vibration	Table 2-125
223	223, 101, 201, 211	Vertical Vibration	Table 2-126
231	231, 102, 201, 211	4-ft. Head-On Drop, Normal Conditions	Table 2-127
232	232, 102, 201, 211	130-ft. Head-On Drop, Normal Conditions (Impact Test)	Table 2-128

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Table 2-96. Load Case 101, 100°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2232E+01	-2.5191E+01	-1.8387E+00	3.7423E+01	5.8177E+01
	8.4340E-02	-1.7369E-01	-1.2677E-02	2.5803E-01	4.0111E-01
2	1.6225E+01	-3.2962E+01	-6.5255E+00	4.9187E+01	1.0016E+02
	1.1187E-01	-2.2727E-01	-4.4992E-02	3.3913E-01	6.9059E-01
3	1.0870E+01	-2.3382E+01	-1.1174E+00	3.4252E+01	5.3526E+01
	7.4943E-02	-1.6122E-01	-7.7043E-03	2.3616E-01	3.6905E-01
4	6.2382E+01	-2.3843E+02	-4.1530E+01	3.0081E+02	5.9563E+02
	4.3011E-01	-1.6439E+00	-2.8634E-01	2.0740E+00	4.1067E+00
5	6.1432E+01	-2.6905E+02	-1.2242E+02	3.3048E+02	5.2038E+02
	4.2356E-01	-1.8550E+00	-8.4406E-01	2.2786E+00	3.5879E+00
6	6.4534E+00	-1.3381E+02	-1.5795E+02	1.4026E+02	1.6725E+02
	4.4494E-02	-9.2256E-01	-1.0890E+00	9.6705E-01	1.1532E+00
7	-1.9752E+00	-4.9672E+01	2.5928E+00	4.7697E+01	4.3899E+01
	-1.3619E-02	-3.4248E-01	1.7877E-02	3.2886E-01	3.0267E-01
8	-2.0037E+00	-4.9648E+01	1.9949E-03	4.7644E+01	4.3457E+01
	-1.3815E-02	-3.4231E-01	1.3755E-05	3.2850E-01	2.9962E-01
9	-1.9811E+00	-4.9582E+01	-5.2273E-01	4.7600E+01	4.1764E+01
	-1.3659E-02	-3.4185E-01	-3.6041E-03	3.2819E-01	2.8795E-01
10	-7.5888E+00	-6.6970E+01	1.0700E+01	5.9381E+01	1.2009E+02
	-5.2323E-02	-4.6174E-01	7.3772E-02	4.0942E-01	8.2802E-01
11	-1.6114E+01	-1.0104E+02	-5.3150E+01	8.4930E+01	7.0193E+00
	-1.1110E-01	-6.9668E-01	-3.6645E-01	5.8557E-01	4.8396E-02
12	4.9440E+00	-1.1870E+02	-1.1938E+02	1.2364E+02	7.5796E+00
	3.4087E-02	-8.1839E-01	-8.2311E-01	8.5248E-01	5.2260E-02
13	-1.3346E+01	-1.7829E+02	-2.9776E+01	1.6495E+02	8.7679E+01
	-9.2016E-02	-1.2293E+00	-2.0530E-01	1.1373E+00	6.0452E-01
14	-1.2832E+01	-1.5680E+02	3.6799E+00	1.4396E+02	9.5911E+01
	-8.8473E-02	-1.0811E+00	2.5372E-02	9.9259E-01	6.6128E-01
15	3.4752E+02	-3.2306E+02	-3.0278E+01	6.7058E+02	1.1250E+03
	2.3960E+00	-2.2274E+00	-2.0876E-01	4.6235E+00	7.7568E+00

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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

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

Table 2-97. Load Case 102, 100°F Ambient, Maximum Decay Heat, Maximum Insolation, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.1209E+01	-2.2903E+01	-8.2048E-01	3.4112E+01	5.2999E+01
	7.7280E-02	-1.5791E-01	-5.6570E-03	2.3519E-01	3.6542E-01
2	1.5905E+01	-3.1956E+01	-6.1279E+00	4.7860E+01	9.8017E+01
	1.0966E-01	-2.2033E-01	-4.2250E-02	3.2999E-01	6.7580E-01
3	1.1811E+01	-2.4968E+01	-3.5854E+00	3.6779E+01	5.8283E+01
	8.1434E-02	-1.7215E-01	-2.4721E-02	2.5358E-01	4.0184E-01
4	5.2547E+01	-2.0891E+02	-3.6054E+01	2.6145E+02	5.1959E+02
	3.6230E-01	-1.4404E+00	-2.4858E-01	1.8027E+00	3.5825E+00
5	5.1880E+01	-2.3921E+02	-1.0941E+02	2.9109E+02	4.5572E+02
	3.5770E-01	-1.6493E+00	-7.5437E-01	2.0070E+00	3.1421E+00
6	5.9793E-01	-1.2010E+02	-1.4297E+02	1.2070E+02	1.4492E+02
	4.1226E-03	-8.2807E-01	-9.8578E-01	8.3220E-01	9.9916E-01
7	-1.9010E+00	-5.0303E+01	2.2818E+00	4.8402E+01	4.2241E+01
	-1.3107E-02	-3.4683E-01	1.5733E-02	3.3372E-01	2.9124E-01
8	-1.9250E+00	-5.0283E+01	1.4590E-02	4.8358E+01	4.1830E+01
	-1.3273E-02	-3.4669E-01	1.0060E-04	3.3341E-01	2.8841E-01
9	-1.9034E+00	-5.0222E+01	-2.5786E-01	4.8318E+01	4.0308E+01
	-1.3124E-02	-3.4627E-01	-1.7779E-03	3.3314E-01	2.7791E-01
10	-8.4266E+00	-6.4304E+01	5.9870E+00	5.5878E+01	1.1046E+02
	-5.8100E-02	-4.4336E-01	4.1279E-02	3.8526E-01	7.6159E-01
11	-1.4294E+01	-9.9614E+01	-5.4047E+01	8.5320E+01	1.0573E+01
	-9.8552E-02	-6.8682E-01	-3.7264E-01	5.8826E-01	7.2897E-02
12	1.1329E+01	-1.1531E+02	-1.1663E+02	1.2664E+02	1.3828E+01
	7.8112E-02	-7.9503E-01	-8.0415E-01	8.7314E-01	9.5344E-02
13	-1.3495E+01	-1.8163E+02	-3.0994E+01	1.6813E+02	9.2927E+01
	-9.3044E-02	-1.2523E+00	-2.1370E-01	1.1592E+00	6.4071E-01
14	-1.2702E+01	-1.5978E+02	4.6598E+00	1.4708E+02	1.0032E+02
	-8.7574E-02	-1.1017E+00	3.2128E-02	1.0141E+00	6.9171E-01
15	6.7090E+02	-6.1894E+02	-6.8961E+01	1.2898E+03	2.1606E+03
	4.6257E+00	-4.2675E+00	-4.7547E-01	8.8932E+00	1.4896E+01

WAREPACK

16	2.3656E+02	-4.7489E+02	-1.4137E+02	7.1145E+02	1.1569E+03
	1.6310E+00	-3.2743E+00	-9.7474E-01	4.9053E+00	7.9765E+00
17	1.0356E+02	-3.2407E+02	3.2625E+01	4.2763E+02	7.3899E+02
	7.1405E-01	-2.2344E+00	2.2494E-01	2.9484E+00	5.0952E+00
18	3.0322E+01	-1.7265E+02	1.3601E+02	2.0298E+02	3.3449E+02
	2.0906E-01	-1.1904E+00	9.3776E-01	1.3995E+00	2.3062E+00
19	9.0441E+01	-2.7088E+02	7.0982E+01	3.6132E+02	6.0110E+02
	6.2357E-01	-1.8677E+00	4.8941E-01	2.4912E+00	4.1444E+00
20	1.0543E+02	-3.5333E+02	2.2636E+00	4.5876E+02	8.5864E+02
	7.2689E-01	-2.4362E+00	1.5607E-02	3.1630E+00	5.9201E+00
21	1.6424E+01	2.6459E+00	5.5238E+00	1.3778E+01	1.0877E+00
	1.1324E-01	1.8242E-02	3.8086E-02	9.4996E-02	7.4996E-03
22	1.1849E+01	-2.6331E+01	-2.1756E+00	3.8180E+01	8.5922E+01
	8.1696E-02	-1.8155E-01	-1.5001E-02	2.6324E-01	5.9241E-01

Allowable Stress for Load Case 102

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	208.24	208.09	20.00	25.00	66.30
2	208.16	207.83	20.00	25.00	66.30
3	207.72	207.46	20.00	25.00	66.30
4	208.48	208.46	20.00	25.00	66.30
5	208.90	208.83	20.00	25.00	66.30
6	209.06	209.00	20.00	25.00	66.30
7	209.24	209.10	20.00	25.00	66.30
8	209.16	209.02	20.00	25.00	66.30
9	209.05	208.91	20.00	25.00	66.30
10	208.86	208.72	20.00	25.00	66.30
11	208.97	208.72	20.00	25.00	66.30
12	209.41	209.12	20.00	25.00	66.30
13	208.39	208.25	20.00	25.00	66.30
14	208.08	208.01	20.00	25.00	66.30
15	208.46	208.42	20.00	25.00	66.30
16	208.54	208.51	20.00	25.00	66.30
17	208.58	208.55	20.00	25.00	66.30
18	208.71	208.68	20.00	25.00	66.30
19	208.83	208.78	20.00	25.00	66.30
20	209.54	209.43	20.00	25.00	66.30
21	207.30	207.19	20.00	25.00	66.30
22	208.26	208.22	20.00	25.00	66.30

Table 2-98. Load Case 103, -20°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.6224E+01	-1.2400E+02	-2.5915E+01	1.6023E+02	1.5954E+02
	2.4975E-01	-8.5497E-01	-1.7868E-01	1.1047E+00	1.1000E+00
2	1.1401E+02	-1.5187E+00	-3.7180E+01	1.1553E+02	1.4883E+01
	7.8607E-01	-1.0471E-02	-2.5635E-01	7.9655E-01	1.0262E-01
3	1.3158E+02	-1.6611E+01	-1.9397E+01	1.4819E+02	1.6471E+02
	9.0718E-01	-1.1453E-01	-1.3374E-01	1.0217E+00	1.1356E+00
4	5.1382E+03	-3.5508E+03	-1.0594E+03	8.6890E+03	1.7448E+04
	3.5427E+01	-2.4482E+01	-7.3043E+00	5.9909E+01	1.2030E+02
5	9.0634E+03	-4.2021E+03	-1.1953E+03	1.3266E+04	1.5716E+04
	6.2490E+01	-2.8973E+01	-8.2415E+00	9.1463E+01	1.0836E+02
6	6.4410E+03	-2.3908E+02	1.3354E+03	6.6800E+03	1.1948E+04
	4.4409E+01	-1.6484E+00	9.2073E+00	4.6057E+01	8.2375E+01
7	3.5268E+03	5.1759E-01	-8.2167E+01	3.5263E+03	9.9515E+01
	2.4317E+01	3.5686E-03	-5.6652E-01	2.4313E+01	6.8613E-01
8	3.5225E+03	1.8346E-02	3.3241E+00	3.5225E+03	6.0174E-01
	2.4287E+01	1.2649E-04	2.2919E-02	2.4287E+01	4.1488E-03
9	3.5237E+03	-6.4911E-02	-4.7631E+01	3.5237E+03	2.6424E+01
	2.4295E+01	-4.4755E-04	-3.2840E-01	2.4295E+01	1.8219E-01
10	3.5411E+03	-2.7486E+02	1.5542E+03	3.8160E+03	1.8204E+03
	2.4415E+01	-1.8951E+00	1.0716E+01	2.6310E+01	1.2551E+01
11	8.5223E+02	-8.5294E+02	1.8047E+02	1.7052E+03	1.5788E+03
	5.8759E+00	-5.8808E+00	1.2443E+00	1.1757E+01	1.0885E+01
12	5.3403E+02	-3.0975E+02	2.2055E+02	8.4378E+02	1.6088E+03
	3.6820E+00	-2.1356E+00	1.5206E+00	5.8177E+00	1.1092E+01
13	4.3646E+03	-1.8592E+03	2.8716E+02	6.2238E+03	4.0695E+03
	3.0093E+01	-1.2819E+01	1.9799E+00	4.2912E+01	2.8058E+01
14	3.3108E+03	-1.5822E+03	2.5586E+02	4.8929E+03	6.0508E+03
	2.2827E+01	-1.0909E+01	1.7641E+00	3.3735E+01	4.1719E+01
15	4.5537E+02	-3.1770E+02	3.0878E+02	7.7307E+02	1.0795E+03
	3.1396E+00	-2.1905E+00	2.1290E+00	5.3301E+00	7.4431E+00

MARPAC

16	1.2167E+03	-5.0524E+02	4.4815E+02	1.7220E+03	1.9041E+03
	8.3891E+00	-3.4835E+00	3.0899E+00	1.1873E+01	1.3128E+01
17	1.4168E+03	-1.7911E+02	-7.3013E+01	1.5960E+03	2.7927E+03
	9.7688E+00	-1.2349E+00	-5.0341E-01	1.1004E+01	1.9255E+01
18	1.5283E+03	-2.2139E+02	-1.2031E+02	1.7497E+03	3.0619E+03
	1.0537E+01	-1.5264E+00	-8.2952E-01	1.2063E+01	2.1111E+01
19	1.4787E+03	-6.1203E+02	4.3835E+02	2.0908E+03	2.4748E+03
	1.0196E+01	-4.2198E+00	3.0223E+00	1.4415E+01	1.7063E+01
20	1.3331E+03	-6.3594E+02	2.6187E+02	1.9690E+03	3.6560E+03
	9.1914E+00	-4.3847E+00	1.8055E+00	1.3576E+01	2.5207E+01
21	4.5624E+02	-4.8712E+02	-3.3167E+01	9.4337E+02	1.8516E+03
	3.1457E+00	-3.3586E+00	-2.2868E-01	6.5043E+00	1.2766E+01
22	8.5505E+01	-1.2200E+02	8.6425E+01	2.0750E+02	1.2799E+01
	5.8953E-01	-8.4114E-01	5.9588E-01	1.4307E+00	8.8246E-02

Allowable Stress for Load Case 103

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

Table 2-99. Load Case 104, -40°F Ambient, Zero Decay Heat, Zero Insolation, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	4.4273E+01	-1.5156E+02	-3.1674E+01	1.9583E+02	1.9499E+02
	3.0525E-01	-1.0450E+00	-2.1838E-01	1.3502E+00	1.3444E+00
2	1.3935E+02	-1.8562E+00	-4.5442E+01	1.4120E+02	1.8190E+01
	9.6076E-01	-1.2798E-02	-3.1331E-01	9.7356E-01	1.2542E-01
3	1.6081E+02	-2.0302E+01	-2.3708E+01	1.8112E+02	2.0131E+02
	1.1088E+00	-1.3998E-01	-1.6346E-01	1.2488E+00	1.3880E+00
4	6.2800E+03	-4.3399E+03	-1.2948E+03	1.0620E+04	2.1326E+04
	4.3299E+01	-2.9923E+01	-8.9275E+00	7.3222E+01	1.4704E+02
5	1.1078E+04	-5.1359E+03	-1.4610E+03	1.6213E+04	1.9209E+04
	7.6377E+01	-3.5411E+01	-1.0073E+01	1.1179E+02	1.3244E+02
6	7.8723E+03	-2.9221E+02	1.6322E+03	8.1645E+03	1.4603E+04
	5.4277E+01	-2.0147E+00	1.1253E+01	5.6292E+01	1.0068E+02
7	4.3105E+03	6.3261E-01	-1.0043E+02	4.3099E+03	1.2163E+02
	2.9720E+01	4.3617E-03	-6.9242E-01	2.9716E+01	8.3860E-01
8	4.3053E+03	2.2422E-02	4.0628E+00	4.3053E+03	7.3546E-01
	2.9684E+01	1.5460E-04	2.8012E-02	2.9684E+01	5.0708E-03
9	4.3067E+03	-7.9336E-02	-5.8216E+01	4.3068E+03	3.2296E+01
	2.9694E+01	-5.4700E-04	-4.0138E-01	2.9694E+01	2.2268E-01
10	4.3281E+03	-3.3594E+02	1.8996E+03	4.6640E+03	2.2249E+03
	2.9841E+01	-2.3162E+00	1.3097E+01	3.2157E+01	1.5340E+01
11	1.0416E+03	-1.0425E+03	2.2057E+02	2.0841E+03	1.9296E+03
	7.1817E+00	-7.1877E+00	1.5208E+00	1.4369E+01	1.3304E+01
12	6.5270E+02	-3.7858E+02	2.6956E+02	1.0313E+03	1.9663E+03
	4.5002E+00	-2.6102E+00	1.8586E+00	7.1105E+00	1.3557E+01
13	5.3345E+03	-2.2724E+03	3.5097E+02	7.6069E+03	4.9738E+03
	3.6780E+01	-1.5668E+01	2.4198E+00	5.2447E+01	3.4293E+01
14	4.0465E+03	-1.9338E+03	3.1272E+02	5.9802E+03	7.3954E+03
	2.7900E+01	-1.3333E+01	2.1561E+00	4.1232E+01	5.0989E+01
15	5.5656E+02	-3.8830E+02	3.7740E+02	9.4486E+02	1.3194E+03
	3.8373E+00	-2.6772E+00	2.6021E+00	6.5146E+00	9.0971E+00

MARKUP

16	1.4871E+03	-6.1752E+02	5.4774E+02	2.1046E+03	2.3272E+03
	1.0253E+01	-4.2576E+00	3.7765E+00	1.4511E+01	1.6046E+01
17	1.7317E+03	-2.1891E+02	-8.9238E+01	1.9506E+03	3.4133E+03
	1.1940E+01	-1.5093E+00	-6.1527E-01	1.3449E+01	2.3534E+01
18	1.8679E+03	-2.7059E+02	-1.4705E+02	2.1385E+03	3.7423E+03
	1.2879E+01	-1.8656E+00	-1.0139E+00	1.4744E+01	2.5803E+01
19	1.8074E+03	-7.4804E+02	5.3576E+02	2.5554E+03	3.0248E+03
	1.2461E+01	-5.1576E+00	3.6940E+00	1.7619E+01	2.0855E+01
20	1.6293E+03	-7.7726E+02	3.2007E+02	2.4066E+03	4.4684E+03
	1.1234E+01	-5.3591E+00	2.2068E+00	1.6593E+01	3.0809E+01
21	5.5763E+02	-5.9537E+02	-4.0537E+01	1.1530E+03	2.2630E+03
	3.8447E+00	-4.1049E+00	-2.7949E-01	7.9497E+00	1.5603E+01
22	1.0451E+02	-1.4911E+02	1.0563E+02	2.5361E+02	1.5643E+01
	7.2054E-01	-1.0281E+00	7.2830E-01	1.7486E+00	1.0786E-01

Allowable Stress for Load Case 104

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

Table 2-100. Load Case 105, -40°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.8764E+01	-1.0847E+02	-2.1388E+01	1.3724E+02	1.8262E+02
	1.9832E-01	-7.4791E-01	-1.4746E-01	9.4623E-01	1.2591E+00
2	7.8887E+01	-1.3266E+01	-3.5005E+01	9.2153E+01	9.9886E+01
	5.4391E-01	-9.1462E-02	-2.4135E-01	6.3537E-01	6.8869E-01
3	9.7784E+01	-2.4387E+01	-1.7338E+01	1.2217E+02	6.5928E+01
	6.7420E-01	-1.6814E-01	-1.1954E-01	8.4234E-01	4.5455E-01
4	3.6057E+03	-2.6177E+03	-8.3281E+02	6.2234E+03	1.2429E+04
	2.4861E+01	-1.8048E+01	-5.7420E+00	4.2909E+01	8.5694E+01
5	6.4748E+03	-3.0782E+03	-1.0215E+03	9.5530E+03	1.1198E+04
	4.4642E+01	-2.1224E+01	-7.0430E+00	6.5866E+01	7.7206E+01
6	4.6474E+03	-1.7830E+02	8.1828E+02	4.8257E+03	8.6891E+03
	3.2043E+01	-1.2293E+00	5.6419E+00	3.3272E+01	5.9909E+01
7	2.5606E+03	-1.7742E+00	-5.8101E+01	2.5624E+03	2.5882E+01
	1.7655E+01	-1.2233E-02	-4.0059E-01	1.7667E+01	1.7845E-01
8	2.5575E+03	-2.1752E+00	2.4541E+00	2.5597E+03	4.7917E+01
	1.7633E+01	-1.4997E-02	1.6920E-02	1.7648E+01	3.3038E-01
9	2.5584E+03	-2.2192E+00	-3.5835E+01	2.5606E+03	2.6275E+01
	1.7639E+01	-1.5301E-02	-2.4708E-01	1.7655E+01	1.8116E-01
10	2.5763E+03	-2.3572E+02	1.1648E+03	2.8120E+03	1.4813E+03
	1.7763E+01	-1.6252E+00	8.0311E+00	1.9388E+01	1.0214E+01
11	5.6888E+02	-6.9413E+02	7.8984E+01	1.2630E+03	1.1789E+03
	3.9223E+00	-4.7858E+00	5.4458E-01	8.7082E+00	8.1285E+00
12	3.2892E+02	-2.8706E+02	3.8193E+01	6.1598E+02	1.1931E+03
	2.2678E+00	-1.9792E+00	2.6333E-01	4.2471E+00	8.2260E+00
13	3.0906E+03	-1.4352E+03	1.8614E+02	4.5258E+03	2.9240E+03
	2.1309E+01	-9.8950E+00	1.2834E+00	3.1204E+01	2.0160E+01
14	2.3224E+03	-1.2189E+03	2.0091E+02	3.5413E+03	4.3946E+03
	1.6012E+01	-8.4040E+00	1.3852E+00	2.4416E+01	3.0300E+01
15	3.4338E+02	-2.3134E+02	2.3878E+02	5.7472E+02	7.9183E+02
	2.3675E+00	-1.5951E+00	1.6463E+00	3.9626E+00	5.4595E+00

MARPAC

16	9.0559E+02	-3.7318E+02	3.1962E+02	1.2788E+03	1.4183E+03
	6.2438E+00	-2.5730E+00	2.2037E+00	8.8168E+00	9.7790E+00
17	1.0498E+03	-1.3217E+02	-7.1526E+01	1.1820E+03	2.0672E+03
	7.2381E+00	-9.1126E-01	-4.9316E-01	8.1494E+00	1.4253E+01
18	1.1238E+03	-1.6893E+02	2.7392E+01	1.2928E+03	2.2661E+03
	7.7487E+00	-1.1647E+00	1.8886E-01	8.9134E+00	1.5624E+01
19	1.0502E+03	-4.6474E+02	4.5627E+02	1.5149E+03	1.7380E+03
	7.2408E+00	-3.2043E+00	3.1459E+00	1.0445E+01	1.1983E+01
20	9.1109E+02	-5.1553E+02	2.1415E+02	1.4266E+03	2.6300E+03
	6.2818E+00	-3.5545E+00	1.4765E+00	9.8362E+00	1.8133E+01
21	3.4585E+02	-3.7291E+02	-2.8575E+01	7.1876E+02	1.4117E+03
	2.3846E+00	-2.5711E+00	-1.9702E-01	4.9557E+00	9.7334E+00
22	5.7349E+01	-9.0246E+01	5.8122E+01	1.4760E+02	1.4656E+01
	3.9541E-01	-6.2223E-01	4.0073E-01	1.0176E+00	1.0105E-01

Allowable Stress for Load Case 105

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	2.44	2.24	20.00	30.00	70.00
2	2.50	2.12	20.00	30.00	70.00
3	2.15	1.87	20.00	30.00	70.00
4	2.71	2.68	20.00	30.00	70.00
5	3.22	3.14	20.00	30.00	70.00
6	3.41	3.34	20.00	30.00	70.00
7	3.74	3.58	20.00	30.00	70.00
8	3.70	3.54	20.00	30.00	70.00
9	3.63	3.47	20.00	30.00	70.00
10	3.45	3.28	20.00	30.00	70.00
11	3.58	3.29	20.00	30.00	70.00
12	4.08	3.74	20.00	30.00	70.00
13	2.93	2.78	20.00	30.00	70.00
14	2.60	2.52	20.00	30.00	70.00
15	2.67	2.61	20.00	30.00	70.00
16	2.79	2.74	20.00	30.00	70.00
17	2.83	2.79	20.00	30.00	70.00
18	2.98	2.95	20.00	30.00	70.00
19	3.11	3.06	20.00	30.00	70.00
20	3.95	3.81	20.00	30.00	70.00
21	1.94	1.85	20.00	30.00	70.00
22	2.32	2.25	20.00	30.00	70.00

SUPERSEDED

Table 2-101. Load Case 106, -20°F Ambient, Maximum Decay Heat, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.1826E+01	-8.2247E+01	-1.5721E+01	1.0407E+02	1.4704E+02
	1.5049E-01	-5.6707E-01	-1.0839E-01	7.1756E-01	1.0138E+00
2	5.7598E+01	-1.6161E+01	-2.6803E+01	7.3760E+01	1.0130E+02
	3.9713E-01	-1.1143E-01	-1.8480E-01	5.0855E-01	6.9843E-01
3	7.0197E+01	-2.1988E+01	-1.2620E+01	9.2185E+01	3.0613E+01
	4.8399E-01	-1.5160E-01	-8.7014E-02	6.3559E-01	2.1107E-01
4	2.4949E+03	-1.8477E+03	-6.0194E+02	4.3426E+03	8.6521E+03
	1.7202E+01	-1.2739E+01	-4.1502E+00	2.9941E+01	5.9654E+01
5	4.5127E+03	-2.1672E+03	-7.5943E+02	6.6798E+03	7.7960E+03
	3.1114E+01	-1.4942E+01	-5.2361E+00	4.6056E+01	5.3751E+01
6	3.2521E+03	-1.2652E+02	5.3166E+02	3.3786E+03	6.0995E+03
	2.2422E+01	-8.7234E-01	3.6657E+00	2.3295E+01	4.2055E+01
7	1.7962E+03	-1.8562E+00	-4.0331E+01	1.7981E+03	4.9881E+00
	1.2384E+01	-1.2798E-02	-2.7807E-01	1.2397E+01	3.4392E-02
8	1.7940E+03	-2.1483E+00	1.7338E+00	1.7961E+03	4.7113E+01
	1.2369E+01	-1.4812E-02	1.1954E-02	1.2384E+01	3.2483E-01
9	1.7946E+03	-2.1740E+00	-2.5523E+01	1.7968E+03	3.1273E+01
	1.2374E+01	-1.4989E-02	-1.7597E-01	1.2389E+01	2.1562E-01
10	1.8089E+03	-1.7621E+02	8.2766E+02	1.9851E+03	1.0860E+03
	1.2472E+01	-1.2149E+00	5.7065E+00	1.3687E+01	7.4876E+00
11	3.8455E+02	-5.0953E+02	3.9312E+01	8.9408E+02	8.3714E+02
	2.6514E+00	-3.5131E+00	2.7104E-01	6.1645E+00	5.7719E+00
12	2.1506E+02	-2.2169E+02	-9.4569E+00	4.3676E+02	8.4492E+02
	1.4828E+00	-1.5285E+00	-6.5203E-02	3.0113E+00	5.8255E+00
13	2.1447E+03	-1.0327E+03	1.2186E+02	3.1774E+03	2.0418E+03
	1.4787E+01	-7.1202E+00	8.4017E-01	2.1907E+01	1.4078E+01
14	1.6049E+03	-8.7665E+02	1.4269E+02	2.4816E+03	3.0833E+03
	1.1066E+01	-6.0443E+00	9.8382E-01	1.7110E+01	2.1259E+01
15	2.4447E+02	-1.6241E+02	1.7159E+02	4.0688E+02	5.5763E+02
	1.6856E+00	-1.1198E+00	1.1831E+00	2.8054E+00	3.8447E+00

WATERMARK

16	6.4148E+02	-2.6354E+02	2.2260E+02	9.0501E+02	1.0050E+03
	4.4228E+00	-1.8170E+00	1.5347E+00	6.2399E+00	6.9294E+00
17	7.4229E+02	-9.3294E+01	-5.5376E+01	8.3558E+02	1.4611E+03
	5.1179E+00	-6.4324E-01	-3.8181E-01	5.7611E+00	1.0074E+01
18	7.9323E+02	-1.2111E+02	5.0964E+01	9.1434E+02	1.6036E+03
	5.4691E+00	-8.3503E-01	3.5138E-01	6.3041E+00	1.1056E+01
19	7.3161E+02	-3.3238E+02	3.5850E+02	1.0640E+03	1.2083E+03
	5.0443E+00	-2.2917E+00	2.4718E+00	7.3359E+00	8.3306E+00
20	6.2818E+02	-3.7771E+02	1.5617E+02	1.0059E+03	1.8479E+03
	4.3311E+00	-2.6042E+00	1.0768E+00	6.9353E+00	1.2741E+01
21	2.4668E+02	-2.6686E+02	-2.1203E+01	5.1354E+02	1.0089E+03
	1.7008E+00	-1.8399E+00	-1.4619E-01	3.5407E+00	6.9561E+00
22	3.8918E+01	-6.3758E+01	3.9475E+01	1.0268E+02	1.1760E+01
	2.6833E-01	-4.3959E-01	2.7217E-01	7.0792E-01	8.1084E-02

Allowable Stress for Load Case 106

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	22.00	21.81	20.00	30.00	70.00
2	22.05	21.68	20.00	30.00	70.00
3	21.71	21.44	20.00	30.00	70.00
4	22.26	22.24	20.00	30.00	70.00
5	22.77	22.68	20.00	30.00	70.00
6	22.95	22.89	20.00	30.00	70.00
7	23.27	23.11	20.00	30.00	70.00
8	23.23	23.07	20.00	30.00	70.00
9	23.16	23.00	20.00	30.00	70.00
10	22.99	22.82	20.00	30.00	70.00
11	23.12	22.84	20.00	30.00	70.00
12	23.61	23.28	20.00	30.00	70.00
13	22.48	22.33	20.00	30.00	70.00
14	22.15	22.08	20.00	30.00	70.00
15	22.22	22.16	20.00	30.00	70.00
16	22.33	22.29	20.00	30.00	70.00
17	22.37	22.34	20.00	30.00	70.00
18	22.52	22.49	20.00	30.00	70.00
19	22.66	22.60	20.00	30.00	70.00
20	23.48	23.34	20.00	30.00	70.00
21	21.50	21.42	20.00	30.00	70.00
22	21.88	21.82	20.00	30.00	70.00

Table 2-102. Load Case 201, Maximum Internal Pressure, 207 kPa (30 psia), Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.4092E+01	-4.4672E+01	3.8621E+01	1.0876E+02	2.0867E+02
	4.4190E-01	-3.0800E-01	2.6628E-01	7.4990E-01	1.4387E+00
2	5.5842E+01	-3.2326E+01	-3.9887E+01	8.8168E+01	1.7001E+02
	3.8502E-01	-2.2288E-01	-2.7501E-01	6.0790E-01	1.1722E+00
3	2.8670E+01	-2.4948E+01	-2.2063E+01	5.3617E+01	7.1587E+01
	1.9767E-01	-1.7201E-01	-1.5212E-01	3.6968E-01	4.9357E-01
4	4.6156E+02	-2.3259E+02	-1.3966E+02	6.9414E+02	1.2226E+03
	3.1823E+00	-1.6036E+00	-9.6291E-01	4.7859E+00	8.4298E+00
5	5.2434E+02	-1.6795E+02	-5.6246E+02	6.9229E+02	2.4421E+02
	3.6152E+00	-1.1580E+00	-3.8780E+00	4.7732E+00	1.6838E+00
6	6.3888E+01	-5.5246E+02	-1.6139E+03	6.1635E+02	9.1698E+02
	4.4049E-01	-3.8091E+00	-1.1128E+01	4.2496E+00	6.3224E+00
7	-1.1858E+02	-3.8574E+02	-3.0357E+03	2.6717E+02	6.2429E+01
	-8.1756E-01	-2.6596E+00	-2.0930E+01	1.8421E+00	4.3043E-01
8	-1.2309E+02	-3.8486E+02	-3.0824E+03	2.6176E+02	3.8723E+01
	-8.4869E-01	-2.6535E+00	-2.1252E+01	1.8048E+00	2.6699E-01
9	-1.1867E+02	-3.9282E+02	-3.1273E+03	2.7415E+02	6.6410E+01
	-8.1820E-01	-2.7084E+00	-2.1562E+01	1.8902E+00	4.5788E-01
10	2.1781E+01	-8.5641E+02	-1.7610E+03	8.7819E+02	8.5795E+01
	1.5018E-01	-5.9047E+00	-1.2142E+01	6.0549E+00	5.9153E-01
11	-9.3673E+01	-8.3080E+02	-8.0334E+02	7.3713E+02	1.0408E+03
	-6.4585E-01	-5.7282E+00	-5.5389E+00	5.0823E+00	7.1763E+00
12	6.1416E+01	-8.3229E+02	-7.9812E+02	8.9371E+02	1.2708E+03
	4.2345E-01	-5.7384E+00	-5.5028E+00	6.1619E+00	8.7618E+00
13	1.0078E+02	-3.9870E+02	-1.3472E+02	4.9948E+02	3.5539E+02
	6.9484E-01	-2.7489E+00	-9.2890E-01	3.4438E+00	2.4503E+00
14	8.5852E+01	-4.8920E+02	-1.1710E+02	5.7505E+02	9.8911E+02
	5.9193E-01	-3.3729E+00	-8.0736E-01	3.9648E+00	6.8197E+00
15	6.9037E+02	-6.5741E+02	-2.3734E+02	1.3478E+03	1.8226E+03
	4.7599E+00	-4.5327E+00	-1.6364E+00	9.2926E+00	1.2566E+01

WATERMARK

16	4.6624E+02	-1.1500E+03	-4.1628E+02	1.6162E+03	2.6124E+03
	3.2146E+00	-7.9290E+00	-2.8702E+00	1.1144E+01	1.8012E+01
17	1.8395E+02	-8.3404E+02	-5.1555E+01	1.0180E+03	1.7413E+03
	1.2683E+00	-5.7505E+00	-3.5546E-01	7.0188E+00	1.2006E+01
18	8.9624E+01	-6.5645E+02	1.7669E+02	7.4607E+02	1.2163E+03
	6.1794E-01	-4.5261E+00	1.2183E+00	5.1440E+00	8.3861E+00
19	3.1321E+02	-9.8841E+02	-4.1116E+01	1.3016E+03	2.1390E+03
	2.1595E+00	-6.8149E+00	-2.8348E-01	8.9744E+00	1.4748E+01
20	3.7669E+02	-1.1427E+03	-1.6730E+02	1.5194E+03	2.8335E+03
	2.5972E+00	-7.8786E+00	-1.1535E+00	1.0476E+01	1.9537E+01
21	1.4008E+02	3.1204E+01	1.2908E+02	1.0888E+02	1.8087E+02
	9.6581E-01	2.1514E-01	8.8996E-01	7.5067E-01	1.2471E+00
22	2.6958E+02	6.9528E+01	2.2625E+02	2.0006E+02	1.3936E+02
	1.8587E+00	4.7938E-01	1.5599E+00	1.3793E+00	9.6083E-01

MARKUP

Table 2-103. Load Case 202, Minimum External Pressure, 24 kPa (3.5 psia), Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.4115E+01	-3.7637E+01	6.5012E+01	1.1175E+02	2.0684E+02
	5.1100E-01	-2.5950E-01	4.4824E-01	7.7050E-01	1.4261E+00
2	6.7213E+01	-2.3362E+01	-1.4461E+01	9.0575E+01	1.7063E+02
	4.6342E-01	-1.6107E-01	-9.9704E-02	6.2449E-01	1.1764E+00
3	3.9705E+01	-1.4549E+01	3.7803E+00	5.4254E+01	7.5822E+01
	2.7376E-01	-1.0031E-01	2.6064E-02	3.7407E-01	5.2277E-01
4	4.0761E+02	-1.3858E+02	-1.7995E+02	5.4619E+02	8.8660E+02
	2.8104E+00	-9.5546E-01	-1.2407E+00	3.7658E+00	6.1129E+00
5	5.3833E+02	-8.8192E+01	-6.1168E+02	6.2652E+02	5.3605E+01
	3.7116E+00	-6.0807E-01	-4.2174E+00	4.3197E+00	3.6959E-01
6	8.3954E+01	-4.7027E+02	-1.6390E+03	5.5422E+02	7.5294E+02
	5.7884E-01	-3.2424E+00	-1.1300E+01	3.8212E+00	5.1913E+00
7	-7.7156E+01	-3.6765E+02	-3.0786E+03	2.9050E+02	6.1723E+01
	-5.3197E-01	-2.5349E+00	-2.1226E+01	2.0029E+00	4.2556E-01
8	-7.8953E+01	-3.6955E+02	-3.1245E+03	2.9059E+02	3.8694E+01
	-5.4436E-01	-2.5479E+00	-2.1542E+01	2.0036E+00	2.6678E-01
9	-7.7228E+01	-3.7475E+02	-3.1711E+03	2.9752E+02	6.5987E+01
	-5.3247E-01	-2.5838E+00	-2.1864E+01	2.0513E+00	4.5497E-01
10	8.4395E+01	-8.8605E+02	-1.7362E+03	9.7044E+02	1.7898E+02
	5.8188E-01	-6.1091E+00	-1.1970E+01	6.6910E+00	1.2340E+00
11	-1.1005E+02	-8.2866E+02	-8.0658E+02	7.1861E+02	1.0247E+03
	-7.5879E-01	-5.7134E+00	-5.5611E+00	4.9546E+00	7.0648E+00
12	5.2898E+01	-8.2071E+02	-7.9608E+02	8.7361E+02	1.1773E+03
	3.6472E-01	-5.6586E+00	-5.4888E+00	6.0233E+00	8.1170E+00
13	1.2391E+02	-3.3288E+02	-1.2355E+02	4.5678E+02	4.7968E+02
	8.5432E-01	-2.2951E+00	-8.5186E-01	3.1494E+00	3.3073E+00
14	5.8527E+01	-3.8277E+02	-1.0316E+02	4.4130E+02	8.2074E+02
	4.0353E-01	-2.6391E+00	-7.1125E-01	3.0427E+00	5.6588E+00
15	8.4051E+02	-7.5089E+02	-1.6780E+02	1.5914E+03	2.4898E+03
	5.7951E+00	-5.1772E+00	-1.1569E+00	1.0972E+01	1.7167E+01

WORKING DRAFT

16	4.1874E+02	-9.5020E+02	-3.2355E+02	1.3689E+03	2.2172E+03
	2.8871E+00	-6.5514E+00	-2.2308E+00	9.4385E+00	1.5287E+01
17	1.7157E+02	-6.7113E+02	1.9678E+00	8.4270E+02	1.4474E+03
	1.1829E+00	-4.6273E+00	1.3568E-02	5.8102E+00	9.9796E+00
18	7.0703E+01	-4.7186E+02	2.1279E+02	5.4256E+02	8.8040E+02
	4.8748E-01	-3.2534E+00	1.4671E+00	3.7408E+00	6.0701E+00
19	2.3349E+02	-7.2665E+02	3.9925E+01	9.6013E+02	1.5835E+03
	1.6098E+00	-5.0100E+00	2.7527E-01	6.6199E+00	1.0918E+01
20	2.7637E+02	-8.6472E+02	-1.1567E+02	1.1411E+03	2.1316E+03
	1.9055E+00	-5.9620E+00	-7.9753E-01	7.8675E+00	1.4697E+01
21	1.3717E+02	2.8721E+01	1.2698E+02	1.0845E+02	2.7164E+01
	9.4578E-01	1.9802E-01	8.7553E-01	7.4776E-01	1.8729E-01
22	2.3247E+02	4.4456E+01	2.1440E+02	1.8801E+02	5.5802E+01
	1.6028E+00	3.0651E-01	1.4782E+00	1.2963E+00	3.8474E-01

MARKUP

Table 2-104. Load Case 203, Maximum Increased External Pressure, 140 kPa (20 psia), Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.0043E+01	-4.7600E+01	2.6480E+01	1.0764E+02	2.1153E+02
	4.1399E-01	-3.2819E-01	1.8257E-01	7.4217E-01	1.4584E+00
2	4.9821E+01	-3.7322E+01	-5.1472E+01	8.7143E+01	1.6954E+02
	3.4351E-01	-2.5733E-01	-3.5489E-01	6.0083E-01	1.1689E+00
3	2.3207E+01	-3.1036E+01	-3.4102E+01	5.4242E+01	6.7672E+01
	1.6000E-01	-2.1398E-01	-2.3512E-01	3.7399E-01	4.6658E-01
4	5.7922E+02	-5.1294E+02	-2.3160E+02	1.0922E+03	2.0459E+03
	3.9936E+00	-3.5366E+00	-1.5968E+00	7.5302E+00	1.4106E+01
5	5.2724E+02	-3.2654E+02	-6.4867E+02	8.5377E+02	9.0779E+02
	3.6352E+00	-2.2514E+00	-4.4724E+00	5.8866E+00	6.2590E+00
6	6.8579E+01	-6.5879E+02	-1.7338E+03	7.2737E+02	1.1418E+03
	4.7284E-01	-4.5422E+00	-1.1954E+01	5.0150E+00	7.8725E+00
7	-1.3774E+02	-3.8858E+02	-3.0830E+03	2.5084E+02	6.2748E+01
	-9.4968E-01	-2.6791E+00	-2.1256E+01	1.7295E+00	4.3263E-01
8	-1.4232E+02	-3.8757E+02	-3.1308E+03	2.4526E+02	3.8737E+01
	-9.8124E-01	-2.6722E+00	-2.1586E+01	1.6910E+00	2.6708E-01
9	-1.3793E+02	-3.9547E+02	-3.1767E+03	2.5754E+02	6.6241E+01
	-9.5101E-01	-2.7267E+00	-2.1902E+01	1.7757E+00	4.5671E-01
10	8.2009E+00	-8.8328E+02	-1.7737E+03	8.9148E+02	1.3392E+02
	5.6543E-02	-6.0900E+00	-1.2229E+01	6.1465E+00	9.2336E-01
11	-1.0200E+02	-8.3267E+02	-8.0847E+02	7.3068E+02	1.0674E+03
	-7.0325E-01	-5.7411E+00	-5.5742E+00	5.0378E+00	7.3592E+00
12	5.7220E+01	-8.2929E+02	-7.9955E+02	8.8651E+02	1.2198E+03
	3.9452E-01	-5.7178E+00	-5.5127E+00	6.1123E+00	8.4103E+00
13	1.0407E+02	-3.8992E+02	-1.3189E+02	4.9399E+02	3.4848E+02
	7.1755E-01	-2.6884E+00	-9.0937E-01	3.4060E+00	2.4027E+00
14	9.1895E+01	-4.8406E+02	-1.1302E+02	5.7595E+02	9.8706E+02
	6.3359E-01	-3.3375E+00	-7.7924E-01	3.9710E+00	6.8055E+00
15	8.7004E+02	-7.9067E+02	-1.7449E+02	1.6607E+03	2.6043E+03
	5.9987E+00	-5.4515E+00	-1.2030E+00	1.1450E+01	1.7956E+01

WAS PRELIMINARY

16	4.3583E+02	-9.8541E+02	-3.3332E+02	1.4212E+03	2.3021E+03
	3.0050E+00	-6.7942E+00	-2.2981E+00	9.7991E+00	1.5872E+01
17	1.7903E+02	-6.9573E+02	5.5621E+00	8.7477E+02	1.5032E+03
	1.2344E+00	-4.7969E+00	3.8350E-02	6.0313E+00	1.0364E+01
18	7.3127E+01	-4.8569E+02	2.1575E+02	5.5882E+02	9.0923E+02
	5.0419E-01	-3.3487E+00	1.4876E+00	3.8529E+00	6.2689E+00
19	2.4152E+02	-7.4625E+02	3.6171E+01	9.8777E+02	1.6285E+03
	1.6652E+00	-5.1452E+00	2.4939E-01	6.8104E+00	1.1228E+01
20	2.8850E+02	-8.8931E+02	-1.1715E+02	1.1778E+03	2.2001E+03
	1.9892E+00	-6.1316E+00	-8.0773E-01	8.1207E+00	1.5169E+01
21	1.4193E+02	1.4687E+01	1.2806E+02	1.2724E+02	2.3596E+02
	9.7858E-01	1.0126E-01	8.8293E-01	8.7732E-01	1.6269E+00
22	2.0371E+02	3.6358E+01	1.8801E+02	1.6735E+02	2.7566E+02
	1.4045E+00	2.5068E-01	1.2963E+00	1.1538E+00	1.9006E+00

MARKUP

Table 2-105. Load Case 204, Additional Increased External Pressure, 2 MPa (290 psia), Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-8.9338E+01	-2.9280E+02	-6.0473E+02	2.0346E+02	2.8587E+02
	-6.1597E-01	-2.0188E+00	-4.1695E+00	1.4028E+00	1.9710E+00
2	-1.5235E+02	-3.4606E+02	-6.5893E+02	1.9370E+02	1.5648E+02
	-1.0504E+00	-2.3860E+00	-4.5431E+00	1.3355E+00	1.0789E+00
3	-1.6376E+02	-3.8302E+02	-6.3925E+02	2.1927E+02	5.3223E+01
	-1.1291E+00	-2.6409E+00	-4.4075E+00	1.5118E+00	3.6696E-01
4	3.6874E+03	-6.7887E+03	-1.0256E+03	1.0476E+04	2.0303E+04
	2.5423E+01	-4.6806E+01	-7.0716E+00	7.2230E+01	1.3998E+02
5	3.3724E+03	-7.0447E+03	-1.2060E+03	1.0417E+04	1.6042E+04
	2.3252E+01	-4.8571E+01	-8.3151E+00	7.1823E+01	1.1060E+02
6	3.2188E+02	-4.2030E+03	-3.2225E+03	4.5249E+03	7.1334E+03
	2.2193E+00	-2.8979E+01	-2.2219E+01	3.1198E+01	4.9183E+01
7	-3.7869E+02	-1.5134E+03	-3.1591E+03	1.1347E+03	7.8422E+01
	-2.6110E+00	-1.0435E+01	-2.1781E+01	7.8235E+00	5.4070E-01
8	-3.8222E+02	-1.5117E+03	-3.2370E+03	1.1294E+03	3.9434E+01
	-2.6353E+00	-1.0422E+01	-2.2318E+01	7.7872E+00	2.7189E-01
9	-3.8509E+02	-1.5129E+03	-3.2707E+03	1.1278E+03	7.0008E+01
	-2.6551E+00	-1.0431E+01	-2.2550E+01	7.7761E+00	4.8269E-01
10	-5.8736E+02	-1.5238E+03	-2.3986E+03	9.3641E+02	5.9040E+02
	-4.0497E+00	-1.0506E+01	-1.6537E+01	6.4563E+00	4.0706E+00
11	1.9204E+02	-1.0867E+03	-8.6304E+02	1.2787E+03	1.7616E+03
	1.3241E+00	-7.4922E+00	-5.9505E+00	8.8163E+00	1.2146E+01
12	1.3747E+02	-1.0251E+03	-8.8142E+02	1.1626E+03	1.8809E+03
	9.4781E-01	-7.0680E+00	-6.0772E+00	8.0158E+00	1.2968E+01
13	7.0123E+02	-2.3182E+03	-3.1093E+02	3.0194E+03	1.8579E+03
	4.8348E+00	-1.5983E+01	-2.1438E+00	2.0818E+01	1.2810E+01
14	8.0032E+02	-2.3704E+03	-3.1724E+02	3.1707E+03	3.7488E+03
	5.5180E+00	-1.6343E+01	-2.1873E+00	2.1861E+01	2.5847E+01
15	3.8054E+02	-2.0470E+03	-3.9014E+02	2.4276E+03	3.5588E+03
	2.6237E+00	-1.4114E+01	-2.6899E+00	1.6738E+01	2.4537E+01

WORKING DRAFT

16	6.2106E+02	-1.3853E+03	-4.4463E+02	2.0064E+03	3.2473E+03
	4.2821E+00	-9.5513E+00	-3.0656E+00	1.3833E+01	2.2389E+01
17	2.4724E+02	-9.7945E+02	4.1465E+01	1.2267E+03	2.1195E+03
	1.7046E+00	-6.7531E+00	2.8589E-01	8.4577E+00	1.4613E+01
18	1.5225E+02	-7.9925E+02	2.6194E+02	9.5150E+02	1.5970E+03
	1.0497E+00	-5.5107E+00	1.8060E+00	6.5604E+00	1.1011E+01
19	4.4520E+02	-1.2007E+03	-7.4698E+01	1.6459E+03	2.7138E+03
	3.0696E+00	-8.2787E+00	-5.1503E-01	1.1348E+01	1.8711E+01
20	5.8216E+02	-1.4609E+03	-2.0473E+02	2.0430E+03	3.8621E+03
	4.0138E+00	-1.0072E+01	-1.4115E+00	1.4086E+01	2.6628E+01
21	8.2261E+02	-8.8645E+02	1.0135E+02	1.7091E+03	3.5380E+03
	5.6717E+00	-6.1119E+00	6.9880E-01	1.1784E+01	2.4393E+01
22	6.2969E+02	-1.2362E+03	-2.3919E+02	1.8659E+03	3.3991E+03
	4.3416E+00	-8.5233E+00	-1.6492E+00	1.2865E+01	2.3436E+01

MARKUP

Table 2-106. Load Case 211, Fabrication Stress, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	5.0993E+02	-1.2900E+02	4.6067E+01	6.3893E+02	8.9316E+02
	3.5159E+00	-8.8942E-01	3.1762E-01	4.4053E+00	6.1581E+00
2	7.0946E+00	-4.4601E+01	3.6652E+01	5.1695E+01	2.5230E+01
	4.8916E-02	-3.0751E-01	2.5270E-01	3.5643E-01	1.7395E-01
3	4.1560E+00	-2.6427E+01	1.1942E+01	3.0582E+01	7.2770E+00
	2.8654E-02	-1.8220E-01	8.2334E-02	2.1086E-01	5.0173E-02
4	3.7259E+02	-9.3381E+01	7.3002E+01	4.6597E+02	5.5832E+02
	2.5689E+00	-6.4384E-01	5.0333E-01	3.2127E+00	3.8495E+00
5	3.7085E+02	-1.2174E+02	4.3727E+01	4.9259E+02	7.5318E+02
	2.5569E+00	-8.3939E-01	3.0149E-01	3.3963E+00	5.1930E+00
6	2.4440E+02	7.7848E+01	1.1226E+02	1.6655E+02	2.4997E+02
	1.6851E+00	5.3674E-01	7.7402E-01	1.1483E+00	1.7235E+00
7	7.4070E+01	2.1570E+00	1.3022E+01	7.1913E+01	3.4813E+00
	5.1069E-01	1.4872E-02	8.9781E-02	4.9582E-01	2.4003E-02
8	5.9997E+01	5.7216E-01	3.9280E+00	5.9425E+01	2.3979E-01
	4.1366E-01	3.9449E-03	2.7083E-02	4.0972E-01	1.6533E-03
9	8.6093E+01	3.0938E-01	1.1872E+00	8.5783E+01	3.9082E+00
	5.9359E-01	2.1331E-03	8.1855E-03	5.9145E-01	2.6946E-02
10	3.4975E+02	-3.7100E+00	1.3939E+02	3.5346E+02	6.3643E+01
	2.4114E+00	-2.5579E-02	9.6107E-01	2.4370E+00	4.3880E-01
11	1.6523E+02	-3.1028E+01	1.0631E+02	1.9625E+02	1.9364E+02
	1.1392E+00	-2.1393E-01	7.3301E-01	1.3531E+00	1.3351E+00
12	2.1035E+02	9.5687E+01	1.2097E+02	1.1466E+02	2.1929E+02
	1.4503E+00	6.5974E-01	8.3406E-01	7.9058E-01	1.5120E+00
13	5.7075E+02	-1.1986E+02	1.6093E+02	6.9061E+02	6.9395E+02
	3.9352E+00	-8.2639E-01	1.1095E+00	4.7616E+00	4.7846E+00
14	5.2477E+02	-1.1222E+02	1.6355E+02	6.3699E+02	5.4979E+02
	3.6181E+00	-7.7376E-01	1.1276E+00	4.3919E+00	3.7906E+00
15	4.8542E+02	1.3703E+02	1.3353E+02	3.4839E+02	1.1757E+02
	3.3469E+00	9.4481E-01	9.2069E-01	2.4021E+00	8.1062E-01

Draft

16	5.9771E+01	-2.3684E+01	-1.3505E+00	8.3455E+01	7.7903E+01
	4.1210E-01	-1.6330E-01	-9.3111E-03	5.7540E-01	5.3713E-01
17	9.4243E+01	-5.7775E+00	-3.0181E+01	1.0002E+02	4.3703E+01
	6.4979E-01	-3.9834E-02	-2.0809E-01	6.8962E-01	3.0132E-01
18	1.1129E+02	-1.1573E+01	-4.5575E+01	1.2286E+02	1.8277E+02
	7.6732E-01	-7.9792E-02	-3.1423E-01	8.4712E-01	1.2602E+00
19	9.1189E+01	-7.1082E+01	9.5176E+00	1.6227E+02	3.0830E+01
	6.2873E-01	-4.9009E-01	6.5621E-02	1.1188E+00	2.1257E-01
20	1.2417E+02	-1.8104E+02	2.4480E+01	3.0521E+02	6.5983E+01
	8.5612E-01	-1.2482E+00	1.6878E-01	2.1043E+00	4.5493E-01
21	1.4022E+02	-7.5207E+01	-7.1474E+01	2.1542E+02	2.5432E+02
	9.6677E-01	-5.1853E-01	-4.9280E-01	1.4853E+00	1.7535E+00
22	4.1516E+02	1.5105E+02	3.9048E+02	2.6412E+02	3.2892E+02
	2.8625E+00	1.0414E+00	2.6923E+00	1.8210E+00	2.2678E+00

MARKUP

Table 2-107. Load Case 215, Compression Load (5x weight), Normal Conditions of Transport – Model AOS-025

Stress (psi/MPa)

Location	Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-2.1774E-01	-2.3517E+01	-2.6105E+00	2.3299E+01	3.6136E+01
	-1.5012E-03	-1.6214E-01	-1.7999E-02	1.6064E-01	2.4915E-01
2	3.7629E-01	-1.7571E+01	1.9194E+00	1.7947E+01	2.1876E-02
	2.5944E-03	-1.2115E-01	1.3234E-02	1.2374E-01	1.5083E-04
3	-6.3962E-01	-2.0661E+01	3.6079E-01	2.0022E+01	6.3575E+00
	-4.4100E-03	-1.4245E-01	2.4876E-03	1.3804E-01	4.3834E-02
4	4.4092E+01	-6.3779E+01	3.9273E+00	1.0787E+02	1.4488E+02
	3.0401E-01	-4.3974E-01	2.7078E-02	7.4375E-01	9.9895E-01
5	3.1827E+01	-4.9142E+01	4.5454E+00	8.0969E+01	1.1467E+02
	2.1944E-01	-3.3883E-01	3.1340E-02	5.5826E-01	7.9060E-01
6	-1.1335E+01	-4.8354E+01	-1.2749E+01	3.7019E+01	1.9367E+01
	-7.8150E-02	-3.3339E-01	-8.7900E-02	2.5524E-01	1.3353E-01
7	-5.4931E-02	-1.3003E+01	3.4204E-01	1.2948E+01	9.3921E-01
	-3.7874E-04	-8.9655E-02	2.3583E-03	8.9276E-02	6.4756E-03
8	9.5203E-02	-7.8221E+00	9.6103E-01	7.9173E+00	5.6182E-02
	6.5640E-04	-5.3931E-02	6.6261E-03	5.4588E-02	3.8736E-04
9	7.8559E-02	-8.4568E+00	9.9932E-01	8.5353E+00	2.0063E-01
	5.4164E-04	-5.8307E-02	6.8901E-03	5.8849E-02	1.3833E-03
10	-7.2667E-01	-3.3330E+01	-1.0248E+01	3.2603E+01	8.2172E+00
	-5.0102E-03	-2.2980E-01	-7.0659E-02	2.2479E-01	5.6655E-02
11	3.1899E+00	-1.4180E+01	-6.3427E+00	1.7370E+01	1.9406E+01
	2.1993E-02	-9.7769E-02	-4.3731E-02	1.1976E-01	1.3380E-01
12	-5.6417E+00	-2.3350E+01	-7.1488E+00	1.7708E+01	2.8191E+01
	-3.8898E-02	-1.6099E-01	-4.9289E-02	1.2209E-01	1.9437E-01
13	1.3628E+01	-4.3016E+01	-8.2098E+00	5.6644E+01	5.2488E+01
	9.3963E-02	-2.9658E-01	-5.6605E-02	3.9054E-01	3.6190E-01
14	1.2628E+01	-3.7883E+01	-7.6610E+00	5.0512E+01	4.2934E+01
	8.7070E-02	-2.6120E-01	-5.2821E-02	3.4827E-01	2.9602E-01
15	-7.0705E+01	-2.2691E+02	-6.9427E+01	1.5620E+02	5.7265E+01
	-4.8750E-01	-1.5645E+00	-4.7868E-01	1.0770E+00	3.9483E-01

WATERMARK

16	2.2921E+00	-1.4587E+01	-4.7409E+00	1.6879E+01	1.1326E+01
	1.5803E-02	-1.0057E-01	-3.2687E-02	1.1637E-01	7.8091E-02
17	-3.1303E+00	-1.6615E+01	-3.2704E+00	1.3484E+01	1.7164E+01
	-2.1583E-02	-1.1455E-01	-2.2549E-02	9.2972E-02	1.1834E-01
18	-3.9142E+00	-2.1162E+01	3.0174E-01	1.7247E+01	2.7957E+01
	-2.6987E-02	-1.4590E-01	2.0804E-03	1.1892E-01	1.9276E-01
19	1.7381E+01	-2.3228E+01	1.6583E-01	4.0609E+01	4.6722E+01
	1.1984E-01	-1.6015E-01	1.1434E-03	2.7999E-01	3.2214E-01
20	2.5737E+01	-2.6220E+01	-3.7458E+00	5.1957E+01	6.9117E+01
	1.7745E-01	-1.8078E-01	-2.5827E-02	3.5823E-01	4.7654E-01
21	-1.4307E+00	-3.6449E+01	-1.8727E+00	3.5018E+01	1.5727E+01
	-9.8642E-03	-2.5131E-01	-1.2912E-02	2.4144E-01	1.0844E-01
22	-4.8541E+01	-1.0183E+02	-5.7071E+01	5.3290E+01	3.7499E+01
	-3.3468E-01	-7.0210E-01	-3.9349E-01	3.6742E-01	2.5855E-01

MARKUP

Table 2-108. Load Case 216, Rod Drop onto Cask, Normal Conditions of Transport – Model AOS-025

Stress (psi/MPa)

Location	Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-2.2652E+00	-2.1001E+01	1.5366E+01	1.8736E+01	5.5625E+00
	-1.5618E-02	-1.4480E-01	1.0594E-01	1.2918E-01	3.8352E-02
2	7.7698E-01	-3.2846E+01	4.2870E+00	3.3623E+01	3.3542E+00
	5.3571E-03	-2.2647E-01	2.9558E-02	2.3183E-01	2.3126E-02
3	9.2402E-01	-3.5772E+01	1.8362E+00	3.6696E+01	5.5939E+00
	6.3709E-03	-2.4664E-01	1.2660E-02	2.5301E-01	3.8569E-02
4	1.1321E+02	-2.7259E+01	8.6065E+01	1.4047E+02	1.7788E+01
	7.8056E-01	-1.8795E-01	5.9340E-01	9.6851E-01	1.2264E-01
5	9.4444E+01	-6.7530E+01	6.3220E+01	1.6197E+02	9.8619E+01
	6.5117E-01	-4.6560E-01	4.3588E-01	1.1168E+00	6.7996E-01
6	-1.6226E+01	-1.9563E+02	-6.8017E-01	1.7940E+02	7.5996E+01
	-1.1188E-01	-1.3488E+00	-4.6896E-03	1.2369E+00	5.2397E-01
7	2.1268E-01	-4.1354E+01	3.0732E+00	4.1567E+01	4.4165E+00
	1.4664E-03	-2.8513E-01	2.1189E-02	2.8659E-01	3.0451E-02
8	3.7297E-01	-1.7071E+01	3.6848E+00	1.7443E+01	2.3246E-01
	2.5715E-03	-1.1770E-01	2.5406E-02	1.2027E-01	1.6028E-03
9	1.9233E-01	-1.7042E+01	2.3387E+00	1.7234E+01	2.4846E-01
	1.3261E-03	-1.1750E-01	1.6125E-02	1.1883E-01	1.7130E-03
10	-1.1647E+00	-6.7622E+01	-1.9600E+01	6.6457E+01	1.5731E+01
	-8.0304E-03	-4.6624E-01	-1.3514E-01	4.5821E-01	1.0846E-01
11	8.5744E+00	-2.7527E+01	-9.5083E+00	3.6101E+01	4.2172E+01
	5.9119E-02	-1.8979E-01	-6.5557E-02	2.4891E-01	2.9076E-01
12	-8.8318E+00	-4.8310E+01	-1.1435E+01	3.9478E+01	5.7835E+01
	-6.0893E-02	-3.3308E-01	-7.8844E-02	2.7219E-01	3.9876E-01
13	3.2148E+01	-8.3489E+01	-1.0776E+01	1.1564E+02	1.0175E+02
	2.2165E-01	-5.7564E-01	-7.4298E-02	7.9729E-01	7.0152E-01
14	3.1068E+01	-7.4565E+01	-9.4930E+00	1.0563E+02	9.1520E+01
	2.1421E-01	-5.1411E-01	-6.5452E-02	7.2832E-01	6.3101E-01
15	-1.0469E+03	-3.5863E+03	-1.0256E+03	2.5393E+03	8.7943E+02
	-7.2184E+00	-2.4726E+01	-7.0714E+00	1.7508E+01	6.0635E+00

WORKING DRAFT

16	8.1823E+01	-1.6929E+02	-1.7004E+01	2.5111E+02	2.7384E+02
	5.6415E-01	-1.1672E+00	-1.1724E-01	1.7313E+00	1.8880E+00
17	6.2774E+01	-1.6193E+02	3.2907E+01	2.2471E+02	3.3881E+02
	4.3281E-01	-1.1165E+00	2.2688E-01	1.5493E+00	2.3360E+00
18	2.8529E+01	-1.1251E+02	-1.1671E+01	1.4104E+02	1.2348E+02
	1.9670E-01	-7.7571E-01	-8.0470E-02	9.7241E-01	8.5137E-01
19	8.4030E+01	-3.8233E+01	3.9534E+01	1.2226E+02	3.8127E+01
	5.7937E-01	-2.6360E-01	2.7258E-01	8.4297E-01	2.6287E-01
20	1.4376E+02	-8.4458E+01	5.1446E+00	2.2822E+02	8.1859E+01
	9.9117E-01	-5.8232E-01	3.5471E-02	1.5735E+00	5.6440E-01
21	-5.3941E+00	-7.6309E+01	-6.3359E+00	7.0915E+01	3.2204E+01
	-3.7191E-02	-5.2613E-01	-4.3685E-02	4.8894E-01	2.2204E-01
22	-2.6675E+02	-1.4072E+03	-3.9920E+02	1.1405E+03	2.7835E+02
	-1.8391E+00	-9.7024E+00	-2.7524E+00	7.8633E+00	1.9191E+00

MARKUP

Table 2-109. Load Case 221, Forward 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.2688E+01	4.1676E-01	-1.5855E+00	1.6281E+01	2.5103E+00
	8.7479E-02	2.8734E-03	-1.0931E-02	1.1226E-01	1.7308E-02
2	8.5700E+01	4.4823E+00	-1.8067E+00	1.4202E+02	5.3730E+01
	5.9088E-01	3.0904E-02	-1.2457E-02	9.7921E-01	3.7045E-01
3	4.3041E+00	5.3027E-01	-4.9446E+00	1.8143E+01	4.6518E+00
	2.9676E-02	3.6561E-03	-3.4092E-02	1.2509E-01	3.2073E-02
4	3.2317E+00	-1.4512E+00	-1.0544E+01	1.1706E+01	5.9714E+00
	2.2282E-02	-1.0006E-02	-7.2695E-02	8.0713E-02	4.1172E-02
5	3.2443E+00	1.1359E+00	-7.7424E+00	1.1015E+01	6.2637E+00
	2.2369E-02	7.8315E-03	-5.3382E-02	7.5945E-02	4.3187E-02
6	5.4491E+00	3.7516E+00	-1.8230E+00	8.5175E+00	3.3900E+00
	3.7570E-02	2.5866E-02	-1.2569E-02	5.8726E-02	2.3373E-02
7	7.2848E+00	2.6594E+00	5.2189E-01	6.7629E+00	5.3125E-01
	5.0227E-02	1.8336E-02	3.5983E-03	4.6628E-02	3.6629E-03
8	9.7206E-01	4.8304E-01	-3.3293E-01	1.4264E+00	4.3465E-02
	6.7021E-03	3.3304E-03	-2.2955E-03	9.8345E-03	2.9968E-04
9	4.3917E+00	-1.8176E+00	-5.2980E+00	4.9764E+00	4.4552E-01
	3.0280E-02	-1.2532E-02	-3.6528E-02	3.4311E-02	3.0718E-03
10	2.8461E+00	-1.4003E+00	-7.0988E+00	1.4471E+01	2.4437E+00
	1.9623E-02	-9.6550E-03	-4.8944E-02	9.9775E-02	1.6848E-02
11	4.7119E+00	-8.9143E-01	-4.1649E+00	1.0637E+01	7.2203E+00
	3.2487E-02	-6.1462E-03	-2.8716E-02	7.3338E-02	4.9782E-02
12	4.1582E+00	-1.5770E+00	-3.9782E+00	8.2485E+00	3.6497E+00
	2.8670E-02	-1.0873E-02	-2.7429E-02	5.6871E-02	2.5164E-02
13	7.1104E+00	4.1351E+00	-1.1357E+00	9.1435E+00	9.0500E+00
	4.9025E-02	2.8511E-02	-7.8305E-03	6.3042E-02	6.2398E-02
14	7.5717E+00	4.3960E+00	-6.1081E-02	9.2118E+00	2.7465E+00
	5.2205E-02	3.0309E-02	-4.2114E-04	6.3513E-02	1.8936E-02
15	4.3751E+00	2.3011E+00	-1.4202E-01	4.4928E+00	7.5136E-01
	3.0165E-02	1.5865E-02	-9.7916E-04	3.0977E-02	5.1804E-03

MARKUP

16	6.4637E+00	-1.5963E-01	-4.8107E+00	8.7267E+00	3.3386E+00
	4.4566E-02	-1.1006E-03	-3.3169E-02	6.0169E-02	2.3019E-02
17	3.5937E+00	5.1228E-01	-2.3374E+00	7.7997E+00	6.4549E+00
	2.4778E-02	3.5320E-03	-1.6116E-02	5.3777E-02	4.4505E-02
18	3.2380E+00	1.2257E+00	-3.1270E+00	6.3645E+00	4.8621E+00
	2.2325E-02	8.4512E-03	-2.1560E-02	4.3882E-02	3.3523E-02
19	3.4965E+00	-5.3834E-01	-7.2883E+00	8.0968E+00	8.9271E-01
	2.4108E-02	-3.7117E-03	-5.0251E-02	5.5825E-02	6.1550E-03
20	2.3709E+00	1.6018E+00	-8.1919E+00	9.8154E+00	2.5360E+00
	1.6347E-02	1.1044E-02	-5.6481E-02	6.7675E-02	1.7485E-02
21	1.7178E+00	-1.0701E+00	-1.0041E+01	1.1745E+01	4.8877E+00
	1.1844E-02	-7.3784E-03	-6.9233E-02	8.0980E-02	3.3699E-02
22	9.0952E+00	1.4076E+00	-8.2385E-01	9.9509E+00	4.5379E+00
	6.2709E-02	9.7049E-03	-5.6802E-03	6.8609E-02	3.1288E-02

MARKUP

Table 2-110. Load Case 222, Lateral 5g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.0586E+01	2.7434E+00	-7.8238E+00	1.7030E+01	4.1611E+00
	7.2986E-02	1.8915E-02	-5.3943E-02	1.1742E-01	2.8690E-02
2	2.4610E+02	4.2525E+00	-9.7404E+00	3.4454E+02	3.8804E+01
	1.6968E+00	2.9320E-02	-6.7157E-02	2.3755E+00	2.6754E-01
3	6.2615E+00	-1.4952E+00	-4.4514E+00	9.9879E+00	4.2185E+00
	4.3171E-02	-1.0309E-02	-3.0691E-02	6.8864E-02	2.9085E-02
4	2.3533E+01	-4.8136E+00	-2.3093E+01	4.6626E+01	4.0751E+01
	1.6225E-01	-3.3188E-02	-1.5922E-01	3.2147E-01	2.8097E-01
5	2.4289E+01	4.9145E+00	-1.2173E+01	4.3129E+01	3.3616E+01
	1.6747E-01	3.3884E-02	-8.3927E-02	2.9736E-01	2.3178E-01
6	2.4224E+01	3.2368E-01	-1.6994E+01	4.7594E+01	1.4319E+01
	1.6702E-01	2.2317E-03	-1.1717E-01	3.2815E-01	9.8726E-02
7	2.2168E+00	4.7731E-01	-1.5412E+00	3.8937E+00	3.8385E-01
	1.5285E-02	3.2909E-03	-1.0626E-02	2.6846E-02	2.6466E-03
8	4.3905E+00	5.1971E-01	-2.5170E+00	8.5060E+00	5.6717E-01
	3.0271E-02	3.5833E-03	-1.7354E-02	5.8647E-02	3.9105E-03
9	5.1370E+00	4.5500E-01	-2.6215E+00	8.8529E+00	1.5743E-01
	3.5418E-02	3.1371E-03	-1.8074E-02	6.1039E-02	1.0855E-03
10	4.9032E+01	2.0792E+01	9.6621E+00	6.1143E+01	2.0990E+01
	3.3806E-01	1.4336E-01	6.6618E-02	4.2157E-01	1.4472E-01
11	2.6339E+01	1.5607E+00	-7.8095E+00	3.8632E+01	4.7840E+01
	1.8160E-01	1.0761E-02	-5.3845E-02	2.6636E-01	3.2984E-01
12	1.5801E+01	7.0073E-01	-7.6306E+00	2.3431E+01	9.7954E+00
	1.0894E-01	4.8314E-03	-5.2611E-02	1.6155E-01	6.7537E-02
13	2.1327E+01	-6.6441E+00	-1.8088E+01	3.8157E+01	5.8053E+00
	1.4705E-01	-4.5809E-02	-1.2471E-01	2.6309E-01	4.0026E-02
14	1.4524E+01	2.0497E+00	-1.4192E+01	2.7931E+01	1.3501E+01
	1.0014E-01	1.4132E-02	-9.7852E-02	1.9258E-01	9.3083E-02
15	1.3479E+01	-1.4125E+00	-1.3480E+01	1.8731E+01	6.6487E+00
	9.2938E-02	-9.7386E-03	-9.2939E-02	1.2915E-01	4.5841E-02

WATERMARK

16	1.2723E+01	-2.7068E+00	-7.3755E+00	2.0286E+01	2.4928E+01
	8.7719E-02	-1.8663E-02	-5.0852E-02	1.3987E-01	1.7187E-01
17	1.0315E+01	1.7823E+00	-4.8906E+00	1.5206E+01	1.2791E+01
	7.1119E-02	1.2288E-02	-3.3720E-02	1.0484E-01	8.8192E-02
18	1.0007E+01	4.3726E+00	-1.0007E+01	8.9909E+00	9.8668E-01
	6.8997E-02	3.0148E-02	-6.8997E-02	6.1990E-02	6.8029E-03
19	1.5421E+01	-1.3948E-01	-9.3792E+00	2.4800E+01	2.7621E+01
	1.0633E-01	-9.6165E-04	-6.4668E-02	1.7099E-01	1.9044E-01
20	1.5098E+01	4.6162E+00	-7.2991E+00	2.2397E+01	2.1322E+01
	1.0410E-01	3.1828E-02	-5.0326E-02	1.5442E-01	1.4701E-01
21	5.1971E+00	6.2696E-01	-3.5637E+00	8.7608E+00	1.1256E+00
	3.5832E-02	4.3228E-03	-2.4571E-02	6.0404E-02	7.7606E-03
22	7.2796E+00	-1.5019E-01	-5.5003E+00	1.2780E+01	1.9535E+00
	5.0191E-02	-1.0355E-03	-3.7923E-02	8.8115E-02	1.3469E-02

MARKUP

Table 2-111. Load Case 223, Vertical 10g Vibration Inertia Load, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.1171E+01	5.4868E+00	-1.5648E+01	3.4060E+01	8.3223E+00
	1.4597E-01	3.7830E-02	-1.0789E-01	2.3484E-01	5.7380E-02
2	4.9220E+02	8.5049E+00	-1.9481E+01	6.8908E+02	7.7607E+01
	3.3936E+00	5.8640E-02	-1.3431E-01	4.7511E+00	5.3508E-01
3	1.2523E+01	-2.9905E+00	-8.9027E+00	1.9976E+01	8.4369E+00
	8.6342E-02	-2.0619E-02	-6.1382E-02	1.3773E-01	5.8171E-02
4	4.7066E+01	-9.6271E+00	-4.6185E+01	9.3251E+01	8.1503E+01
	3.2451E-01	-6.6377E-02	-3.1844E-01	6.4295E-01	5.6194E-01
5	4.8578E+01	9.8290E+00	-2.4345E+01	8.6258E+01	6.7233E+01
	3.3493E-01	6.7768E-02	-1.6785E-01	5.9472E-01	4.6355E-01
6	4.8448E+01	6.4736E-01	-3.3988E+01	9.5188E+01	2.8638E+01
	3.3403E-01	4.4634E-03	-2.3434E-01	6.5630E-01	1.9745E-01
7	4.4337E+00	9.5461E-01	-3.0824E+00	7.7874E+00	7.6770E-01
	3.0569E-02	6.5818E-03	-2.1252E-02	5.3692E-02	5.2931E-03
8	8.7809E+00	1.0394E+00	-5.0341E+00	1.7012E+01	1.1343E+00
	6.0542E-02	7.1665E-03	-3.4709E-02	1.1729E-01	7.8210E-03
9	1.0274E+01	9.1000E-01	-5.2429E+00	1.7706E+01	3.1487E-01
	7.0836E-02	6.2742E-03	-3.6149E-02	1.2208E-01	2.1709E-03
10	9.8063E+01	4.1584E+01	1.9324E+01	1.2229E+02	4.1980E+01
	6.7612E-01	2.8671E-01	1.3324E-01	8.4313E-01	2.8944E-01
11	5.2678E+01	3.1214E+00	-1.5619E+01	7.7265E+01	9.5679E+01
	3.6320E-01	2.1521E-02	-1.0769E-01	5.3272E-01	6.5968E-01
12	3.1601E+01	1.4015E+00	-1.5261E+01	4.6863E+01	1.9591E+01
	2.1788E-01	9.6628E-03	-1.0522E-01	3.2311E-01	1.3507E-01
13	4.2654E+01	-1.3288E+01	-3.6177E+01	7.6315E+01	1.1611E+01
	2.9409E-01	-9.1619E-02	-2.4943E-01	5.2617E-01	8.0053E-02
14	2.9049E+01	4.0995E+00	-2.8384E+01	5.5863E+01	2.7001E+01
	2.0029E-01	2.8265E-02	-1.9570E-01	3.8516E-01	1.8617E-01
15	2.6959E+01	-2.8249E+00	-2.6959E+01	3.7462E+01	1.3297E+01
	1.8588E-01	-1.9477E-02	-1.8588E-01	2.5829E-01	9.1683E-02

WORKING DRAFT

16	2.5445E+01	-5.4136E+00	-1.4751E+01	4.0573E+01	4.9855E+01
	1.7544E-01	-3.7326E-02	-1.0170E-01	2.7974E-01	3.4374E-01
17	2.0630E+01	3.5645E+00	-9.7813E+00	3.0411E+01	2.5582E+01
	1.4224E-01	2.4577E-02	-6.7440E-02	2.0968E-01	1.7638E-01
18	2.0014E+01	8.7453E+00	-2.0014E+01	1.7982E+01	1.9734E+00
	1.3799E-01	6.0296E-02	-1.3799E-01	1.2398E-01	1.3606E-02
19	3.0842E+01	-2.7895E-01	-1.8758E+01	4.9601E+01	5.5241E+01
	2.1265E-01	-1.9233E-03	-1.2934E-01	3.4199E-01	3.8087E-01
20	3.0196E+01	9.2324E+00	-1.4598E+01	4.4795E+01	4.2644E+01
	2.0820E-01	6.3655E-02	-1.0065E-01	3.0885E-01	2.9402E-01
21	1.0394E+01	1.2539E+00	-7.1275E+00	1.7522E+01	2.2512E+00
	7.1665E-02	8.6455E-03	-4.9142E-02	1.2081E-01	1.5521E-02
22	1.4559E+01	-3.0038E-01	-1.1001E+01	2.5560E+01	3.9070E+00
	1.0038E-01	-2.0711E-03	-7.5847E-02	1.7623E-01	2.6938E-02

MARKUP

Table 2-112. Load Case 231, 4-ft. Head-On Drop, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-3.6745E+01	-1.6350E+03	-2.9227E+02	1.5982E+03	5.1532E+02
	-2.5334E-01	-1.1273E+01	-2.0151E+00	1.1019E+01	3.5530E+00
2	1.6924E+01	-1.0850E+03	-7.1515E+01	1.1019E+03	7.3222E+01
	1.1668E-01	-7.4806E+00	-4.9308E-01	7.5973E+00	5.0484E-01
3	-2.0459E+00	-9.8360E+02	1.1397E+00	9.8155E+02	2.0557E+02
	-1.4106E-02	-6.7817E+00	7.8582E-03	6.7676E+00	1.4174E+00
4	2.8433E+02	-2.5891E+03	-7.8589E+02	2.8734E+03	1.3145E+03
	1.9604E+00	-1.7851E+01	-5.4186E+00	1.9812E+01	9.0629E+00
5	-2.0875E+01	-8.5734E+02	-3.3140E+02	8.3646E+02	9.6546E+02
	-1.4393E-01	-5.9111E+00	-2.2849E+00	5.7672E+00	6.6566E+00
6	-1.6969E+02	-8.9536E+02	-3.3515E+02	7.2567E+02	9.9642E+01
	-1.1700E+00	-6.1733E+00	-2.3108E+00	5.0033E+00	6.8701E-01
7	-8.3610E+00	-6.9440E+02	-7.3969E+01	6.8604E+02	3.0956E+00
	-5.7647E-02	-4.7877E+00	-5.1000E-01	4.7301E+00	2.1343E-02
8	-5.5420E+00	-7.3296E+02	-5.2759E+01	7.2742E+02	2.7063E+00
	-3.8211E-02	-5.0536E+00	-3.6376E-01	5.0154E+00	1.8659E-02
9	3.7687E-01	-7.0048E+02	1.7045E+01	7.0086E+02	3.1932E-02
	2.5984E-03	-4.8297E+00	1.1752E-01	4.8323E+00	2.2017E-04
10	-2.0917E+02	-1.7997E+03	-3.0970E+02	1.5906E+03	7.1822E+02
	-1.4422E+00	-1.2409E+01	-2.1353E+00	1.0967E+01	4.9519E+00
11	1.5986E+02	-9.7789E+02	-1.6693E+02	1.1377E+03	4.2225E+02
	1.1022E+00	-6.7423E+00	-1.1509E+00	7.8445E+00	2.9113E+00
12	1.6157E+02	-1.6147E+02	1.3320E+02	3.2303E+02	6.6215E+02
	1.1140E+00	-1.1133E+00	9.1838E-01	2.2272E+00	4.5654E+00
13	2.3572E+02	-1.0218E+03	-9.9449E+01	1.2575E+03	8.0188E+02
	1.6252E+00	-7.0447E+00	-6.8568E-01	8.6699E+00	5.5288E+00
14	2.6536E+02	-9.1342E+02	-4.1437E+01	1.1788E+03	4.0336E+02
	1.8296E+00	-6.2978E+00	-2.8570E-01	8.1274E+00	2.7811E+00
15	1.0722E+02	7.3405E+01	1.0106E+02	3.3820E+01	2.0506E+01
	7.3929E-01	5.0611E-01	6.9682E-01	2.3318E-01	1.4138E-01

WITHDRAWN

16	-5.5379E-01	-3.7020E+02	-1.7500E+02	3.6965E+02	7.2371E+00
	-3.8182E-03	-2.5524E+00	-1.2066E+00	2.5486E+00	4.9898E-02
17	6.5941E+01	-4.1597E+02	-2.4258E+02	4.8191E+02	3.7293E+02
	4.5465E-01	-2.8680E+00	-1.6725E+00	3.3226E+00	2.5713E+00
18	4.7255E+01	-8.3566E+02	-2.4456E+02	8.8291E+02	7.7129E+02
	3.2581E-01	-5.7617E+00	-1.6862E+00	6.0875E+00	5.3179E+00
19	1.5840E+02	-7.6592E+02	-2.5278E+02	9.2432E+02	4.8833E+02
	1.0921E+00	-5.2808E+00	-1.7429E+00	6.3729E+00	3.3669E+00
20	-8.0328E+01	-5.8238E+02	-3.3109E+02	5.0205E+02	4.5037E+02
	-5.5384E-01	-4.0153E+00	-2.2828E+00	3.4615E+00	3.1052E+00
21	-9.2123E+01	-8.5338E+02	-9.4524E+01	7.6125E+02	3.1862E+02
	-6.3516E-01	-5.8838E+00	-6.5172E-01	5.2487E+00	2.1968E+00
22	1.7497E+02	4.5819E+01	1.7414E+02	1.2915E+02	8.8723E+01
	1.2064E+00	3.1591E-01	1.2006E+00	8.9049E-01	6.1172E-01

MARKUP

Table 2-113. Load Case 232, 30-ft. Head-On Drop Impact Test, Normal Conditions, Normal Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-3.6745E+01	-1.6350E+03	-2.9227E+02	1.5982E+03	5.1532E+02
	-2.5334E-01	-1.1273E+01	-2.0151E+00	1.1019E+01	3.5530E+00
2	1.6924E+01	-1.0850E+03	-7.1515E+01	1.1019E+03	7.3222E+01
	1.1668E-01	-7.4806E+00	-4.9308E-01	7.5973E+00	5.0484E-01
3	-2.0459E+00	-9.8360E+02	1.1397E+00	9.8155E+02	2.0557E+02
	-1.4106E-02	-6.7817E+00	7.8582E-03	6.7676E+00	1.4174E+00
4	2.8433E+02	-2.5891E+03	-7.8589E+02	2.8734E+03	1.3145E+03
	1.9604E+00	-1.7851E+01	-5.4186E+00	1.9812E+01	9.0629E+00
5	-2.0875E+01	-8.5734E+02	-3.3140E+02	8.3646E+02	9.6546E+02
	-1.4393E-01	-5.9111E+00	-2.2849E+00	5.7672E+00	6.6566E+00
6	-1.6969E+02	-8.9536E+02	-3.3515E+02	7.2567E+02	9.9642E+01
	-1.1700E+00	-6.1733E+00	-2.3108E+00	5.0033E+00	6.8701E-01
7	-8.3610E+00	-6.9440E+02	-7.3969E+01	6.8604E+02	3.0956E+00
	-5.7647E-02	-4.7877E+00	-5.1000E-01	4.7301E+00	2.1343E-02
8	-5.5420E+00	-7.3296E+02	-5.2759E+01	7.2742E+02	2.7063E+00
	-3.8211E-02	-5.0536E+00	-3.6376E-01	5.0154E+00	1.8659E-02
9	3.7687E-01	-7.0048E+02	1.7045E+01	7.0086E+02	3.1932E-02
	2.5984E-03	-4.8297E+00	1.1752E-01	4.8323E+00	2.2017E-04
10	-2.0917E+02	-1.7997E+03	-3.0970E+02	1.5906E+03	7.1822E+02
	-1.4422E+00	-1.2409E+01	-2.1353E+00	1.0967E+01	4.9519E+00
11	1.5986E+02	-9.7789E+02	-1.6693E+02	1.1377E+03	4.2225E+02
	1.1022E+00	-6.7423E+00	-1.1509E+00	7.8445E+00	2.9113E+00
12	1.6157E+02	-1.6147E+02	1.3320E+02	3.2303E+02	6.6215E+02
	1.1140E+00	-1.1133E+00	9.1838E-01	2.2272E+00	4.5654E+00
13	2.3572E+02	-1.0218E+03	-9.9449E+01	1.2575E+03	8.0188E+02
	1.6252E+00	-7.0447E+00	-6.8568E-01	8.6699E+00	5.5288E+00
14	2.6536E+02	-9.1342E+02	-4.1437E+01	1.1788E+03	4.0336E+02
	1.8296E+00	-6.2978E+00	-2.8570E-01	8.1274E+00	2.7811E+00
15	1.0722E+02	7.3405E+01	1.0106E+02	3.3820E+01	2.0506E+01
	7.3929E-01	5.0611E-01	6.9682E-01	2.3318E-01	1.4138E-01

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16	-5.5379E-01	-3.7020E+02	-1.7500E+02	3.6965E+02	7.2371E+00
	-3.8182E-03	-2.5524E+00	-1.2066E+00	2.5486E+00	4.9898E-02
17	6.5941E+01	-4.1597E+02	-2.4258E+02	4.8191E+02	3.7293E+02
	4.5465E-01	-2.8680E+00	-1.6725E+00	3.3226E+00	2.5713E+00
18	4.7255E+01	-8.3566E+02	-2.4456E+02	8.8291E+02	7.7129E+02
	3.2581E-01	-5.7617E+00	-1.6862E+00	6.0875E+00	5.3179E+00
19	1.5840E+02	-7.6592E+02	-2.5278E+02	9.2432E+02	4.8833E+02
	1.0921E+00	-5.2808E+00	-1.7429E+00	6.3729E+00	3.3669E+00
20	-8.0328E+01	-5.8238E+02	-3.3109E+02	5.0205E+02	4.5037E+02
	-5.5384E-01	-4.0153E+00	-2.2828E+00	3.4615E+00	3.1052E+00
21	-9.2123E+01	-8.5338E+02	-9.4524E+01	7.6125E+02	3.1862E+02
	-6.3516E-01	-5.8838E+00	-6.5172E-01	5.2487E+00	2.1968E+00
22	1.7497E+02	4.5819E+01	1.7414E+02	1.2915E+02	8.8723E+01
	1.2064E+00	3.1591E-01	1.2006E+00	8.9049E-01	6.1172E-01

MARKUP

Table 2-114. Load Combination 101, Hot Environment, Normal Conditions of Transport – Model AOS-025

Load Cases: 102, 201, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.75	1.10	0.03	1.85	1.88	20.00	70.00	>10
	5.16	7.60	0.24	12.75	12.99	137.90	482.63	
2	0.14	0.20	0.05	0.34	0.38	20.00	70.00	>10
	0.96	1.35	0.33	2.31	2.64	137.90	482.63	
3	0.08	0.08	0.04	0.16	0.20	20.00	70.00	>10
	0.58	0.54	0.25	1.12	1.38	137.90	482.63	
4	1.16	1.78	0.26	2.94	3.20	20.00	70.00	9.20
	8.00	12.28	1.80	20.28	22.08	137.90	482.63	
5	1.18	1.00	0.29	2.18	2.47	20.00	70.00	>10
	8.17	6.88	2.01	15.05	17.05	137.90	482.63	
6	0.78	1.17	0.12	1.95	2.07	20.00	70.00	>10
	5.40	8.05	0.83	13.44	14.28	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	3.13	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	2.82	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	3.30	137.90	482.63	
10	1.23	0.15	0.06	1.38	1.44	20.00	70.00	>10
	8.49	1.03	0.39	9.52	9.91	137.90	482.63	
11	0.93	1.23	0.09	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	0.13	2.50	2.63	20.00	70.00	>10
	6.95	10.27	0.87	17.23	18.10	137.90	482.63	
13	1.19	1.05	0.17	2.24	2.41	20.00	70.00	>10
	8.21	7.23	1.16	15.44	16.60	137.90	482.63	

MARKUP

14	1.21	1.54	0.15	2.75	2.90	20.00	70.00	9.91
	8.36	10.61	1.01	18.97	19.98	137.90	482.63	
15	1.70	1.94	1.29	3.64	4.93	20.00	70.00	7.25
	11.69	13.38	8.89	25.07	33.96	137.90	482.63	
16	1.70	2.69	0.71	4.39	5.10	20.00	70.00	5.83
	11.72	18.55	4.91	30.27	35.17	137.90	482.63	
17	1.12	1.79	0.43	2.90	3.33	20.00	70.00	9.33
	7.71	12.31	2.95	20.02	22.96	137.90	482.63	
18	0.87	1.40	0.20	2.27	2.47	20.00	70.00	>10
	5.99	9.65	1.40	15.64	17.04	137.90	482.63	
19	1.46	2.17	0.36	3.63	4.00	20.00	70.00	7.26
	10.09	14.96	2.49	25.05	27.54	137.90	482.63	
20	1.82	2.90	0.46	4.72	5.18	20.00	70.00	5.35
	12.58	19.99	3.16	32.57	35.73	137.90	482.63	
21	0.32	0.44	0.01	0.76	0.77	20.00	70.00	>10
	2.24	3.00	0.09	5.24	5.33	137.90	482.63	
22	0.46	0.47	0.04	0.93	0.97	20.00	70.00	>10
	3.20	3.23	0.26	6.43	6.69	137.90	482.63	

Min MS: 5.350, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-115. Load Combination 102, Cold Environment, Normal Conditions of Transport – Model AOS-025

Load Cases: 104, 201, 211
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.75	1.10	0.20	1.85	2.05	20.00	70.00	>10
	5.16	7.60	1.35	12.75	14.10	137.90	482.63	
2	0.14	0.20	0.14	0.34	0.48	20.00	70.00	>10
	0.96	1.35	0.97	2.31	3.28	137.90	482.63	
3	0.08	0.08	0.18	0.16	0.34	20.00	70.00	>10
	0.58	0.54	1.25	1.12	2.37	137.90	482.63	
4	1.16	1.78	10.62	2.94	13.56	20.00	70.00	3.42
	8.00	12.28	73.22	20.28	93.50	137.90	482.63	
5	1.18	1.00	16.21	2.18	18.40	20.00	70.00	2.26
	8.17	6.88	111.78	15.05	126.83	137.90	482.63	
6	0.78	1.17	8.16	1.95	10.11	20.00	70.00	4.93
	5.40	8.05	56.29	13.44	69.74	137.90	482.63	
7	0.34	0.07	4.31	0.40	4.71	20.00	70.00	>10
	2.34	0.45	29.72	2.79	32.51	137.90	482.63	
8	0.32	0.04	4.31	0.36	4.67	20.00	70.00	>10
	2.21	0.27	29.68	2.48	32.17	137.90	482.63	
9	0.36	0.07	4.31	0.43	4.74	20.00	70.00	>10
	2.48	0.48	29.69	2.97	32.66	137.90	482.63	
10	1.23	0.15	4.66	1.38	6.05	20.00	70.00	8.93
	8.49	1.03	32.16	9.52	41.68	137.90	482.63	
11	0.93	1.23	2.08	2.17	4.25	20.00	70.00	>10
	6.44	8.51	14.37	14.95	29.32	137.90	482.63	
12	1.01	1.49	1.03	2.50	3.53	20.00	70.00	>10
	6.95	10.27	7.11	17.23	24.34	137.90	482.63	
13	1.19	1.05	7.61	2.24	9.85	20.00	70.00	5.09
	8.21	7.23	52.45	15.44	67.89	137.90	482.63	

WAIVER

14	1.21	1.54	5.98	2.75	8.73	20.00	70.00	5.87
	8.36	10.61	41.23	18.97	60.20	137.90	482.63	
15	1.70	1.94	0.94	3.64	4.58	20.00	70.00	7.25
	11.69	13.38	6.51	25.07	31.59	137.90	482.63	
16	1.70	2.69	2.10	4.39	6.49	20.00	70.00	5.83
	11.72	18.55	14.51	30.27	44.78	137.90	482.63	
17	1.12	1.79	1.95	2.90	4.85	20.00	70.00	9.33
	7.71	12.31	13.45	20.02	33.46	137.90	482.63	
18	0.87	1.40	2.14	2.27	4.41	20.00	70.00	>10
	5.99	9.65	14.74	15.64	30.38	137.90	482.63	
19	1.46	2.17	2.56	3.63	6.19	20.00	70.00	7.26
	10.09	14.96	17.62	25.05	42.67	137.90	482.63	
20	1.82	2.90	2.41	4.72	7.13	20.00	70.00	5.35
	12.58	19.99	16.59	32.57	49.16	137.90	482.63	
21	0.32	0.44	1.15	0.76	1.91	20.00	70.00	>10
	2.24	3.00	7.95	5.24	13.19	137.90	482.63	
22	0.46	0.47	0.25	0.93	1.19	20.00	70.00	>10
	3.20	3.23	1.75	6.43	8.18	137.90	482.63	

Min MS: 2.262, Location: 5, Combination: Pm+Pb+Q

MARKUP

Table 2-116. Load Combination 103, Increased External Pressure, Normal Conditions of Transport – Model AOS-025

Load Cases: 103, 201, 211
-20°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.75	1.10	0.16	1.85	2.01	20.00	70.00	>10
	5.16	7.60	1.10	12.75	13.86	137.90	482.63	
2	0.14	0.20	0.12	0.34	0.45	20.00	70.00	>10
	0.96	1.35	0.80	2.31	3.11	137.90	482.63	
3	0.08	0.08	0.15	0.16	0.31	20.00	70.00	>10
	0.58	0.54	1.02	1.12	2.15	137.90	482.63	
4	1.16	1.78	8.69	2.94	11.63	20.00	70.00	4.16
	8.00	12.28	59.91	20.28	80.19	137.90	482.63	
5	1.18	1.00	13.27	2.18	15.45	20.00	70.00	2.88
	8.17	6.88	91.47	15.05	106.51	137.90	482.63	
6	0.78	1.17	6.68	1.95	8.63	20.00	70.00	5.95
	5.40	8.05	46.06	13.44	59.50	137.90	482.63	
7	0.34	0.07	3.53	0.40	3.93	20.00	70.00	>10
	2.34	0.45	24.31	2.79	27.11	137.90	482.63	
8	0.32	0.04	3.52	0.36	3.88	20.00	70.00	>10
	2.21	0.27	24.29	2.48	26.77	137.90	482.63	
9	0.36	0.07	3.52	0.43	3.95	20.00	70.00	>10
	2.48	0.48	24.30	2.97	27.26	137.90	482.63	
10	1.23	0.15	3.82	1.38	5.20	20.00	70.00	>10
	8.49	1.03	26.31	9.52	35.83	137.90	482.63	
11	0.93	1.23	1.71	2.17	3.87	20.00	70.00	>10
	6.44	8.51	11.76	14.95	26.70	137.90	482.63	
12	1.01	1.49	0.84	2.50	3.34	20.00	70.00	>10
	6.95	10.27	5.82	17.23	23.04	137.90	482.63	
13	1.19	1.05	6.22	2.24	8.46	20.00	70.00	6.09
	8.21	7.23	42.91	15.44	58.35	137.90	482.63	

WAPRUP

14	1.21	1.54	4.89	2.75	7.64	20.00	70.00	6.85
	8.36	10.61	33.74	18.97	52.70	137.90	482.63	
15	1.70	1.94	0.77	3.64	4.41	20.00	70.00	7.25
	11.69	13.38	5.33	25.07	30.40	137.90	482.63	
16	1.70	2.69	1.72	4.39	6.11	20.00	70.00	5.83
	11.72	18.55	11.87	30.27	42.14	137.90	482.63	
17	1.12	1.79	1.60	2.90	4.50	20.00	70.00	9.33
	7.71	12.31	11.00	20.02	31.02	137.90	482.63	
18	0.87	1.40	1.75	2.27	4.02	20.00	70.00	>10
	5.99	9.65	12.06	15.64	27.70	137.90	482.63	
19	1.46	2.17	2.09	3.63	5.72	20.00	70.00	7.26
	10.09	14.96	14.42	25.05	39.47	137.90	482.63	
20	1.82	2.90	1.97	4.72	6.69	20.00	70.00	5.35
	12.58	19.99	13.58	32.57	46.15	137.90	482.63	
21	0.32	0.44	0.94	0.76	1.70	20.00	70.00	>10
	2.24	3.00	6.50	5.24	11.74	137.90	482.63	
22	0.46	0.47	0.21	0.93	1.14	20.00	70.00	>10
	3.20	3.23	1.43	6.43	7.86	137.90	482.63	

Min MS: 2.884, Location: 5, Combination: Pm+Pb+Q

MARKUP

Table 2-117. Load Combination 104, Minimum External Pressure, Normal Conditions of Transport – Model AOS-025

Load Cases: 101, 201, 202, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 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	0.86	1.31	0.04	2.17	2.21	20.00	70.00	>10
	5.93	9.02	0.26	14.95	15.21	137.90	482.63	
2	0.23	0.37	0.05	0.60	0.65	20.00	70.00	>10
	1.59	2.52	0.34	4.11	4.45	137.90	482.63	
3	0.14	0.15	0.03	0.29	0.33	20.00	70.00	>10
	0.95	1.07	0.24	2.02	2.26	137.90	482.63	
4	1.71	2.67	0.30	4.37	4.67	20.00	70.00	5.86
	11.76	18.39	2.07	30.16	32.23	137.90	482.63	
5	1.81	1.05	0.33	2.86	3.19	20.00	70.00	9.48
	12.49	7.25	2.28	19.74	22.01	137.90	482.63	
6	1.34	1.92	0.14	3.26	3.40	20.00	70.00	8.21
	9.22	13.24	0.97	22.46	23.42	137.90	482.63	
7	0.63	0.13	0.05	0.76	0.80	20.00	70.00	>10
	4.34	0.88	0.33	5.22	5.55	137.90	482.63	
8	0.61	0.08	0.05	0.69	0.74	20.00	70.00	>10
	4.22	0.54	0.33	4.75	5.08	137.90	482.63	
9	0.66	0.14	0.05	0.79	0.84	20.00	70.00	>10
	4.53	0.94	0.33	5.47	5.80	137.90	482.63	
10	2.20	0.33	0.06	2.53	2.59	20.00	70.00	8.08
	15.18	2.26	0.41	17.45	17.86	137.90	482.63	
11	1.65	2.26	0.08	3.91	4.00	20.00	70.00	6.67
	11.39	15.58	0.59	26.97	27.55	137.90	482.63	
12	1.88	2.67	0.12	4.55	4.67	20.00	70.00	5.59
	12.98	18.39	0.85	31.37	32.22	137.90	482.63	
13	1.65	1.53	0.16	3.18	3.34	20.00	70.00	8.45
	11.35	10.54	1.14	21.90	23.03	137.90	482.63	

MARKUP

14	1.65	2.36	0.14	4.01	4.16	20.00	70.00	6.48
	11.40	16.27	0.99	27.67	28.66	137.90	482.63	
15	3.29	4.43	0.67	7.72	8.39	20.00	70.00	2.89
	22.67	30.54	4.62	53.21	57.83	137.90	482.63	
16	3.07	4.91	0.36	7.98	8.34	20.00	70.00	2.76
	21.16	33.84	2.49	54.99	57.48	137.90	482.63	
17	1.96	3.23	0.22	5.19	5.41	20.00	70.00	4.78
	13.52	22.29	1.50	35.81	37.31	137.90	482.63	
18	1.41	2.28	0.10	3.69	3.79	20.00	70.00	7.13
	9.73	15.72	0.69	25.45	26.14	137.90	482.63	
19	2.42	3.75	0.18	6.18	6.36	20.00	70.00	3.86
	16.71	25.88	1.28	42.59	43.87	137.90	482.63	
20	2.97	5.03	0.22	8.00	8.22	20.00	70.00	2.75
	20.45	34.69	1.52	55.14	56.66	137.90	482.63	
21	0.43	0.46	0.01	0.90	0.90	20.00	70.00	>10
	2.98	3.19	0.06	6.17	6.23	137.90	482.63	
22	0.65	0.52	0.02	1.18	1.19	20.00	70.00	>10
	4.50	3.61	0.12	8.11	8.23	137.90	482.63	

Min MS: 2.752, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-118. Load Combination 105, Cold Environment with Maximum Decay Heat, Normal Conditions of Transport – Model AOS-025

Load Cases: 105, 201, 202, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 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	0.86	1.31	0.14	2.17	2.31	20.00	70.00	>10
	5.93	9.02	0.95	14.95	15.89	137.90	482.63	
2	0.23	0.37	0.09	0.60	0.69	20.00	70.00	>10
	1.59	2.52	0.64	4.11	4.75	137.90	482.63	
3	0.14	0.15	0.12	0.29	0.42	20.00	70.00	>10
	0.95	1.07	0.84	2.02	2.86	137.90	482.63	
4	1.71	2.67	6.22	4.37	10.60	20.00	70.00	4.66
	11.76	18.39	42.91	30.16	73.07	137.90	482.63	
5	1.81	1.05	9.55	2.86	12.42	20.00	70.00	3.83
	12.49	7.25	65.87	19.74	85.60	137.90	482.63	
6	1.34	1.92	4.83	3.26	8.08	20.00	70.00	6.42
	9.22	13.24	33.27	22.46	55.73	137.90	482.63	
7	0.63	0.13	2.56	0.76	3.32	20.00	70.00	>10
	4.34	0.88	17.67	5.22	22.89	137.90	482.63	
8	0.61	0.08	2.56	0.69	3.25	20.00	70.00	>10
	4.22	0.54	17.65	4.75	22.40	137.90	482.63	
9	0.66	0.14	2.56	0.79	3.35	20.00	70.00	>10
	4.53	0.94	17.65	5.47	23.13	137.90	482.63	
10	2.20	0.33	2.81	2.53	5.34	20.00	70.00	8.08
	15.18	2.26	19.39	17.45	36.84	137.90	482.63	
11	1.65	2.26	1.26	3.91	5.17	20.00	70.00	6.67
	11.39	15.58	8.71	26.97	35.67	137.90	482.63	
12	1.88	2.67	0.62	4.55	5.17	20.00	70.00	5.59
	12.98	18.39	4.25	31.37	35.61	137.90	482.63	
13	1.65	1.53	4.53	3.18	7.70	20.00	70.00	6.79
	11.35	10.54	31.20	21.90	53.10	137.90	482.63	

MARKUP

14	1.65	2.36	3.54	4.01	7.55	20.00	70.00	6.48
	11.40	16.27	24.42	27.67	52.08	137.90	482.63	
15	3.29	4.43	0.57	7.72	8.29	20.00	70.00	2.89
	22.67	30.54	3.96	53.21	57.17	137.90	482.63	
16	3.07	4.91	1.28	7.98	9.25	20.00	70.00	2.76
	21.16	33.84	8.82	54.99	63.81	137.90	482.63	
17	1.96	3.23	1.18	5.19	6.38	20.00	70.00	4.78
	13.52	22.29	8.15	35.81	43.95	137.90	482.63	
18	1.41	2.28	1.29	3.69	4.98	20.00	70.00	7.13
	9.73	15.72	8.91	25.45	34.36	137.90	482.63	
19	2.42	3.75	1.51	6.18	7.69	20.00	70.00	3.86
	16.71	25.88	10.44	42.59	53.04	137.90	482.63	
20	2.97	5.03	1.43	8.00	9.42	20.00	70.00	2.75
	20.45	34.69	9.84	55.14	64.97	137.90	482.63	
21	0.43	0.46	0.72	0.90	1.61	20.00	70.00	>10
	2.98	3.19	4.96	6.17	11.13	137.90	482.63	
22	0.65	0.52	0.15	1.18	1.32	20.00	70.00	>10
	4.50	3.61	1.02	8.11	9.13	137.90	482.63	

Min MS: 2.752, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-119. Load Combination 106, Maximum Pressure, Hot Environment, Normal Conditions of Transport – Model AOS-025

Load Cases: 101, 201, 203, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 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	0.86	1.31	0.04	2.17	2.21	20.00	70.00	>10
	5.90	9.06	0.26	14.95	15.21	137.90	482.63	
2	0.23	0.36	0.05	0.59	0.64	20.00	70.00	>10
	1.57	2.52	0.34	4.08	4.42	137.90	482.63	
3	0.14	0.15	0.03	0.28	0.32	20.00	70.00	>10
	0.95	1.01	0.24	1.96	2.20	137.90	482.63	
4	2.25	3.83	0.30	6.08	6.38	20.00	70.00	3.93
	15.53	26.38	2.07	41.91	43.99	137.90	482.63	
5	2.04	1.91	0.33	3.94	4.27	20.00	70.00	6.61
	14.06	13.14	2.28	27.19	29.47	137.90	482.63	
6	1.51	2.31	0.14	3.82	3.96	20.00	70.00	6.86
	10.41	15.92	0.97	26.33	27.30	137.90	482.63	
7	0.59	0.13	0.05	0.72	0.77	20.00	70.00	>10
	4.07	0.89	0.33	4.95	5.28	137.90	482.63	
8	0.57	0.08	0.05	0.64	0.69	20.00	70.00	>10
	3.91	0.54	0.33	4.44	4.77	137.90	482.63	
9	0.62	0.14	0.05	0.75	0.80	20.00	70.00	>10
	4.26	0.94	0.33	5.20	5.53	137.90	482.63	
10	2.12	0.28	0.06	2.41	2.47	20.00	70.00	8.42
	14.64	1.95	0.41	16.59	17.00	137.90	482.63	
11	1.66	2.30	0.08	3.97	4.05	20.00	70.00	6.56
	11.47	15.87	0.59	27.34	27.93	137.90	482.63	
12	1.89	2.71	0.12	4.60	4.73	20.00	70.00	5.51
	13.06	18.68	0.85	31.75	32.60	137.90	482.63	
13	1.68	1.40	0.16	3.08	3.25	20.00	70.00	8.73
	11.61	9.64	1.14	21.25	22.39	137.90	482.63	

MARKUP

14	1.79	2.53	0.14	4.31	4.46	20.00	70.00	5.95
	12.33	17.42	0.99	29.74	30.74	137.90	482.63	
15	3.36	4.54	0.67	7.90	8.57	20.00	70.00	2.80
	23.14	31.33	4.62	54.48	59.10	137.90	482.63	
16	3.12	4.99	0.36	8.11	8.47	20.00	70.00	2.70
	21.52	34.42	2.49	55.94	58.43	137.90	482.63	
17	1.99	3.29	0.22	5.28	5.50	20.00	70.00	4.68
	13.74	22.67	1.50	36.41	37.92	137.90	482.63	
18	1.43	2.31	0.10	3.74	3.84	20.00	70.00	7.03
	9.84	15.92	0.69	25.76	26.45	137.90	482.63	
19	2.45	3.80	0.18	6.25	6.43	20.00	70.00	3.80
	16.90	26.19	1.28	43.09	44.37	137.90	482.63	
20	3.00	5.10	0.22	8.10	8.32	20.00	70.00	2.70
	20.70	35.16	1.52	55.86	57.38	137.90	482.63	
21	0.45	0.67	0.01	1.12	1.13	20.00	70.00	>10
	3.11	4.63	0.06	7.74	7.80	137.90	482.63	
22	0.63	0.74	0.02	1.38	1.39	20.00	70.00	>10
	4.35	5.13	0.12	9.48	9.61	137.90	482.63	

Min MS: 2.698, Location: 16, Combination: Pm+Pb

MARKUP

Table 2-120. Load Combination 107, Maximum Pressure, Cold Environment, Normal Conditions of Transport – Model AOS-025

Load Cases: 105, 201, 203, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 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	0.86	1.31	0.14	2.17	2.31	20.00	70.00	>10
	5.90	9.06	0.95	14.95	15.90	137.90	482.63	
2	0.23	0.36	0.09	0.59	0.68	20.00	70.00	>10
	1.57	2.52	0.64	4.08	4.72	137.90	482.63	
3	0.14	0.15	0.12	0.28	0.41	20.00	70.00	>10
	0.95	1.01	0.84	1.96	2.81	137.90	482.63	
4	2.25	3.83	6.22	6.08	12.30	20.00	70.00	3.88
	15.53	26.38	42.91	41.91	84.82	137.90	482.63	
5	2.04	1.91	9.55	3.94	13.50	20.00	70.00	3.45
	14.06	13.14	65.87	27.19	93.06	137.90	482.63	
6	1.51	2.31	4.83	3.82	8.64	20.00	70.00	5.94
	10.41	15.92	33.27	26.33	59.60	137.90	482.63	
7	0.59	0.13	2.56	0.72	3.28	20.00	70.00	>10
	4.07	0.89	17.67	4.95	22.62	137.90	482.63	
8	0.57	0.08	2.56	0.64	3.20	20.00	70.00	>10
	3.91	0.54	17.65	4.44	22.09	137.90	482.63	
9	0.62	0.14	2.56	0.75	3.31	20.00	70.00	>10
	4.26	0.94	17.65	5.20	22.85	137.90	482.63	
10	2.12	0.28	2.81	2.41	5.22	20.00	70.00	8.42
	14.64	1.95	19.39	16.59	35.98	137.90	482.63	
11	1.66	2.30	1.26	3.97	5.23	20.00	70.00	6.56
	11.47	15.87	8.71	27.34	36.05	137.90	482.63	
12	1.89	2.71	0.62	4.60	5.22	20.00	70.00	5.51
	13.06	18.68	4.25	31.75	36.00	137.90	482.63	
13	1.68	1.40	4.53	3.08	7.61	20.00	70.00	6.89
	11.61	9.64	31.20	21.25	52.45	137.90	482.63	

WATERMARK

14	1.79	2.53	3.54	4.31	7.86	20.00	70.00	5.95
	12.33	17.42	24.42	29.74	54.16	137.90	482.63	
15	3.36	4.54	0.57	7.90	8.48	20.00	70.00	2.80
	23.14	31.33	3.96	54.48	58.44	137.90	482.63	
16	3.12	4.99	1.28	8.11	9.39	20.00	70.00	2.70
	21.52	34.42	8.82	55.94	64.76	137.90	482.63	
17	1.99	3.29	1.18	5.28	6.46	20.00	70.00	4.68
	13.74	22.67	8.15	36.41	44.56	137.90	482.63	
18	1.43	2.31	1.29	3.74	5.03	20.00	70.00	7.03
	9.84	15.92	8.91	25.76	34.67	137.90	482.63	
19	2.45	3.80	1.51	6.25	7.76	20.00	70.00	3.80
	16.90	26.19	10.44	43.09	53.54	137.90	482.63	
20	3.00	5.10	1.43	8.10	9.53	20.00	70.00	2.70
	20.70	35.16	9.84	55.86	65.70	137.90	482.63	
21	0.45	0.67	0.72	1.12	1.84	20.00	70.00	>10
	3.11	4.63	4.96	7.74	12.70	137.90	482.63	
22	0.63	0.74	0.15	1.38	1.52	20.00	70.00	>10
	4.35	5.13	1.02	9.48	10.50	137.90	482.63	

Min MS: 2.698, Location: 16, Combination: Pm+Pb

MARKUP

Table 2-121. Load Combination 215, Compression Load, Normal Conditions of Transport – Model AOS-025

Load Cases: 215, 101, 201, 211
Compression Load (5x weight)
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.77	1.14	0.04	1.91	1.95	20.00	70.00	>10
	5.32	7.85	0.26	13.16	13.42	137.90	482.63	
2	0.16	0.20	0.05	0.35	0.40	20.00	70.00	>10
	1.09	1.35	0.34	2.43	2.77	137.90	482.63	
3	0.10	0.09	0.03	0.19	0.22	20.00	70.00	>10
	0.72	0.59	0.24	1.31	1.54	137.90	482.63	
4	1.27	1.93	0.30	3.19	3.49	20.00	70.00	8.39
	8.74	13.28	2.07	22.02	24.09	137.90	482.63	
5	1.27	1.11	0.33	2.38	2.71	20.00	70.00	>10
	8.73	7.67	2.28	16.40	18.67	137.90	482.63	
6	0.82	1.19	0.14	2.01	2.15	20.00	70.00	>10
	5.65	8.18	0.97	13.83	14.80	137.90	482.63	
7	0.35	0.07	0.05	0.42	0.47	20.00	70.00	>10
	2.43	0.46	0.33	2.89	3.22	137.90	482.63	
8	0.33	0.04	0.05	0.37	0.42	20.00	70.00	>10
	2.27	0.27	0.33	2.54	2.87	137.90	482.63	
9	0.37	0.07	0.05	0.44	0.49	20.00	70.00	>10
	2.54	0.49	0.33	3.03	3.35	137.90	482.63	
10	1.26	0.16	0.06	1.42	1.48	20.00	70.00	>10
	8.72	1.09	0.41	9.80	10.21	137.90	482.63	
11	0.95	1.25	0.08	2.20	2.29	20.00	70.00	>10
	6.56	8.64	0.59	15.20	15.79	137.90	482.63	
12	1.03	1.52	0.12	2.54	2.67	20.00	70.00	>10
	7.07	10.47	0.85	17.54	18.40	137.90	482.63	
13	1.25	1.10	0.16	2.35	2.51	20.00	70.00	>10
	8.60	7.60	1.14	16.19	17.33	137.90	482.63	

WATERMARK

14	1.26	1.58	0.14	2.84	2.99	20.00	70.00	9.55
	8.70	10.91	0.99	19.61	20.60	137.90	482.63	
15	1.85	2.00	0.67	3.85	4.52	20.00	70.00	6.79
	12.77	13.77	4.62	26.54	31.17	137.90	482.63	
16	1.72	2.70	0.36	4.42	4.78	20.00	70.00	5.79
	11.84	18.63	2.49	30.46	32.95	137.90	482.63	
17	1.13	1.80	0.22	2.93	3.15	20.00	70.00	9.23
	7.80	12.43	1.50	20.23	21.73	137.90	482.63	
18	0.89	1.43	0.10	2.31	2.41	20.00	70.00	>10
	6.11	9.84	0.69	15.95	16.64	137.90	482.63	
19	1.50	2.22	0.18	3.72	3.91	20.00	70.00	7.06
	10.37	15.28	1.28	25.66	26.93	137.90	482.63	
20	1.88	2.97	0.22	4.85	5.07	20.00	70.00	5.19
	12.94	20.47	1.52	33.41	34.93	137.90	482.63	
21	0.36	0.45	0.01	0.81	0.82	20.00	70.00	>10
	2.48	3.11	0.06	5.59	5.65	137.90	482.63	
22	0.52	0.51	0.02	1.02	1.04	20.00	70.00	>10
	3.57	3.49	0.12	7.06	7.18	137.90	482.63	

Min MS: 5.192, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-122. Load Combination 216, Rod Drop, Normal Conditions of Transport – Model AOS-025

Load Cases: 216, 101, 201, 211
Rod Drop onto Cask
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.77	1.11	0.04	1.87	1.91	20.00	70.00	>10
	5.28	7.64	0.26	12.92	13.18	137.90	482.63	
2	0.17	0.20	0.05	0.37	0.42	20.00	70.00	>10
	1.20	1.37	0.34	2.57	2.90	137.90	482.63	
3	0.12	0.08	0.03	0.21	0.24	20.00	70.00	>10
	0.83	0.58	0.24	1.42	1.65	137.90	482.63	
4	1.30	1.80	0.30	3.10	3.40	20.00	70.00	8.68
	8.97	12.40	2.07	21.37	23.44	137.90	482.63	
5	1.35	1.10	0.33	2.44	2.77	20.00	70.00	>10
	9.29	7.56	2.28	16.84	19.12	137.90	482.63	
6	0.96	1.24	0.14	2.21	2.35	20.00	70.00	>10
	6.63	8.57	0.97	15.20	16.17	137.90	482.63	
7	0.38	0.07	0.05	0.45	0.50	20.00	70.00	>10
	2.62	0.48	0.33	3.11	3.44	137.90	482.63	
8	0.34	0.04	0.05	0.38	0.43	20.00	70.00	>10
	2.33	0.27	0.33	2.60	2.93	137.90	482.63	
9	0.38	0.07	0.05	0.45	0.50	20.00	70.00	>10
	2.60	0.49	0.33	3.09	3.42	137.90	482.63	
10	1.30	0.17	0.06	1.46	1.52	20.00	70.00	>10
	8.95	1.14	0.41	10.09	10.50	137.90	482.63	
11	0.97	1.28	0.08	2.25	2.33	20.00	70.00	>10
	6.68	8.80	0.59	15.49	16.07	137.90	482.63	
12	1.05	1.55	0.12	2.60	2.72	20.00	70.00	>10
	7.22	10.67	0.85	17.90	18.75	137.90	482.63	
13	1.31	1.15	0.16	2.46	2.62	20.00	70.00	>10
	9.00	7.94	1.14	16.94	18.08	137.90	482.63	

WATERMARK

14	1.32	1.63	0.14	2.95	3.09	20.00	70.00	9.18
	9.09	11.24	0.99	20.33	21.32	137.90	482.63	
15	4.24	2.82	0.67	7.06	7.73	20.00	70.00	3.25
	29.20	19.44	4.62	48.64	53.27	137.90	482.63	
16	1.95	2.96	0.36	4.91	5.28	20.00	70.00	5.10
	13.45	20.44	2.49	33.89	36.37	137.90	482.63	
17	1.34	2.12	0.22	3.47	3.68	20.00	70.00	7.65
	9.26	14.64	1.50	23.90	25.41	137.90	482.63	
18	1.01	1.52	0.10	2.53	2.63	20.00	70.00	>10
	6.96	10.50	0.69	17.46	18.15	137.90	482.63	
19	1.59	2.21	0.18	3.79	3.98	20.00	70.00	6.91
	10.94	15.22	1.28	26.16	27.43	137.90	482.63	
20	2.05	2.98	0.22	5.03	5.26	20.00	70.00	4.96
	14.15	20.56	1.52	34.71	36.23	137.90	482.63	
21	0.40	0.47	0.01	0.86	0.87	20.00	70.00	>10
	2.72	3.22	0.06	5.95	6.01	137.90	482.63	
22	1.60	0.75	0.02	2.35	2.37	20.00	70.00	>10
	11.06	5.15	0.12	16.21	16.34	137.90	482.63	

Min MS: 3.252, Location: 15, Combination: Pm+Pb

MARKUP

Table 2-123. Load Combination 217, Rod Drop, Cold Environment, Normal Conditions of Transport – Model AOS-025

Load Cases: 216, 104, 201, 211
Rod Drop onto Cask
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.77	1.11	0.20	1.87	2.07	20.00	70.00	>10
	5.28	7.64	1.35	12.92	14.27	137.90	482.63	
2	0.17	0.20	0.14	0.37	0.51	20.00	70.00	>10
	1.20	1.37	0.97	2.57	3.54	137.90	482.63	
3	0.12	0.08	0.18	0.21	0.39	20.00	70.00	>10
	0.83	0.58	1.25	1.42	2.66	137.90	482.63	
4	1.30	1.80	10.62	3.10	13.72	20.00	70.00	3.37
	8.97	12.40	73.22	21.37	94.59	137.90	482.63	
5	1.35	1.10	16.21	2.44	18.66	20.00	70.00	2.22
	9.29	7.56	111.78	16.84	128.63	137.90	482.63	
6	0.96	1.24	8.16	2.21	10.37	20.00	70.00	4.79
	6.63	8.57	56.29	15.20	71.50	137.90	482.63	
7	0.38	0.07	4.31	0.45	4.76	20.00	70.00	>10
	2.62	0.48	29.72	3.11	32.83	137.90	482.63	
8	0.34	0.04	4.31	0.38	4.68	20.00	70.00	>10
	2.33	0.27	29.68	2.60	32.29	137.90	482.63	
9	0.38	0.07	4.31	0.45	4.75	20.00	70.00	>10
	2.60	0.49	29.69	3.09	32.78	137.90	482.63	
10	1.30	0.17	4.66	1.46	6.13	20.00	70.00	8.79
	8.95	1.14	32.16	10.09	42.25	137.90	482.63	
11	0.97	1.28	2.08	2.25	4.33	20.00	70.00	>10
	6.68	8.80	14.37	15.49	29.86	137.90	482.63	
12	1.05	1.55	1.03	2.60	3.63	20.00	70.00	>10
	7.22	10.67	7.11	17.90	25.01	137.90	482.63	
13	1.31	1.15	7.61	2.46	10.06	20.00	70.00	4.96
	9.00	7.94	52.45	16.94	69.39	137.90	482.63	

MARKUP

14	1.32	1.63	5.98	2.95	8.93	20.00	70.00	5.72
	9.09	11.24	41.23	20.33	61.56	137.90	482.63	
15	4.24	2.82	0.94	7.06	8.00	20.00	70.00	3.25
	29.20	19.44	6.51	48.64	55.16	137.90	482.63	
16	1.95	2.96	2.10	4.91	7.02	20.00	70.00	5.10
	13.45	20.44	14.51	33.89	48.40	137.90	482.63	
17	1.34	2.12	1.95	3.47	5.42	20.00	70.00	7.65
	9.26	14.64	13.45	23.90	37.35	137.90	482.63	
18	1.01	1.52	2.14	2.53	4.67	20.00	70.00	>10
	6.96	10.50	14.74	17.46	32.21	137.90	482.63	
19	1.59	2.21	2.56	3.79	6.35	20.00	70.00	6.91
	10.94	15.22	17.62	26.16	43.78	137.90	482.63	
20	2.05	2.98	2.41	5.03	7.44	20.00	70.00	4.96
	14.15	20.56	16.59	34.71	51.30	137.90	482.63	
21	0.40	0.47	1.15	0.86	2.02	20.00	70.00	>10
	2.72	3.22	7.95	5.95	13.90	137.90	482.63	
22	1.60	0.75	0.25	2.35	2.60	20.00	70.00	>10
	11.06	5.15	1.75	16.21	17.96	137.90	482.63	

Min MS: 2.216, Location: 5, Combination: Pm+Pb+Q

MARKUP

Table 2-124. Load Combination 221, Forward Vibration, Normal Conditions of Transport – Model AOS-025

Load Cases: 221, 101, 201, 211
Forward 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.76	1.10	0.04	1.87	1.91	20.00	70.00	>10
	5.27	7.61	0.26	12.88	13.14	137.90	482.63	
2	0.28	0.25	0.05	0.53	0.58	20.00	70.00	>10
	1.94	1.72	0.34	3.66	4.00	137.90	482.63	
3	0.10	0.08	0.03	0.19	0.22	20.00	70.00	>10
	0.71	0.58	0.24	1.28	1.52	137.90	482.63	
4	1.17	1.79	0.30	2.96	3.26	20.00	70.00	9.14
	8.08	12.32	2.07	20.40	22.47	137.90	482.63	
5	1.20	1.00	0.33	2.20	2.53	20.00	70.00	>10
	8.25	6.92	2.28	15.17	17.44	137.90	482.63	
6	0.79	1.17	0.14	1.96	2.10	20.00	70.00	>10
	5.46	8.07	0.97	13.53	14.49	137.90	482.63	
7	0.35	0.07	0.05	0.41	0.46	20.00	70.00	>10
	2.38	0.46	0.33	2.84	3.17	137.90	482.63	
8	0.32	0.04	0.05	0.36	0.41	20.00	70.00	>10
	2.22	0.27	0.33	2.49	2.82	137.90	482.63	
9	0.36	0.07	0.05	0.44	0.48	20.00	70.00	>10
	2.52	0.49	0.33	3.00	3.33	137.90	482.63	
10	1.25	0.15	0.06	1.40	1.46	20.00	70.00	>10
	8.59	1.05	0.41	9.64	10.05	137.90	482.63	
11	0.94	1.24	0.08	2.19	2.27	20.00	70.00	>10
	6.51	8.56	0.59	15.07	15.66	137.90	482.63	
12	1.02	1.49	0.12	2.51	2.63	20.00	70.00	>10
	7.01	10.30	0.85	17.31	18.16	137.90	482.63	
13	1.20	1.06	0.16	2.26	2.42	20.00	70.00	>10
	8.27	7.30	1.14	15.57	16.70	137.90	482.63	

MARKUP

14	1.22	1.54	0.14	2.76	2.91	20.00	70.00	9.86
	8.42	10.63	0.99	19.05	20.04	137.90	482.63	
15	1.70	1.94	0.67	3.64	4.31	20.00	70.00	7.24
	11.73	13.38	4.62	25.11	29.73	137.90	482.63	
16	1.71	2.69	0.36	4.40	4.76	20.00	70.00	5.82
	11.78	18.57	2.49	30.35	32.84	137.90	482.63	
17	1.13	1.79	0.22	2.92	3.14	20.00	70.00	9.28
	7.76	12.35	1.50	20.11	21.62	137.90	482.63	
18	0.88	1.40	0.10	2.28	2.38	20.00	70.00	>10
	6.03	9.68	0.69	15.71	16.41	137.90	482.63	
19	1.47	2.17	0.18	3.64	3.83	20.00	70.00	7.24
	10.15	14.97	1.28	25.12	26.39	137.90	482.63	
20	1.83	2.90	0.22	4.74	4.96	20.00	70.00	5.33
	12.65	20.01	1.52	32.66	34.18	137.90	482.63	
21	0.34	0.44	0.01	0.78	0.79	20.00	70.00	>10
	2.32	3.03	0.06	5.35	5.41	137.90	482.63	
22	0.47	0.47	0.02	0.95	0.96	20.00	70.00	>10
	3.27	3.26	0.12	6.53	6.65	137.90	482.63	

Min MS: 5.334, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-125. Load Combination 222, Lateral Vibration, Normal Conditions of Transport – Model AOS-025

Load Cases: 222, 101, 201, 211
Lateral 5g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	0.76	1.11	0.04	1.87	1.91	20.00	70.00	>10
	5.27	7.63	0.26	12.90	13.16	137.90	482.63	
2	0.48	0.23	0.05	0.72	0.77	20.00	70.00	>10
	3.34	1.61	0.34	4.95	5.29	137.90	482.63	
3	0.09	0.08	0.03	0.18	0.21	20.00	70.00	>10
	0.65	0.57	0.24	1.22	1.46	137.90	482.63	
4	1.21	1.82	0.30	3.03	3.33	20.00	70.00	8.91
	8.32	12.56	2.07	20.88	22.95	137.90	482.63	
5	1.23	1.03	0.33	2.26	2.59	20.00	70.00	>10
	8.47	7.11	2.28	15.58	17.85	137.90	482.63	
6	0.83	1.18	0.14	2.01	2.15	20.00	70.00	>10
	5.73	8.14	0.97	13.87	14.84	137.90	482.63	
7	0.34	0.07	0.05	0.41	0.46	20.00	70.00	>10
	2.36	0.46	0.33	2.82	3.15	137.90	482.63	
8	0.33	0.04	0.05	0.37	0.42	20.00	70.00	>10
	2.27	0.27	0.33	2.55	2.87	137.90	482.63	
9	0.37	0.07	0.05	0.44	0.49	20.00	70.00	>10
	2.54	0.49	0.33	3.03	3.36	137.90	482.63	
10	1.29	0.17	0.06	1.46	1.52	20.00	70.00	>10
	8.91	1.18	0.41	10.09	10.50	137.90	482.63	
11	0.97	1.28	0.08	2.25	2.34	20.00	70.00	>10
	6.70	8.84	0.59	15.54	16.13	137.90	482.63	
12	1.03	1.50	0.12	2.53	2.66	20.00	70.00	>10
	7.11	10.34	0.85	17.46	18.31	137.90	482.63	
13	1.23	1.06	0.16	2.28	2.45	20.00	70.00	>10
	8.47	7.27	1.14	15.74	16.88	137.90	482.63	

WATERMARK

14	1.24	1.55	0.14	2.79	2.94	20.00	70.00	9.74
	8.55	10.70	0.99	19.25	20.25	137.90	482.63	
15	1.71	1.95	0.67	3.66	4.33	20.00	70.00	7.19
	11.82	13.42	4.62	25.25	29.87	137.90	482.63	
16	1.72	2.72	0.36	4.44	4.80	20.00	70.00	5.76
	11.86	18.72	2.49	30.58	33.07	137.90	482.63	
17	1.13	1.80	0.22	2.93	3.15	20.00	70.00	9.24
	7.81	12.40	1.50	20.21	21.71	137.90	482.63	
18	0.88	1.40	0.10	2.28	2.38	20.00	70.00	>10
	6.05	9.65	0.69	15.71	16.40	137.90	482.63	
19	1.49	2.20	0.18	3.69	3.87	20.00	70.00	7.14
	10.26	15.15	1.28	25.41	26.69	137.90	482.63	
20	1.85	2.92	0.22	4.77	4.99	20.00	70.00	5.29
	12.73	20.14	1.52	32.87	34.40	137.90	482.63	
21	0.33	0.44	0.01	0.77	0.78	20.00	70.00	>10
	2.30	3.01	0.06	5.30	5.37	137.90	482.63	
22	0.48	0.47	0.02	0.95	0.97	20.00	70.00	>10
	3.29	3.24	0.12	6.53	6.65	137.90	482.63	

Min MS: 5.292, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-126. Load Combination 223, Vertical Vibration, Normal Conditions of Transport – Model AOS-025

Load Cases: 223, 101, 201, 211
Vertical 10g Vibration Inertia Load
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
---	--	--	-	-----	-------	--	--	--
1	0.78	1.11	0.04	1.89	1.93	20.00	70.00	>10
	5.39	7.65	0.26	13.04	13.30	137.90	482.63	
2	0.83	0.27	0.05	1.10	1.15	20.00	70.00	>10
	5.72	1.88	0.34	7.60	7.94	137.90	482.63	
3	0.10	0.09	0.03	0.19	0.23	20.00	70.00	>10
	0.72	0.60	0.24	1.32	1.56	137.90	482.63	
4	1.25	1.86	0.30	3.12	3.42	20.00	70.00	8.63
	8.64	12.84	2.07	21.48	23.56	137.90	482.63	
5	1.27	1.06	0.33	2.34	2.67	20.00	70.00	>10
	8.76	7.34	2.28	16.10	18.38	137.90	482.63	
6	0.88	1.20	0.14	2.07	2.21	20.00	70.00	>10
	6.05	8.24	0.97	14.30	15.26	137.90	482.63	
7	0.35	0.07	0.05	0.41	0.46	20.00	70.00	>10
	2.39	0.46	0.33	2.85	3.18	137.90	482.63	
8	0.34	0.04	0.05	0.38	0.43	20.00	70.00	>10
	2.33	0.28	0.33	2.61	2.94	137.90	482.63	
9	0.38	0.07	0.05	0.45	0.50	20.00	70.00	>10
	2.60	0.49	0.33	3.09	3.42	137.90	482.63	
10	1.35	0.19	0.06	1.55	1.60	20.00	70.00	>10
	9.34	1.32	0.41	10.65	11.06	137.90	482.63	
11	1.01	1.33	0.08	2.34	2.43	20.00	70.00	>10
	6.97	9.17	0.59	16.14	16.72	137.90	482.63	
12	1.06	1.51	0.12	2.56	2.69	20.00	70.00	>10
	7.28	10.41	0.85	17.68	18.54	137.90	482.63	
13	1.27	1.06	0.16	2.33	2.49	20.00	70.00	>10
	8.73	7.31	1.14	16.05	17.18	137.90	482.63	

MARKUP

14	1.27	1.57	0.14	2.83	2.98	20.00	70.00	9.59
	8.74	10.80	0.99	19.54	20.53	137.90	482.63	
15	1.73	1.95	0.67	3.69	4.36	20.00	70.00	7.14
	11.95	13.47	4.62	25.42	30.05	137.90	482.63	
16	1.74	2.74	0.36	4.48	4.84	20.00	70.00	5.70
	12.00	18.89	2.49	30.89	33.38	137.90	482.63	
17	1.15	1.81	0.22	2.96	3.18	20.00	70.00	9.14
	7.92	12.48	1.50	20.40	21.91	137.90	482.63	
18	0.89	1.40	0.10	2.29	2.39	20.00	70.00	>10
	6.12	9.66	0.69	15.77	16.47	137.90	482.63	
19	1.51	2.23	0.18	3.74	3.92	20.00	70.00	7.02
	10.44	15.34	1.28	25.78	27.05	137.90	482.63	
20	1.87	2.94	0.22	4.81	5.03	20.00	70.00	5.24
	12.89	20.29	1.52	33.17	34.70	137.90	482.63	
21	0.34	0.44	0.01	0.78	0.79	20.00	70.00	>10
	2.36	3.02	0.06	5.37	5.43	137.90	482.63	
22	0.49	0.47	0.02	0.96	0.98	20.00	70.00	>10
	3.38	3.26	0.12	6.63	6.76	137.90	482.63	

Min MS: 5.235, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-127. Load Combination 231, 4-ft. Head-On Drop, Normal Conditions, Normal Conditions of Transport – Model AOS-025

Load Cases: 231, 102, 201, 211
4-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	2.35	1.62	0.03	3.96	4.00	20.00	66.30	6.57
	16.17	11.15	0.24	27.32	27.56	137.90	457.12	
2	1.24	0.27	0.05	1.51	1.56	20.00	66.30	>10
	8.56	1.85	0.33	10.41	10.74	137.90	457.12	
3	1.07	0.28	0.04	1.35	1.39	20.00	66.30	>10
	7.35	1.96	0.25	9.31	9.56	137.90	457.12	
4	4.03	3.10	0.26	7.13	7.39	20.00	66.30	3.21
	27.81	21.34	1.80	49.15	50.95	137.90	457.12	
5	2.02	1.96	0.29	3.98	4.28	20.00	66.30	6.53
	13.94	13.53	2.01	27.47	29.48	137.90	457.12	
6	1.51	1.27	0.12	2.78	2.90	20.00	66.30	9.81
	10.40	8.73	0.83	19.13	19.97	137.90	457.12	
7	1.03	0.07	0.05	1.09	1.14	20.00	66.30	>10
	7.07	0.48	0.33	7.54	7.88	137.90	457.12	
8	1.05	0.04	0.05	1.09	1.14	20.00	66.30	>10
	7.23	0.29	0.33	7.52	7.85	137.90	457.12	
9	1.06	0.07	0.05	1.13	1.18	20.00	66.30	>10
	7.31	0.49	0.33	7.80	8.13	137.90	457.12	
10	2.82	0.87	0.06	3.69	3.75	20.00	66.30	6.09
	19.46	5.98	0.39	25.44	25.83	137.90	457.12	
11	2.07	1.66	0.09	3.73	3.81	20.00	66.30	7.05
	14.28	11.42	0.59	25.70	26.29	137.90	457.12	
12	1.33	2.15	0.13	3.48	3.61	20.00	66.30	7.61
	9.18	14.84	0.87	24.02	24.89	137.90	457.12	
13	2.45	1.85	0.17	4.30	4.47	20.00	66.30	5.98
	16.88	12.76	1.16	29.64	30.80	137.90	457.12	

WATERMARK

14	2.39	1.94	0.15	4.33	4.48	20.00	66.30	5.92
	16.48	13.39	1.01	29.88	30.89	137.90	457.12	
15	1.73	1.96	1.29	3.69	4.98	20.00	66.30	7.13
	11.93	13.52	8.89	25.45	34.34	137.90	457.12	
16	2.07	2.70	0.71	4.77	5.48	20.00	66.30	5.29
	14.27	18.60	4.91	32.87	37.77	137.90	457.12	
17	1.60	2.16	0.43	3.76	4.19	20.00	66.30	6.98
	11.03	14.88	2.95	25.91	28.86	137.90	457.12	
18	1.75	2.17	0.20	3.92	4.13	20.00	66.30	6.65
	12.08	14.96	1.40	27.04	28.44	137.90	457.12	
19	2.39	2.66	0.36	5.05	5.41	20.00	66.30	4.94
	16.47	18.33	2.49	34.79	37.28	137.90	457.12	
20	2.33	3.35	0.46	5.68	6.14	20.00	66.30	4.28
	16.04	23.10	3.16	39.14	42.30	137.90	457.12	
21	1.09	0.75	0.01	1.84	1.85	20.00	66.30	>10
	7.48	5.20	0.09	12.68	12.78	137.90	457.12	
22	0.59	0.56	0.04	1.15	1.19	20.00	66.30	>10
	4.09	3.84	0.26	7.93	8.19	137.90	457.12	

Min MS: 3.208, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-128. Load Combination 232, l30-ft. Head-On Drop, Normal Conditions (Impact Test), Normal Conditions of Transport – Model AOS-025

Load Cases: 232, 102, 201, 211
30-ft. Head-On Drop Impact Test, Normal Conditions
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	2.75	1.77	0.03	4.52	4.56	20.00	66.30	5.63
	18.99	12.19	0.24	31.18	31.42	137.90	457.12	
2	1.23	0.26	0.05	1.49	1.54	20.00	66.30	>10
	8.47	1.78	0.33	10.26	10.59	137.90	457.12	
3	0.71	0.15	0.04	0.86	0.89	20.00	66.30	>10
	4.88	1.03	0.25	5.91	6.16	137.90	457.12	
4	4.79	3.44	0.26	8.22	8.48	20.00	66.30	2.65
	33.01	23.68	1.80	56.69	58.49	137.90	457.12	
5	2.18	2.18	0.29	4.37	4.66	20.00	66.30	5.87
	15.06	15.06	2.01	30.12	32.13	137.90	457.12	
6	1.51	1.36	0.12	2.88	3.00	20.00	66.30	9.43
	10.44	9.40	0.83	19.84	20.67	137.90	457.12	
7	1.05	0.07	0.05	1.12	1.17	20.00	66.30	>10
	7.22	0.49	0.33	7.71	8.05	137.90	457.12	
8	1.02	0.04	0.05	1.05	1.10	20.00	66.30	>10
	7.00	0.28	0.33	7.27	7.61	137.90	457.12	
9	0.93	0.07	0.05	1.00	1.05	20.00	66.30	>10
	6.43	0.49	0.33	6.92	7.25	137.90	457.12	
10	2.21	0.59	0.06	2.80	2.85	20.00	66.30	8.06
	15.22	4.07	0.39	19.30	19.68	137.90	457.12	
11	1.65	1.51	0.09	3.16	3.24	20.00	66.30	8.50
	11.38	10.39	0.59	21.77	22.36	137.90	457.12	
12	1.20	1.88	0.13	3.08	3.21	20.00	66.30	8.74
	8.24	12.98	0.87	21.23	22.10	137.90	457.12	
13	1.89	1.46	0.17	3.35	3.52	20.00	66.30	7.96
	13.05	10.04	1.16	23.09	24.25	137.90	457.12	

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14	1.82	1.76	0.15	3.58	3.73	20.00	66.30	7.38
	12.57	12.12	1.01	24.69	25.71	137.90	457.12	
15	1.76	1.98	1.29	3.74	5.03	20.00	66.30	7.02
	12.17	13.64	8.89	25.81	34.70	137.90	457.12	
16	2.26	2.71	0.71	4.97	5.69	20.00	66.30	5.03
	15.59	18.71	4.91	34.30	39.21	137.90	457.12	
17	1.87	2.37	0.43	4.24	4.66	20.00	66.30	6.08
	12.88	16.33	2.95	29.21	32.16	137.90	457.12	
18	2.09	2.47	0.20	4.56	4.76	20.00	66.30	5.58
	14.39	17.04	1.40	31.43	32.83	137.90	457.12	
19	2.65	2.77	0.36	5.41	5.78	20.00	66.30	4.54
	18.24	19.09	2.49	37.33	39.82	137.90	457.12	
20	2.29	3.45	0.46	5.74	6.20	20.00	66.30	4.22
	15.80	23.79	3.16	39.59	42.75	137.90	457.12	
21	0.33	0.45	0.01	0.79	0.80	20.00	66.30	>10
	2.29	3.13	0.09	5.42	5.52	137.90	457.12	
22	0.71	0.60	0.04	1.31	1.35	20.00	66.30	>10
	4.87	4.17	0.26	9.04	9.30	137.90	457.12	

Min MS: 2.649, Location: 4, Combination: Pm+Pb

MARKUP

2.10.1.2 Hypothetical Accident Conditions of Transport, Summary of Damages (Stresses) – Model AOS-025

Table 2-129 and Table 2-130 present Model AOS-025 transport package Load Cases and Load Combinations, respectively, under Hypothetical Accident conditions of transport:

- Table 2-131 through Table 2-143 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 2-144 through Table 2-158 present Load Combination test case output data.

Table 2-129. Load Cases Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-025

Load Case	Description	Data
111	Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat	Table 2-131
112	Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-132
113	Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-133
114	Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-134
115	Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-135
116	Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation	Table 2-136
301	30-ft. Head-On Drop	Table 2-137
302	30-ft. Side Drop + Slap-Down	Table 2-138
303	30-ft. Cg/Corner Drop	Table 2-139
304	30-ft. Head-On Drop at -40°F, Low Temperature	Table 2-140
305	30-ft. Side Drop + Slap-Down at -40°F, Low Temperature	Table 2-141
306	30-ft. Cg/Corner Drop at -40°F, Low Temperature	Table 2-142
311	4-ft. Drop onto Rod	Table 2-143

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Table 2-130. Load Combinations Associated with Allowable Stresses under Hypothetical Accident Conditions of Transport – Model AOS-025

Load Combination	Load Cases[a]	Description	Data
301	301, 102, 201, 211	Head-On Drop Orientation	Table 2-144
302	302, 102, 201, 211	Side Drop Orientation	Table 2-145
303	303, 102, 201, 211	Cg/Corner Drop Orientation	Table 2-146
304	304, 105, 202, 211	Head-On Drop Orientation at -40°F, Cold Environment	Table 2-147
305	305, 105, 202, 211	Side Drop Orientation at -40°F, Cold Environment	Table 2-148
306	306, 105, 202, 211	Cg/Corner Drop Orientation at -40°F, Cold Environment	Table 2-149
310	204, 101, 211	Additional Increased External Pressure (290 psi)	Table 2-150
311	311, 101, 201, 211	4-ft. Drop onto Rod	Table 2-151
312	311, 104, 201, 211	4-ft. Drop onto Rod at -40°F, Cold Environment	Table 2-152
350	111, 201, 211	Fire at 30 Minutes	Table 2-153
351	112, 201, 211	Fire at 60 Minutes	Table 2-154
352	113, 201, 211	Fire at 90 Minutes	Table 2-155
353	114, 201, 211	Fire at 120 Minutes	Table 2-156
354	115, 201, 211	Fire at 150 Minutes	Table 2-157
355	116, 201, 211	Fire at 180 Minutes	Table 2-158

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

MAIN

Table 2-131. Load Case 111, Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.0208E+02	-1.8946E+02	1.9895E+02	4.9154E+02	8.2977E+02
	2.0828E+00	-1.3063E+00	1.3717E+00	3.3891E+00	5.7210E+00
2	3.7536E+02	-8.2090E+01	-9.8539E+01	4.5745E+02	4.0070E+02
	2.5880E+00	-5.6599E-01	-6.7940E-01	3.1540E+00	2.7627E+00
3	1.9040E+02	-4.0882E+01	3.9375E+02	2.3128E+02	4.9218E+02
	1.3128E+00	-2.8187E-01	2.7148E+00	1.5946E+00	3.3935E+00
4	-2.0613E+01	-3.9414E+02	1.6433E+01	3.7352E+02	4.9664E+02
	-1.4212E-01	-2.7175E+00	1.1330E-01	2.5753E+00	3.4242E+00
5	-1.8560E+01	-4.0410E+02	-9.7054E+02	3.8554E+02	5.1384E+02
	-1.2796E-01	-2.7862E+00	-6.6916E+00	2.6582E+00	3.5428E+00
6	-1.1872E+01	-2.7464E+02	-1.3066E+03	2.6276E+02	1.6123E+02
	-8.1855E-02	-1.8935E+00	-9.0087E+00	1.8117E+00	1.1117E+00
7	-4.7896E+01	-2.0147E+02	-1.7101E+03	1.5358E+02	2.3811E+01
	-3.3023E-01	-1.3891E+00	-1.1791E+01	1.0589E+00	1.6417E-01
8	-4.5972E+01	-2.2894E+02	-1.9339E+03	1.8297E+02	5.1865E+01
	-3.1696E-01	-1.5785E+00	-1.3333E+01	1.2615E+00	3.5760E-01
9	-4.2277E+01	-2.4363E+02	-2.0210E+03	2.0136E+02	7.8673E+01
	-2.9149E-01	-1.6798E+00	-1.3934E+01	1.3883E+00	5.4243E-01
10	-2.3186E-01	-3.6069E+02	-1.2249E+03	3.6046E+02	1.1664E+02
	-1.5986E-03	-2.4869E+00	-8.4453E+00	2.4853E+00	8.0419E-01
11	-3.0213E+01	-5.7892E+02	-7.0631E+02	5.4871E+02	1.6785E+01
	-2.0831E-01	-3.9915E+00	-4.8699E+00	3.7832E+00	1.1573E-01
12	4.7540E+01	-4.9332E+02	-5.0509E+02	5.4086E+02	9.3578E+01
	3.2777E-01	-3.4013E+00	-3.4825E+00	3.7291E+00	6.4520E-01
13	-4.3036E+01	-6.9904E+02	-3.2707E+02	6.5601E+02	2.3268E+02
	-2.9672E-01	-4.8197E+00	-2.2551E+00	4.5230E+00	1.6043E+00
14	-2.9058E+01	-6.3162E+02	2.0453E+01	6.0256E+02	3.3754E+01
	-2.0035E-01	-4.3548E+00	1.4102E-01	4.1545E+00	2.3272E-01
15	8.4978E+02	-6.9079E+02	2.2092E+01	1.5406E+03	2.5797E+03
	5.8591E+00	-4.7629E+00	1.5232E-01	1.0622E+01	1.7786E+01

WORKING DRAFT

16	2.8981E+02	-5.3121E+02	-2.8942E+02	8.2101E+02	1.3310E+03
	1.9981E+00	-3.6626E+00	-1.9955E+00	5.6607E+00	9.1766E+00
17	1.2832E+02	-3.8212E+02	-9.4183E+01	5.1044E+02	8.8364E+02
	8.8471E-01	-2.6346E+00	-6.4937E-01	3.5194E+00	6.0925E+00
18	3.7775E+01	-2.2072E+02	5.1840E+02	2.5849E+02	2.7306E+02
	2.6045E-01	-1.5218E+00	3.5743E+00	1.7822E+00	1.8827E+00
19	7.2256E+01	-4.3035E+02	4.3222E+02	5.0261E+02	8.2772E+02
	4.9819E-01	-2.9672E+00	2.9800E+00	3.4654E+00	5.7069E+00
20	-1.6996E+01	-5.0613E+02	-1.8442E+02	4.8914E+02	8.3983E+02
	-1.1719E-01	-3.4897E+00	-1.2715E+00	3.3725E+00	5.7904E+00
21	3.0621E+02	4.7697E+01	2.9666E+02	2.5851E+02	1.6757E+01
	2.1113E+00	3.2886E-01	2.0454E+00	1.7824E+00	1.1554E-01
22	3.5465E+02	-1.5907E+01	3.5432E+02	3.7055E+02	3.5079E+02
	2.4452E+00	-1.0967E-01	2.4429E+00	2.5549E+00	2.4186E+00

Allowable Stress for Load Case 111

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	242.81	240.96	20.00	25.00	66.30
2	287.58	273.80	20.00	23.60	66.30
3	266.50	262.40	20.00	23.60	66.30
4	237.27	236.66	20.00	25.00	66.30
5	241.88	240.87	20.00	25.00	66.30
6	243.43	242.64	20.00	25.00	66.30
7	254.16	253.90	20.00	23.60	66.30
8	259.38	259.18	20.00	23.60	66.30
9	261.39	261.33	20.00	23.60	66.30
10	257.42	256.26	20.00	23.60	66.30
11	254.85	252.67	20.00	23.60	66.30
12	251.95	251.48	20.00	23.60	66.30
13	251.71	250.31	20.00	23.60	66.30
14	249.28	248.45	20.00	25.00	66.30
15	225.65	225.34	20.00	25.00	66.30
16	226.98	226.75	20.00	25.00	66.30
17	227.18	227.08	20.00	25.00	66.30
18	229.51	229.06	20.00	25.00	66.30
19	230.48	230.04	20.00	25.00	66.30
20	234.39	233.65	20.00	25.00	66.30
21	239.74	238.65	20.00	25.00	66.30
22	224.41	224.20	20.00	25.00	66.30

Table 2-132. Load Case 112, Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	7.7491E+01	-3.5237E+01	7.3408E+01	1.1273E+02	2.0709E+02
	5.3428E-01	-2.4295E-01	5.0613E-01	7.7723E-01	1.4278E+00
2	7.0484E+01	-2.0861E+01	-6.3423E+00	9.1345E+01	1.7074E+02
	4.8597E-01	-1.4383E-01	-4.3729E-02	6.2980E-01	1.1772E+00
3	4.3045E+01	-1.1674E+01	1.1939E+01	5.4720E+01	7.6659E+01
	2.9679E-01	-8.0493E-02	8.2318E-02	3.7728E-01	5.2854E-01
4	4.2407E+02	-2.0783E+02	-2.4321E+02	6.3189E+02	1.0753E+03
	2.9238E+00	-1.4329E+00	-1.6769E+00	4.3568E+00	7.4136E+00
5	5.1514E+02	-8.6656E+01	-6.7714E+02	6.0180E+02	8.6234E+01
	3.5518E+00	-5.9747E-01	-4.6687E+00	4.1492E+00	5.9456E-01
6	9.3044E+01	-4.7067E+02	-1.7062E+03	5.6372E+02	7.6834E+02
	6.4152E-01	-3.2452E+00	-1.1764E+01	3.8867E+00	5.2975E+00
7	-6.3641E+01	-3.5925E+02	-3.1216E+03	2.9561E+02	6.1483E+01
	-4.3879E-01	-2.4769E+00	-2.1523E+01	2.0381E+00	4.2391E-01
8	-6.5170E+01	-3.6142E+02	-3.1677E+03	2.9625E+02	3.8685E+01
	-4.4933E-01	-2.4919E+00	-2.1840E+01	2.0426E+00	2.6672E-01
9	-6.3713E+01	-3.6630E+02	-3.2155E+03	3.0259E+02	6.5713E+01
	-4.3929E-01	-2.5255E+00	-2.2170E+01	2.0863E+00	4.5307E-01
10	1.1178E+02	-9.1335E+02	-1.7286E+03	1.0251E+03	2.4776E+02
	7.7073E-01	-6.2973E+00	-1.1918E+01	7.0680E+00	1.7083E+00
11	-1.2086E+02	-8.2824E+02	-8.0919E+02	7.0737E+02	1.0292E+03
	-8.3333E-01	-5.7105E+00	-5.5792E+00	4.8772E+00	7.0960E+00
12	4.4881E+01	-8.1367E+02	-7.9470E+02	8.5855E+02	1.1046E+03
	3.0944E-01	-5.6101E+00	-5.4793E+00	5.9195E+00	7.6162E+00
13	1.4579E+02	-2.9999E+02	-1.1424E+02	4.4577E+02	5.4259E+02
	1.0052E+00	-2.0683E+00	-7.8765E-01	3.0735E+00	3.7410E+00
14	5.5347E+01	-3.3102E+02	-9.1967E+01	3.8637E+02	7.3350E+02
	3.8160E-01	-2.2823E+00	-6.3409E-01	2.6639E+00	5.0573E+00
15	1.0407E+03	-9.6113E+02	-1.0304E+02	2.0019E+03	3.3564E+03
	7.1756E+00	-6.6267E+00	-7.1046E-01	1.3802E+01	2.3142E+01

WATERMARK

16	3.6979E+02	-7.4587E+02	-2.2903E+02	1.1157E+03	1.8095E+03
	2.5496E+00	-5.1426E+00	-1.5791E+00	7.6922E+00	1.2476E+01
17	1.5921E+02	-5.0373E+02	5.2457E+01	6.6294E+02	1.1397E+03
	1.0977E+00	-3.4731E+00	3.6168E-01	4.5708E+00	7.8577E+00
18	4.6358E+01	-2.7058E+02	2.4042E+02	3.1694E+02	5.0359E+02
	3.1963E-01	-1.8656E+00	1.6576E+00	2.1852E+00	3.4721E+00
19	1.4021E+02	-4.3833E+02	1.2236E+02	5.7855E+02	9.5892E+02
	9.6675E-01	-3.0222E+00	8.4366E-01	3.9889E+00	6.6115E+00
20	1.5499E+02	-5.4711E+02	-6.5935E+01	7.0210E+02	1.3179E+03
	1.0686E+00	-3.7722E+00	-4.5461E-01	4.8408E+00	9.0869E+00
21	1.3263E+02	2.0841E+01	1.2471E+02	1.1179E+02	4.3288E+01
	9.1447E-01	1.4369E-01	8.5986E-01	7.7078E-01	2.9846E-01
22	1.8666E+02	-1.8271E+01	1.8795E+02	2.0493E+02	4.2761E+01
	1.2870E+00	-1.2597E-01	1.2958E+00	1.4130E+00	2.9483E-01

Allowable Stress for Load Case 112

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	286.43	285.61	20.00	23.60	66.30
2	291.30	289.78	20.00	23.60	66.30
3	291.44	290.37	20.00	23.60	66.30
4	283.45	283.31	20.00	23.60	66.30
5	284.59	284.31	20.00	23.60	66.30
6	285.02	284.81	20.00	23.60	66.30
7	287.91	287.75	20.00	23.60	66.30
8	288.92	288.77	20.00	23.60	66.30
9	289.51	289.38	20.00	23.60	66.30
10	289.10	288.95	20.00	23.60	66.30
11	288.89	288.56	20.00	23.60	66.30
12	289.01	288.72	20.00	23.60	66.30
13	288.23	288.00	20.00	23.60	66.30
14	287.79	287.66	20.00	23.60	66.30
15	279.99	279.91	20.00	23.60	66.30
16	280.19	280.14	20.00	23.60	66.30
17	280.21	280.11	20.00	23.60	66.30
18	280.68	280.51	20.00	23.60	66.30
19	280.99	280.84	20.00	23.60	66.30
20	282.47	282.19	20.00	23.60	66.30
21	286.15	285.94	20.00	23.60	66.30
22	280.69	280.45	20.00	23.60	66.30

Table 2-133. Load Case 113, Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.8828E+01	-8.9413E+00	1.5719E+01	2.7769E+01	4.3898E+01
	1.2982E-01	-6.1648E-02	1.0838E-01	1.9146E-01	3.0267E-01
2	1.9740E+01	-1.2225E+01	1.0579E+00	3.1965E+01	5.4700E+01
	1.3610E-01	-8.4288E-02	7.2940E-03	2.2039E-01	3.7715E-01
3	1.1640E+01	-4.6060E+00	-4.3025E+00	1.6246E+01	1.9984E+01
	8.0257E-02	-3.1757E-02	-2.9665E-02	1.1201E-01	1.3778E-01
4	6.0240E+02	-2.7690E+02	-3.7657E+02	8.7929E+02	1.4697E+03
	4.1534E+00	-1.9091E+00	-2.5963E+00	6.0625E+00	1.0133E+01
5	7.1701E+02	-1.1119E+02	-6.7786E+02	8.2820E+02	9.6645E+01
	4.9436E+00	-7.6664E-01	-4.6737E+00	5.7103E+00	6.6635E-01
6	1.3785E+02	-5.8346E+02	-1.9253E+03	7.2131E+02	9.9663E+02
	9.5041E-01	-4.0228E+00	-1.3274E+01	4.9732E+00	6.8716E+00
7	-7.8813E+01	-4.1060E+02	-3.5569E+03	3.3179E+02	6.9673E+01
	-5.4339E-01	-2.8310E+00	-2.4524E+01	2.2876E+00	4.8038E-01
8	-8.1888E+01	-4.0533E+02	-3.5537E+03	3.2345E+02	3.6781E+01
	-5.6460E-01	-2.7947E+00	-2.4502E+01	2.2301E+00	2.5359E-01
9	-7.9832E+01	-4.0739E+02	-3.5767E+03	3.2756E+02	6.3756E+01
	-5.5042E-01	-2.8089E+00	-2.4661E+01	2.2584E+00	4.3958E-01
10	1.2359E+02	-1.0402E+03	-1.9012E+03	1.1638E+03	2.7474E+02
	8.5215E-01	-7.1720E+00	-1.3108E+01	8.0241E+00	1.8943E+00
11	-1.3293E+02	-9.1896E+02	-8.7289E+02	7.8603E+02	1.2141E+03
	-9.1649E-01	-6.3360E+00	-6.0184E+00	5.4195E+00	8.3711E+00
12	4.9172E+01	-9.1353E+02	-8.8029E+02	9.6270E+02	1.2814E+03
	3.3903E-01	-6.2985E+00	-6.0694E+00	6.6376E+00	8.8352E+00
13	2.1106E+02	-3.0498E+02	-8.9829E+01	5.1605E+02	6.9892E+02
	1.4552E+00	-2.1028E+00	-6.1935E-01	3.5580E+00	4.8189E+00
14	1.1510E+02	-3.6745E+02	-1.0010E+02	4.8255E+02	9.2048E+02
	7.9357E-01	-2.5335E+00	-6.9018E-01	3.3270E+00	6.3465E+00
15	1.1133E+03	-1.0834E+03	-1.4471E+02	2.1968E+03	3.6902E+03
	7.6761E+00	-7.4701E+00	-9.9771E-01	1.5146E+01	2.5443E+01

WAPRA DRAFT

16	3.9197E+02	-8.0206E+02	-2.0485E+02	1.1940E+03	1.9397E+03
	2.7026E+00	-5.5300E+00	-1.4124E+00	8.2326E+00	1.3374E+01
17	1.6940E+02	-5.3688E+02	9.3076E+01	7.0628E+02	1.2152E+03
	1.1680E+00	-3.7016E+00	6.4174E-01	4.8696E+00	8.3788E+00
18	5.1487E+01	-2.8010E+02	1.3887E+02	3.3159E+02	5.6156E+02
	3.5499E-01	-1.9312E+00	9.5750E-01	2.2862E+00	3.8718E+00
19	1.5713E+02	-4.2080E+02	1.8194E+01	5.7793E+02	9.5388E+02
	1.0834E+00	-2.9013E+00	1.2544E-01	3.9847E+00	6.5768E+00
20	2.1347E+02	-5.4575E+02	-1.1659E+01	7.5922E+02	1.4135E+03
	1.4719E+00	-3.7628E+00	-8.0384E-02	5.2347E+00	9.7454E+00
21	5.1230E+01	9.8953E+00	4.4191E+01	4.1335E+01	1.8069E+01
	3.5322E-01	6.8226E-02	3.0469E-01	2.8499E-01	1.2458E-01
22	2.6814E+01	-4.3436E+01	1.6198E+01	7.0250E+01	1.3976E+02
	1.8487E-01	-2.9948E-01	1.1168E-01	4.8436E-01	9.6359E-01

Allowable Stress for Load Case 113

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	298.38	298.08	20.00	23.60	66.30
2	297.33	297.15	20.00	23.60	66.30
3	297.52	297.32	20.00	23.60	66.30
4	297.84	297.83	20.00	23.60	66.30
5	298.05	298.00	20.00	23.60	66.30
6	298.16	298.11	20.00	23.60	66.30
7	298.33	298.20	20.00	23.60	66.30
8	298.20	298.07	20.00	23.60	66.30
9	298.10	297.97	20.00	23.60	66.30
10	297.89	297.76	20.00	23.60	66.30
11	297.95	297.71	20.00	23.60	66.30
12	298.32	298.04	20.00	23.60	66.30
13	297.42	297.30	20.00	23.60	66.30
14	297.15	297.08	20.00	23.60	66.30
15	298.18	298.09	20.00	23.60	66.30
16	297.94	297.91	20.00	23.60	66.30
17	297.88	297.83	20.00	23.60	66.30
18	297.78	297.76	20.00	23.60	66.30
19	297.88	297.84	20.00	23.60	66.30
20	298.45	298.35	20.00	23.60	66.30
21	296.61	296.56	20.00	23.60	66.30
22	298.84	298.62	20.00	23.60	66.30

Table 2-134. Load Case 114, Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	8.2075E+00	-1.7742E+01	-2.9937E+00	2.5949E+01	4.4747E+01
	5.6589E-02	-1.2232E-01	-2.0640E-02	1.7891E-01	3.0852E-01
2	9.1808E+00	-2.2168E+01	-2.0710E+00	3.1348E+01	4.8175E+01
	6.3299E-02	-1.5284E-01	-1.4279E-02	2.1614E-01	3.3215E-01
3	5.9955E+00	-1.2363E+01	-7.8263E+00	1.8359E+01	2.7578E+01
	4.1337E-02	-8.5243E-02	-5.3961E-02	1.2658E-01	1.9015E-01
4	6.5583E+02	-3.6304E+02	-4.0451E+02	1.0189E+03	1.7664E+03
	4.5218E+00	-2.5031E+00	-2.7890E+00	7.0249E+00	1.2179E+01
5	7.2326E+02	-1.4673E+02	-7.0937E+02	8.7000E+02	2.6931E+02
	4.9867E+00	-1.0117E+00	-4.8909E+00	5.9984E+00	1.8569E+00
6	1.3660E+02	-6.3441E+02	-2.0082E+03	7.7101E+02	1.1002E+03
	9.4182E-01	-4.3741E+00	-1.3846E+01	5.3159E+00	7.5854E+00
7	-9.2890E+01	-4.2527E+02	-3.6498E+03	3.3238E+02	7.1751E+01
	-6.4046E-01	-2.9321E+00	-2.5165E+01	2.2917E+00	4.9470E-01
8	-9.8737E+01	-4.1661E+02	-3.6420E+03	3.1788E+02	3.7454E+01
	-6.8077E-01	-2.8725E+00	-2.5111E+01	2.1917E+00	2.5823E-01
9	-9.4131E+01	-4.2093E+02	-3.6641E+03	3.2680E+02	6.4299E+01
	-6.4901E-01	-2.9022E+00	-2.5263E+01	2.2532E+00	4.4333E-01
10	1.1541E+02	-1.0770E+03	-1.9467E+03	1.1924E+03	2.8318E+02
	7.9572E-01	-7.4255E+00	-1.3422E+01	8.2212E+00	1.9524E+00
11	-1.3645E+02	-9.4973E+02	-8.9267E+02	8.1328E+02	1.2708E+03
	-9.4079E-01	-6.5482E+00	-6.1548E+00	5.6074E+00	8.7617E+00
12	5.2424E+01	-9.4773E+02	-9.1087E+02	1.0002E+03	1.3404E+03
	3.6145E-01	-6.5344E+00	-6.2802E+00	6.8958E+00	9.2418E+00
13	2.2300E+02	-3.2130E+02	-9.0820E+01	5.4430E+02	7.2602E+02
	1.5375E+00	-2.2153E+00	-6.2618E-01	3.7528E+00	5.0058E+00
14	1.3252E+02	-3.9930E+02	-1.1370E+02	5.3182E+02	1.0087E+03
	9.1370E-01	-2.7531E+00	-7.8397E-01	3.6668E+00	6.9549E+00
15	1.1359E+03	-1.0977E+03	-1.3975E+02	2.2336E+03	3.7502E+03
	7.8318E+00	-7.5682E+00	-9.6357E-01	1.5400E+01	2.5857E+01

MARKED FOR REVISION

16	4.0025E+02	-8.1347E+02	-2.1639E+02	1.2137E+03	1.9729E+03
	2.7596E+00	-5.6087E+00	-1.4920E+00	8.3683E+00	1.3602E+01
17	1.7410E+02	-5.4840E+02	8.3927E+01	7.2250E+02	1.2458E+03
	1.2004E+00	-3.7811E+00	5.7865E-01	4.9815E+00	8.5893E+00
18	5.3151E+01	-2.8638E+02	1.3683E+02	3.3953E+02	5.7797E+02
	3.6646E-01	-1.9745E+00	9.4340E-01	2.3410E+00	3.9850E+00
19	1.6120E+02	-4.2736E+02	1.4700E+01	5.8856E+02	9.7153E+02
	1.1114E+00	-2.9466E+00	1.0135E-01	4.0580E+00	6.6985E+00
20	2.2062E+02	-5.5675E+02	-2.9471E+00	7.7737E+02	1.4461E+03
	1.5211E+00	-3.8386E+00	-2.0319E-02	5.3598E+00	9.9708E+00
21	2.6991E+01	3.1542E+00	1.3309E+01	2.3837E+01	1.3049E+01
	1.8610E-01	2.1748E-02	9.1761E-02	1.6435E-01	8.9970E-02
22	9.8883E+00	-5.1459E+01	-9.2235E+00	6.1347E+01	1.4393E+02
	6.8177E-02	-3.5480E-01	-6.3594E-02	4.2297E-01	9.9235E-01

Allowable Stress for Load Case 114

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	300.10	300.06	20.00	22.40	61.80
2	299.25	298.68	20.00	23.60	66.30
3	299.07	298.88	20.00	23.60	66.30
4	300.46	300.44	20.00	22.40	61.80
5	300.64	300.61	20.00	22.40	61.80
6	300.78	300.69	20.00	22.40	61.80
7	300.54	300.40	20.00	22.40	61.80
8	300.30	300.16	20.00	22.40	61.80
9	300.14	300.00	20.00	22.40	61.80
10	300.13	299.98	20.00	23.60	66.30
11	300.30	300.08	20.00	22.40	61.80
12	300.76	300.49	20.00	22.40	61.80
13	299.80	299.72	20.00	23.60	66.30
14	299.59	299.55	20.00	23.60	66.30
15	301.05	301.02	20.00	22.40	61.80
16	300.93	300.92	20.00	22.40	61.80
17	300.91	300.90	20.00	22.40	61.80
18	300.90	300.88	20.00	22.40	61.80
19	300.96	300.93	20.00	22.40	61.80
20	301.48	301.40	20.00	22.40	61.80
21	299.33	299.31	20.00	23.60	66.30
22	301.28	301.18	20.00	22.40	61.80

Table 2-135. Load Case 115, Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.5518E+01	-3.3632E+01	-9.5093E+00	4.9150E+01	8.3368E+01
	1.0699E-01	-2.3189E-01	-6.5565E-02	3.3888E-01	5.7480E-01
2	1.6226E+01	-3.7864E+01	-3.8163E+00	5.4090E+01	9.9006E+01
	1.1188E-01	-2.6106E-01	-2.6313E-02	3.7294E-01	6.8262E-01
3	9.8106E+00	-2.3442E+01	-9.1182E+00	3.3253E+01	5.5266E+01
	6.7642E-02	-1.6163E-01	-6.2867E-02	2.2927E-01	3.8105E-01
4	6.6368E+02	-4.0628E+02	-4.0251E+02	1.0700E+03	1.8912E+03
	4.5759E+00	-2.8012E+00	-2.7752E+00	7.3771E+00	1.3039E+01
5	6.9898E+02	-1.6733E+02	-7.1369E+02	8.6632E+02	3.7660E+02
	4.8193E+00	-1.1537E+00	-4.9207E+00	5.9731E+00	2.5966E+00
6	1.2985E+02	-6.4627E+02	-2.0022E+03	7.7612E+02	1.1272E+03
	8.9528E-01	-4.4559E+00	-1.3804E+01	5.3512E+00	7.7721E+00
7	-9.8961E+01	-4.2229E+02	-3.6009E+03	3.2333E+02	7.1798E+01
	-6.8231E-01	-2.9116E+00	-2.4827E+01	2.2293E+00	4.9503E-01
8	-1.0471E+02	-4.1384E+02	-3.5940E+03	3.0914E+02	3.8038E+01
	-7.2192E-01	-2.8534E+00	-2.4780E+01	2.1314E+00	2.6226E-01
9	-1.0024E+02	-4.1809E+02	-3.6167E+03	3.1785E+02	6.4210E+01
	-6.9112E-01	-2.8826E+00	-2.4936E+01	2.1915E+00	4.4271E-01
10	1.0704E+02	-1.0699E+03	-1.9220E+03	1.1769E+03	2.8603E+02
	7.3804E-01	-7.3765E+00	-1.3252E+01	8.1145E+00	1.9721E+00
11	-1.3693E+02	-9.4598E+02	-8.8570E+02	8.0905E+02	1.2626E+03
	-9.4410E-01	-6.5223E+00	-6.1067E+00	5.5782E+00	8.7055E+00
12	5.1418E+01	-9.4574E+02	-9.0962E+02	9.9716E+02	1.3321E+03
	3.5451E-01	-6.5207E+00	-6.2716E+00	6.8752E+00	9.1843E+00
13	2.1784E+02	-3.3026E+02	-9.6322E+01	5.4811E+02	7.1540E+02
	1.5020E+00	-2.2771E+00	-6.6411E-01	3.7791E+00	4.9325E+00
14	1.3208E+02	-4.1242E+02	-1.2303E+02	5.4450E+02	1.0297E+03
	9.1068E-01	-2.8435E+00	-8.4824E-01	3.7542E+00	7.0998E+00
15	1.1362E+03	-1.0903E+03	-1.3158E+02	2.2265E+03	3.7375E+03
	7.8337E+00	-7.5173E+00	-9.0718E-01	1.5351E+01	2.5769E+01

WATERMARK

16	4.0008E+02	-8.0848E+02	-2.2400E+02	1.2086E+03	1.9649E+03
	2.7584E+00	-5.5743E+00	-1.5444E+00	8.3327E+00	1.3548E+01
17	1.7468E+02	-5.4771E+02	7.3753E+01	7.2239E+02	1.2470E+03
	1.2044E+00	-3.7763E+00	5.0851E-01	4.9807E+00	8.5975E+00
18	5.2879E+01	-2.8596E+02	1.4307E+02	3.3884E+02	5.7621E+02
	3.6459E-01	-1.9717E+00	9.8641E-01	2.3362E+00	3.9728E+00
19	1.6020E+02	-4.2797E+02	2.1833E+01	5.8818E+02	9.7143E+02
	1.1046E+00	-2.9508E+00	1.5053E-01	4.0553E+00	6.6978E+00
20	2.1703E+02	-5.5721E+02	-1.9715E+00	7.7424E+02	1.4411E+03
	1.4964E+00	-3.8418E+00	-1.3593E-02	5.3382E+00	9.9357E+00
21	2.0537E+01	-3.6108E+00	3.0393E-01	2.4147E+01	1.4182E+01
	1.4159E-01	-2.4896E-02	2.0955E-03	1.6649E-01	9.7780E-02
22	7.6666E+00	-4.6932E+01	-7.6403E+00	5.4599E+01	1.3022E+02
	5.2860E-02	-3.2358E-01	-5.2678E-02	3.7644E-01	8.9780E-01

Allowable Stress for Load Case 115

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	298.71	298.58	20.00	23.60	66.30
2	298.00	297.31	20.00	23.60	66.30
3	297.84	297.54	20.00	23.60	66.30
4	299.17	299.15	20.00	23.60	66.30
5	299.41	299.37	20.00	23.60	66.30
6	299.57	299.48	20.00	23.60	66.30
7	299.33	299.19	20.00	23.60	66.30
8	299.10	298.96	20.00	23.60	66.30
9	298.96	298.83	20.00	23.60	66.30
10	299.07	298.89	20.00	23.60	66.30
11	299.26	299.05	20.00	23.60	66.30
12	299.77	299.50	20.00	23.60	66.30
13	298.78	298.71	20.00	23.60	66.30
14	298.60	298.56	20.00	23.60	66.30
15	299.62	299.61	20.00	23.60	66.30
16	299.62	299.60	20.00	23.60	66.30
17	299.64	299.62	20.00	23.60	66.30
18	299.69	299.67	20.00	23.60	66.30
19	299.76	299.72	20.00	23.60	66.30
20	300.31	300.23	20.00	22.40	61.80
21	298.36	298.33	20.00	23.60	66.30
22	299.55	299.53	20.00	23.60	66.30

Table 2-136. Load Case 116, Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	1.8733E+01	-4.0346E+01	-1.1783E+01	5.9079E+01	9.9445E+01
	1.2916E-01	-2.7818E-01	-8.1238E-02	4.0733E-01	6.8565E-01
2	1.9955E+01	-4.5269E+01	-4.6036E+00	6.5224E+01	1.2375E+02
	1.3759E-01	-3.1212E-01	-3.1741E-02	4.4971E-01	8.5324E-01
3	1.2397E+01	-2.9697E+01	-1.0593E+01	4.2094E+01	7.1052E+01
	8.5474E-02	-2.0475E-01	-7.3034E-02	2.9023E-01	4.8989E-01
4	6.5331E+02	-4.2277E+02	-3.9173E+02	1.0761E+03	1.9220E+03
	4.5044E+00	-2.9149E+00	-2.7009E+00	7.4193E+00	1.3252E+01
5	6.6974E+02	-1.7703E+02	-7.0099E+02	8.4677E+02	4.3271E+02
	4.6177E+00	-1.2206E+00	-4.8331E+00	5.8382E+00	2.9834E+00
6	1.2286E+02	-6.3942E+02	-1.9554E+03	7.6229E+02	1.1183E+03
	8.4710E-01	-4.4087E+00	-1.3482E+01	5.2558E+00	7.7105E+00
7	-1.0042E+02	-4.1173E+02	-3.4945E+03	3.1131E+02	7.1149E+01
	-6.9235E-01	-2.8388E+00	-2.4094E+01	2.1464E+00	4.9055E-01
8	-1.0598E+02	-4.0357E+02	-3.4882E+03	2.9759E+02	3.8449E+01
	-7.3068E-01	-2.7825E+00	-2.4051E+01	2.0518E+00	2.6510E-01
9	-1.0168E+02	-4.0764E+02	-3.5104E+03	3.0596E+02	6.3670E+01
	-7.0106E-01	-2.8106E+00	-2.4203E+01	2.1095E+00	4.3899E-01
10	9.9384E+01	-1.0417E+03	-1.8658E+03	1.1411E+03	2.8328E+02
	6.8523E-01	-7.1822E+00	-1.2865E+01	7.8675E+00	1.9532E+00
11	-1.3494E+02	-9.2397E+02	-8.6373E+02	7.8903E+02	1.2264E+03
	-9.3041E-01	-6.3705E+00	-5.9552E+00	5.4401E+00	8.4558E+00
12	4.9178E+01	-9.2469E+02	-8.9062E+02	9.7387E+02	1.2946E+03
	3.3907E-01	-6.3755E+00	-6.1406E+00	6.7146E+00	8.9260E+00
13	2.0742E+02	-3.3111E+02	-9.7891E+01	5.3853E+02	6.8988E+02
	1.4301E+00	-2.2829E+00	-6.7494E-01	3.7130E+00	4.7566E+00
14	1.2639E+02	-4.1269E+02	-1.2321E+02	5.3908E+02	1.0175E+03
	8.7145E-01	-2.8454E+00	-8.4947E-01	3.7168E+00	7.0152E+00
15	1.1263E+03	-1.0762E+03	-1.2546E+02	2.2025E+03	3.6969E+03
	7.7654E+00	-7.4202E+00	-8.6502E-01	1.5186E+01	2.5489E+01

WORKING DRAFT

16	3.9629E+02	-7.9816E+02	-2.2650E+02	1.1945E+03	1.9422E+03
	2.7323E+00	-5.5031E+00	-1.5617E+00	8.2355E+00	1.3391E+01
17	1.7336E+02	-5.4217E+02	6.7151E+01	7.1553E+02	1.2358E+03
	1.1953E+00	-3.7381E+00	4.6299E-01	4.9334E+00	8.5204E+00
18	5.2126E+01	-2.8296E+02	1.4674E+02	3.3508E+02	5.6906E+02
	3.5939E-01	-1.9509E+00	1.0117E+00	2.3103E+00	3.9236E+00
19	1.5790E+02	-4.2465E+02	2.7269E+01	5.8255E+02	9.6251E+02
	1.0887E+00	-2.9278E+00	1.8801E-01	4.0165E+00	6.6363E+00
20	2.1212E+02	-5.5251E+02	-1.9177E+00	7.6463E+02	1.4238E+03
	1.4625E+00	-3.8094E+00	-1.3222E-02	5.2719E+00	9.8167E+00
21	1.9112E+01	-7.1202E+00	-4.4125E+00	2.6232E+01	1.6186E+01
	1.3177E-01	-4.9092E-02	-3.0423E-02	1.8086E-01	1.1160E-01
22	8.3575E+00	-4.2763E+01	-3.4326E+00	5.1121E+01	1.1992E+02
	5.7623E-02	-2.9484E-01	-2.3667E-02	3.5246E-01	8.2683E-01

Allowable Stress for Load Case 116

LOC	Tmax (deg_F)	Tave (deg_F)	Sm (ksi)	Sy (ksi)	Su (ksi)
1	296.02	295.85	20.00	23.60	66.30
2	295.40	294.68	20.00	23.60	66.30
3	295.20	294.85	20.00	23.60	66.30
4	296.50	296.48	20.00	23.60	66.30
5	296.78	296.74	20.00	23.60	66.30
6	296.95	296.85	20.00	23.60	66.30
7	296.73	296.59	20.00	23.60	66.30
8	296.52	296.38	20.00	23.60	66.30
9	296.38	296.25	20.00	23.60	66.30
10	296.50	296.32	20.00	23.60	66.30
11	296.71	296.49	20.00	23.60	66.30
12	297.22	296.95	20.00	23.60	66.30
13	296.21	296.14	20.00	23.60	66.30
14	296.03	295.99	20.00	23.60	66.30
15	296.85	296.82	20.00	23.60	66.30
16	296.90	296.87	20.00	23.60	66.30
17	296.93	296.90	20.00	23.60	66.30
18	297.02	296.99	20.00	23.60	66.30
19	297.09	297.06	20.00	23.60	66.30
20	297.68	297.59	20.00	23.60	66.30
21	295.72	295.66	20.00	23.60	66.30
22	296.66	296.62	20.00	23.60	66.30

Table 2-137. Load Case 301, 30-ft. Head-On Drop, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.2710E+02	-5.6472E+03	-1.0106E+03	5.5201E+03	1.7801E+03
	-8.7636E-01	-3.8936E+01	-6.9678E+00	3.8060E+01	1.2274E+01
2	5.8425E+01	-3.7447E+03	-2.4691E+02	3.8031E+03	2.5249E+02
	4.0283E-01	-2.5818E+01	-1.7024E+00	2.6221E+01	1.7408E+00
3	-7.0689E+00	-3.3916E+03	3.7189E+00	3.3846E+03	7.0831E+02
	-4.8739E-02	-2.3385E+01	2.5641E-02	2.3336E+01	4.8837E+00
4	9.8095E+02	-8.9436E+03	-2.7161E+03	9.9246E+03	4.5407E+03
	6.7634E+00	-6.1664E+01	-1.8727E+01	6.8427E+01	3.1307E+01
5	-7.2912E+01	-2.9612E+03	-1.1457E+03	2.8883E+03	3.3345E+03
	-5.0271E-01	-2.0417E+01	-7.8992E+00	1.9914E+01	2.2990E+01
6	-5.8621E+02	-3.0904E+03	-1.1579E+03	2.5042E+03	3.4496E+02
	-4.0418E+00	-2.1308E+01	-7.9832E+00	1.7266E+01	2.3784E+00
7	-2.8897E+01	-2.3971E+03	-2.5575E+02	2.3682E+03	1.0696E+01
	-1.9924E-01	-1.6527E+01	-1.7633E+00	1.6328E+01	7.3745E-02
8	-1.9148E+01	-2.5297E+03	-1.8228E+02	2.5105E+03	9.3167E+00
	-1.3202E-01	-1.7441E+01	-1.2568E+00	1.7309E+01	6.4237E-02
9	1.2769E+00	-2.4167E+03	5.8569E+01	2.4179E+03	1.2066E-01
	8.8041E-03	-1.6662E+01	4.0382E-01	1.6671E+01	8.3190E-04
10	-7.2146E+02	-6.2058E+03	-1.0681E+03	5.4843E+03	2.4764E+03
	-4.9743E+00	-4.2787E+01	-7.3640E+00	3.7813E+01	1.7075E+01
11	5.5124E+02	-3.3719E+03	-5.7565E+02	3.9232E+03	1.4560E+03
	3.8007E+00	-2.3249E+01	-3.9690E+00	2.7049E+01	1.0039E+01
12	5.5720E+02	-5.5647E+02	4.5930E+02	1.1137E+03	2.2830E+03
	3.8417E+00	-3.8367E+00	3.1668E+00	7.6785E+00	1.5741E+01
13	8.1262E+02	-3.5225E+03	-3.4288E+02	4.3351E+03	2.7641E+03
	5.6028E+00	-2.4287E+01	-2.3641E+00	2.9890E+01	1.9058E+01
14	9.1472E+02	-3.1487E+03	-1.4280E+02	4.0634E+03	1.3905E+03
	6.3067E+00	-2.1710E+01	-9.8454E-01	2.8016E+01	9.5874E+00
15	3.7015E+02	2.5368E+02	3.4875E+02	1.1646E+02	7.0796E+01
	2.5521E+00	1.7491E+00	2.4046E+00	8.0299E-01	4.8812E-01

WITHDRAWN

16	-1.8354E+00	-1.2804E+03	-6.0566E+02	1.2785E+03	2.4768E+01
	-1.2655E-02	-8.8278E+00	-4.1758E+00	8.8152E+00	1.7077E-01
17	2.2805E+02	-1.4373E+03	-8.3880E+02	1.6653E+03	1.2887E+03
	1.5723E+00	-9.9099E+00	-5.7833E+00	1.1482E+01	8.8851E+00
18	1.6400E+02	-2.8863E+03	-8.4525E+02	3.0503E+03	2.6652E+03
	1.1307E+00	-1.9900E+01	-5.8278E+00	2.1031E+01	1.8376E+01
19	5.4636E+02	-2.6457E+03	-8.7429E+02	3.1921E+03	1.6866E+03
	3.7670E+00	-1.8242E+01	-6.0280E+00	2.2009E+01	1.1629E+01
20	-2.7900E+02	-2.0105E+03	-1.1442E+03	1.7315E+03	1.5555E+03
	-1.9237E+00	-1.3862E+01	-7.8892E+00	1.1938E+01	1.0725E+01
21	-3.1715E+02	-2.9377E+03	-3.2542E+02	2.6206E+03	1.0970E+03
	-2.1866E+00	-2.0255E+01	-2.2437E+00	1.8068E+01	7.5633E+00
22	6.0356E+02	1.5843E+02	6.0066E+02	4.4513E+02	3.0628E+02
	4.1614E+00	1.0924E+00	4.1414E+00	3.0690E+00	2.1118E+00

MARKUP

Table 2-138. Load Case 302, 30-ft. Side Drop + Slap-Down, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	9.4893E+02	-1.9871E+03	-9.9572E+03	9.5453E+03	2.4711E+03
	6.5426E+00	-1.3701E+01	-6.8653E+01	6.5813E+01	1.7038E+01
2	1.0811E+03	-2.4985E+03	-9.3168E+03	8.8039E+03	2.0033E+03
	7.4542E+00	-1.7226E+01	-6.4237E+01	6.0701E+01	1.3812E+01
3	9.4839E+02	-1.9903E+03	-9.9989E+03	9.5942E+03	2.4887E+03
	6.5389E+00	-1.3723E+01	-6.8940E+01	6.6150E+01	1.7159E+01
4	1.0016E+03	4.3070E+02	-4.0275E+03	4.9066E+03	5.3305E+02
	6.9056E+00	2.9696E+00	-2.7769E+01	3.3830E+01	3.6753E+00
5	1.1352E+03	6.8876E+02	-4.2754E+03	5.4106E+03	1.6724E+02
	7.8268E+00	4.7489E+00	-2.9478E+01	3.7305E+01	1.1531E+00
6	9.8900E+02	3.8030E+02	-4.9899E+03	5.7569E+03	2.5883E+02
	6.8189E+00	2.6221E+00	-3.4404E+01	3.9692E+01	1.7845E+00
7	3.5913E+03	2.0881E+03	5.3608E+01	6.9674E+03	5.0985E+02
	2.4761E+01	1.4397E+01	3.6961E-01	4.8038E+01	3.5153E+00
8	3.7560E+03	2.0873E+03	6.9143E+01	7.2378E+03	4.9772E+02
	2.5897E+01	1.4391E+01	4.7672E-01	4.9903E+01	3.4317E+00
9	3.5832E+03	2.1046E+03	5.2390E+01	6.9521E+03	5.1385E+02
	2.4705E+01	1.4511E+01	3.6122E-01	4.7933E+01	3.5429E+00
10	1.8104E+03	1.3109E+03	-3.3947E+03	5.8531E+03	4.2236E+02
	1.2482E+01	9.0383E+00	-2.3406E+01	4.0356E+01	2.9121E+00
11	8.7975E+02	-1.9265E+02	-5.0162E+03	5.4821E+03	1.9797E+03
	6.0657E+00	-1.3282E+00	-3.4586E+01	3.7798E+01	1.3650E+01
12	3.9985E+02	-7.0756E+01	-4.0533E+03	4.3540E+03	4.5490E+02
	2.7569E+00	-4.8785E-01	-2.7946E+01	3.0020E+01	3.1364E+00
13	1.0747E+03	6.2898E+02	-4.0779E+03	5.1526E+03	2.1678E+02
	7.4098E+00	4.3367E+00	-2.8116E+01	3.5526E+01	1.4947E+00
14	1.0738E+03	5.1677E+02	-4.0972E+03	5.1369E+03	3.7675E+02
	7.4035E+00	3.5630E+00	-2.8249E+01	3.5418E+01	2.5976E+00
15	4.0828E+02	-7.5666E+01	-2.5203E+03	2.9761E+03	3.7616E+01
	2.8150E+00	-5.2170E-01	-1.7377E+01	2.0520E+01	2.5935E-01

WATERMARK

16	7.8045E+02	1.2410E+02	-3.8818E+03	4.4344E+03	1.2309E+02
	5.3810E+00	8.5566E-01	-2.6764E+01	3.0574E+01	8.4869E-01
17	8.9100E+02	4.4486E+01	-4.5215E+03	4.8967E+03	1.5994E+02
	6.1432E+00	3.0672E-01	-3.1175E+01	3.3762E+01	1.1027E+00
18	9.5620E+02	3.1921E+02	-4.9670E+03	5.5141E+03	2.0882E+02
	6.5928E+00	2.2009E+00	-3.4246E+01	3.8018E+01	1.4398E+00
19	1.0280E+03	3.2742E+02	-4.4714E+03	5.3997E+03	5.7580E+01
	7.0879E+00	2.2575E+00	-3.0829E+01	3.7230E+01	3.9700E-01
20	8.0263E+02	1.3585E+02	-3.9675E+03	4.5482E+03	2.9072E+02
	5.5340E+00	9.3668E-01	-2.7355E+01	3.1359E+01	2.0044E+00
21	4.4693E+02	-3.7013E+01	-2.6224E+03	3.0712E+03	8.2108E+01
	3.0815E+00	-2.5520E-01	-1.8081E+01	2.1175E+01	5.6612E-01
22	4.4740E+02	-2.6089E+01	-2.6582E+03	3.1081E+03	9.7020E+01
	3.0847E+00	-1.7987E-01	-1.8328E+01	2.1430E+01	6.6893E-01

MARKUP

Table 2-139. Load Case 303, 30-ft. Cg/Corner Drop, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	3.8391E+03	2.0048E+02	-4.0328E+03	7.8719E+03	2.1735E+03
	2.6470E+01	1.3822E+00	-2.7805E+01	5.4275E+01	1.4986E+01
2	2.0480E+03	-3.8260E+02	-7.5243E+03	9.5723E+03	7.5018E+02
	1.4120E+01	-2.6379E+00	-5.1878E+01	6.5998E+01	5.1723E+00
3	7.5190E+02	-9.1468E+02	-9.8299E+03	1.0207E+04	1.9368E+03
	5.1841E+00	-6.3065E+00	-6.7775E+01	7.0375E+01	1.3354E+01
4	1.0493E+03	3.3715E+02	-3.2058E+03	5.3650E+03	3.5892E+02
	7.2349E+00	2.3245E+00	-2.2103E+01	3.6990E+01	2.4747E+00
5	1.1472E+03	-8.2328E+02	-4.1200E+03	5.4101E+03	2.1199E+02
	7.9097E+00	-5.6763E+00	-2.8406E+01	3.7302E+01	1.4617E+00
6	9.4152E+02	-1.5311E+03	-5.1678E+03	5.4503E+03	4.7357E+02
	6.4915E+00	-1.0557E+01	-3.5630E+01	3.7578E+01	3.2652E+00
7	1.5649E+03	4.4852E+02	-6.0035E+02	6.4734E+03	1.8579E+02
	1.0789E+01	3.0925E+00	-4.1392E+00	4.4633E+01	1.2810E+00
8	1.6784E+03	5.8179E+02	-4.1358E+02	5.6876E+03	1.9480E+02
	1.1572E+01	4.0113E+00	-2.8515E+00	3.9215E+01	1.3431E+00
9	1.6682E+03	8.1850E+02	-2.3158E+02	4.3247E+03	2.7658E+02
	1.1502E+01	5.6434E+00	-1.5967E+00	2.9817E+01	1.9070E+00
10	1.6043E+03	1.1286E+03	-5.1397E+01	3.3139E+03	1.3052E+03
	1.1061E+01	7.7816E+00	-3.5437E-01	2.2849E+01	8.9991E+00
11	9.4707E+02	5.4909E+02	-9.3284E+02	2.6770E+03	1.1969E+03
	6.5298E+00	3.7858E+00	-6.4317E+00	1.8457E+01	8.2521E+00
12	4.8697E+02	8.1785E+01	-1.0098E+03	1.5873E+03	1.4395E+02
	3.3576E+00	5.6389E-01	-6.9620E+00	1.0944E+01	9.9249E-01
13	9.8030E+02	3.9001E+02	-1.1146E+03	2.3963E+03	1.4055E+02
	6.7589E+00	2.6890E+00	-7.6848E+00	1.6522E+01	9.6907E-01
14	7.5178E+02	3.7461E+02	-1.3968E+03	2.2711E+03	2.3795E+02
	5.1834E+00	2.5829E+00	-9.6308E+00	1.5659E+01	1.6406E+00
15	8.5297E+02	1.1335E+02	-1.7002E+03	2.5859E+03	7.3500E+01
	5.8810E+00	7.8149E-01	-1.1723E+01	1.7829E+01	5.0676E-01

WITHDRAWN

16	1.0082E+03	2.5954E+01	-1.2765E+03	3.6676E+03	3.0985E+02
	6.9514E+00	1.7895E-01	-8.8008E+00	2.5287E+01	2.1363E+00
17	1.0450E+03	5.1641E+01	-1.4205E+03	4.2036E+03	2.9959E+02
	7.2049E+00	3.5605E-01	-9.7940E+00	2.8983E+01	2.0656E+00
18	1.0197E+03	-1.2728E+02	-3.2974E+03	4.2270E+03	2.0251E+02
	7.0306E+00	-8.7753E-01	-2.2735E+01	2.9144E+01	1.3963E+00
19	1.2578E+03	-2.8422E+02	-3.6275E+03	4.9408E+03	3.2644E+02
	8.6723E+00	-1.9596E+00	-2.5011E+01	3.4066E+01	2.2507E+00
20	7.8987E+02	-7.9240E+02	-4.2514E+03	4.8063E+03	2.0659E+02
	5.4460E+00	-5.4634E+00	-2.9312E+01	3.3138E+01	1.4244E+00
21	9.9169E+01	9.0691E+00	-4.3204E+02	5.1776E+02	6.9166E+01
	6.8375E-01	6.2529E-02	-2.9788E+00	3.5698E+00	4.7689E-01
22	1.2594E+03	4.1988E+01	-1.5405E+03	2.8372E+03	3.0551E+02
	8.6831E+00	2.8949E-01	-1.0622E+01	1.9562E+01	2.1064E+00

MARKUP

Table 2-140. Load Case 304, 30-ft. Head-On Drop at -40°F, Low Temperature, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	-1.7796E+02	-7.9062E+03	-1.4148E+03	7.7283E+03	2.4922E+03
	-1.2270E+00	-5.4512E+01	-9.7550E+00	5.3285E+01	1.7183E+01
2	8.1798E+01	-5.2428E+03	-3.4568E+02	5.3246E+03	3.5351E+02
	5.6398E-01	-3.6148E+01	-2.3834E+00	3.6712E+01	2.4374E+00
3	-9.8964E+00	-4.7488E+03	5.2261E+00	4.7389E+03	9.9180E+02
	-6.8233E-02	-3.2742E+01	3.6033E-02	3.2674E+01	6.8382E+00
4	1.3734E+03	-1.2521E+04	-3.8026E+03	1.3895E+04	6.3571E+03
	9.4691E+00	-8.6331E+01	-2.6218E+01	9.5800E+01	4.3830E+01
5	-1.0206E+02	-4.1457E+03	-1.6040E+03	4.0437E+03	4.6684E+03
	-7.0369E-01	-2.8584E+01	-1.1059E+01	2.7880E+01	3.2187E+01
6	-8.2072E+02	-4.3268E+03	-1.6210E+03	3.5061E+03	4.8289E+02
	-5.6587E+00	-2.9832E+01	-1.1177E+01	2.4173E+01	3.3294E+00
7	-4.0457E+01	-3.3561E+03	-3.5804E+02	3.3156E+03	1.4973E+01
	-2.7894E-01	-2.3140E+01	-2.4686E+00	2.2861E+01	1.0324E-01
8	-2.6807E+01	-3.5418E+03	-2.5520E+02	3.5150E+03	1.3046E+01
	-1.8483E-01	-2.4420E+01	-1.7595E+00	2.4235E+01	8.9946E-02
9	1.7899E+00	-3.3836E+03	8.2025E+01	3.3854E+03	1.6821E-01
	1.2341E-02	-2.3329E+01	5.6554E-01	2.3341E+01	1.1598E-03
10	-1.0101E+03	-8.6891E+03	-1.4954E+03	7.6789E+03	3.4674E+03
	-6.9647E+00	-5.9909E+01	-1.0311E+01	5.2944E+01	2.3907E+01
11	7.7182E+02	-4.7212E+03	-8.0600E+02	5.4931E+03	2.0387E+03
	5.3215E+00	-3.2552E+01	-5.5572E+00	3.7873E+01	1.4056E+01
12	7.8016E+02	-7.7918E+02	6.4309E+02	1.5593E+03	3.1966E+03
	5.3790E+00	-5.3722E+00	4.4340E+00	1.0751E+01	2.2040E+01
13	1.1378E+03	-4.9322E+03	-4.8009E+02	6.0700E+03	3.8703E+03
	7.8450E+00	-3.4006E+01	-3.3101E+00	4.1851E+01	2.6685E+01
14	1.2808E+03	-4.4088E+03	-1.9994E+02	5.6895E+03	1.9470E+03
	8.8306E+00	-3.0397E+01	-1.3786E+00	3.9228E+01	1.3424E+01
15	5.1814E+02	3.5511E+02	4.8819E+02	1.6303E+02	9.9105E+01
	3.5725E+00	2.4484E+00	3.3660E+00	1.1241E+00	6.8331E-01

MARSHALL

16	-2.6091E+00	-1.7925E+03	-8.4795E+02	1.7899E+03	3.4702E+01
	-1.7989E-02	-1.2359E+01	-5.8464E+00	1.2341E+01	2.3926E-01
17	3.1921E+02	-2.0122E+03	-1.1743E+03	2.3314E+03	1.8041E+03
	2.2009E+00	-1.3874E+01	-8.0968E+00	1.6074E+01	1.2439E+01
18	2.2953E+02	-4.0409E+03	-1.1834E+03	4.2704E+03	3.7312E+03
	1.5825E+00	-2.7861E+01	-8.1590E+00	2.9443E+01	2.5726E+01
19	7.6491E+02	-3.7041E+03	-1.2240E+03	4.4690E+03	2.3612E+03
	5.2738E+00	-2.5539E+01	-8.4390E+00	3.0812E+01	1.6280E+01
20	-3.9054E+02	-2.8148E+03	-1.6019E+03	2.4242E+03	2.1777E+03
	-2.6927E+00	-1.9407E+01	-1.1045E+01	1.6715E+01	1.5015E+01
21	-4.4410E+02	-4.1137E+03	-4.5568E+02	3.6696E+03	1.5361E+03
	-3.0620E+00	-2.8363E+01	-3.1418E+00	2.5301E+01	1.0591E+01
22	8.4491E+02	2.2179E+02	8.4084E+02	6.2312E+02	4.2878E+02
	5.8254E+00	1.5292E+00	5.7974E+00	4.2963E+00	2.9564E+00

MARKUP

Table 2-141. Load Case 305, 30-ft. Side Drop + Slap-Down at -40°F, Low Temperature, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.8957E+02	-7.0053E+02	-3.2458E+03	3.7802E+03	1.1542E+03
	1.9965E+00	-4.8300E+00	-2.2379E+01	2.6064E+01	7.9579E+00
2	9.8891E+02	-1.0503E+03	-2.4020E+03	2.1996E+03	8.5585E+02
	6.8183E+00	-7.2413E+00	-1.6561E+01	1.5166E+01	5.9009E+00
3	2.9083E+02	-7.0132E+02	-3.2548E+03	3.7973E+03	1.1504E+03
	2.0052E+00	-4.8354E+00	-2.2441E+01	2.6181E+01	7.9319E+00
4	7.8811E+02	1.0534E+02	-1.9153E+03	2.5956E+03	2.7898E+02
	5.4338E+00	7.2628E-01	-1.3206E+01	1.7896E+01	1.9235E+00
5	1.3271E+03	-7.2430E+00	-2.2008E+03	2.9164E+03	1.3010E+02
	9.1497E+00	-4.9939E-02	-1.5174E+01	2.0108E+01	8.9703E-01
6	1.1087E+03	-2.9154E+02	-2.5443E+03	2.8680E+03	1.1987E+02
	7.6443E+00	-2.0101E+00	-1.7542E+01	1.9774E+01	8.2646E-01
7	1.0309E+03	5.4212E+02	1.6204E+01	2.1513E+03	1.8267E+02
	7.1081E+00	3.7378E+00	1.1172E-01	1.4832E+01	1.2595E+00
8	1.0340E+03	5.0998E+02	3.5219E+01	1.5897E+03	1.7597E+02
	7.1295E+00	3.5162E+00	2.4283E-01	1.0961E+01	1.2132E+00
9	1.0269E+03	5.4299E+02	1.6329E+01	2.1354E+03	1.8387E+02
	7.0800E+00	3.7438E+00	1.1258E-01	1.4723E+01	1.2677E+00
10	1.3934E+03	1.1710E+02	-2.2069E+03	2.6257E+03	7.1380E+02
	9.6068E+00	8.0735E-01	-1.5216E+01	1.8103E+01	4.9215E+00
11	6.3111E+02	-3.7758E+02	-2.6916E+03	2.5785E+03	1.0620E+03
	4.3514E+00	-2.6033E+00	-1.8558E+01	1.7778E+01	7.3222E+00
12	-2.4027E+01	-1.5051E+02	-1.8656E+03	1.8416E+03	1.5266E+02
	-1.6566E-01	-1.0377E+00	-1.2863E+01	1.2697E+01	1.0526E+00
13	1.3210E+03	-2.1250E+01	-2.1048E+03	2.8769E+03	1.1065E+02
	9.1083E+00	-1.4651E-01	-1.4512E+01	1.9835E+01	7.6290E-01
14	1.1205E+03	1.6104E+01	-2.0277E+03	2.7757E+03	3.0104E+02
	7.7258E+00	1.1103E-01	-1.3981E+01	1.9138E+01	2.0756E+00
15	-5.7884E+01	-1.4460E+02	-1.7054E+03	1.7239E+03	1.0571E+02
	-3.9909E-01	-9.9697E-01	-1.1759E+01	1.1886E+01	7.2887E-01

WATERMARK

16	2.5494E+02	4.7404E+01	-1.8486E+03	2.7383E+03	5.6678E+01
	1.7578E+00	3.2684E-01	-1.2746E+01	1.8880E+01	3.9078E-01
17	2.9250E+02	-3.5043E+01	-2.0898E+03	2.9160E+03	1.4092E+02
	2.0167E+00	-2.4161E-01	-1.4409E+01	2.0105E+01	9.7162E-01
18	7.9147E+02	-4.0234E+02	-2.1927E+03	3.1095E+03	1.0655E+02
	5.4570E+00	-2.7740E+00	-1.5118E+01	2.1440E+01	7.3461E-01
19	1.1169E+03	-3.3368E+01	-2.2100E+03	2.9944E+03	1.2687E+02
	7.7007E+00	-2.3006E-01	-1.5237E+01	2.0646E+01	8.7475E-01
20	8.2703E+02	-2.3877E+02	-2.1057E+03	2.4128E+03	1.2112E+02
	5.7022E+00	-1.6463E+00	-1.4518E+01	1.6636E+01	8.3510E-01
21	-2.3831E+01	-1.6010E+02	-1.8352E+03	1.8676E+03	1.5807E+02
	-1.6431E-01	-1.1039E+00	-1.2653E+01	1.2877E+01	1.0899E+00
22	-4.8146E-01	-1.7350E+02	-1.8739E+03	1.9348E+03	1.6319E+02
	-3.3196E-03	-1.1962E+00	-1.2920E+01	1.3340E+01	1.1252E+00

MARKUP

Table 2-142. Load Case 306, 30-ft. Cg/Corner Drop at -40°F, Low Temperature, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	2.3170E+02	7.2236E+01	-1.1455E+03	5.6995E+03	8.6691E+02
	1.5975E+00	4.9805E-01	-7.8981E+00	3.9297E+01	5.9771E+00
2	2.4914E+02	5.3397E+01	-4.8204E+02	1.6696E+03	1.3748E+02
	1.7178E+00	3.6816E-01	-3.3236E+00	1.1512E+01	9.4786E-01
3	5.9352E+02	-1.8178E+01	-1.0421E+02	6.9773E+02	1.7005E+02
	4.0921E+00	-1.2533E-01	-7.1851E-01	4.8107E+00	1.1724E+00
4	3.3162E+02	-3.4311E+01	-1.3456E+03	3.7663E+03	1.5771E+02
	2.2865E+00	-2.3657E-01	-9.2773E+00	2.5968E+01	1.0874E+00
5	5.9024E+02	-4.1908E+02	-1.8046E+03	2.6018E+03	7.0552E+01
	4.0695E+00	-2.8894E+00	-1.2442E+01	1.7939E+01	4.8644E-01
6	7.7084E+02	-6.9950E+02	-2.2379E+03	2.3781E+03	3.2711E+02
	5.3147E+00	-4.8229E+00	-1.5430E+01	1.6396E+01	2.2554E+00
7	5.5450E+02	8.7991E+01	-1.2996E+02	2.4391E+03	6.9455E+01
	3.8232E+00	6.0668E-01	-8.9601E-01	1.6817E+01	4.7887E-01
8	4.0211E+02	5.5865E+01	-1.2050E+02	1.8470E+03	3.9060E+01
	2.7724E+00	3.8518E-01	-8.3081E-01	1.2734E+01	2.6931E-01
9	2.6056E+02	3.0079E+01	-1.3325E+02	1.2664E+03	1.8273E+01
	1.7965E+00	2.0739E-01	-9.1876E-01	8.7314E+00	1.2599E-01
10	3.2738E+02	6.9494E+01	-9.1987E+01	1.1279E+03	5.1394E+02
	2.2572E+00	4.7915E-01	-6.3423E-01	7.7763E+00	3.5435E+00
11	3.8857E+02	9.9543E+01	1.6826E+01	8.1927E+02	2.5647E+02
	2.6791E+00	6.8633E-01	1.1601E-01	5.6487E+00	1.7683E+00
12	2.1928E+02	1.4414E+02	-1.8288E+01	2.3757E+02	8.6321E+01
	1.5119E+00	9.9380E-01	-1.2609E-01	1.6380E+00	5.9516E-01
13	2.7029E+02	6.0133E+01	-1.3626E+02	7.5768E+02	3.2730E+01
	1.8636E+00	4.1460E-01	-9.3947E-01	5.2240E+00	2.2566E-01
14	2.6105E+02	-7.0776E+01	-1.7330E+02	7.0293E+02	2.2486E+01
	1.7999E+00	-4.8798E-01	-1.1949E+00	4.8466E+00	1.5504E-01
15	1.2850E+02	-5.8217E+02	-1.0223E+03	1.1966E+03	2.8948E+01
	8.8595E-01	-4.0139E+00	-7.0487E+00	8.2505E+00	1.9959E-01

MARKUP

16	1.1013E+02	-8.1636E+01	-6.7169E+02	2.5407E+03	9.1074E+01
	7.5933E-01	-5.6286E-01	-4.6311E+00	1.7518E+01	6.2793E-01
17	5.0105E+01	-8.1327E+01	-7.8338E+02	2.9570E+03	7.6837E+01
	3.4546E-01	-5.6073E-01	-5.4012E+00	2.0388E+01	5.2977E-01
18	2.5712E+02	-1.9311E+02	-1.4722E+03	2.6829E+03	1.2288E+02
	1.7728E+00	-1.3314E+00	-1.0151E+01	1.8498E+01	8.4722E-01
19	4.6226E+02	-2.2594E+02	-1.6089E+03	2.5609E+03	2.7282E+02
	3.1871E+00	-1.5578E+00	-1.1093E+01	1.7657E+01	1.8810E+00
20	6.9867E+02	-3.8562E+02	-1.9190E+03	2.3962E+03	8.0897E+01
	4.8172E+00	-2.6588E+00	-1.3231E+01	1.6521E+01	5.5776E-01
21	8.5846E+01	-3.2508E+01	-1.1071E+02	1.8952E+02	2.3866E+01
	5.9189E-01	-2.2414E-01	-7.6332E-01	1.3067E+00	1.6455E-01
22	5.0153E+01	-6.7121E+02	-8.7190E+02	9.6980E+02	6.0855E+01
	3.4579E-01	-4.6278E+00	-6.0115E+00	6.6866E+00	4.1958E-01

MARKUP

Table 2-143. Load Case 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-025

Location	Stress (psi/MPa) Sigma_1	Sigma_2	Sigma_3	Pm	Pb
1	6.6001E+00	-7.8842E+01	5.5081E+01	8.5442E+01	5.3889E+01
	4.5506E-02	-5.4360E-01	3.7977E-01	5.8910E-01	3.7155E-01
2	2.0272E+00	-6.2360E+01	1.3488E+01	6.4387E+01	1.0053E+01
	1.3977E-02	-4.2996E-01	9.2997E-02	4.4394E-01	6.9312E-02
3	1.0296E+00	-2.4097E+01	1.3910E+00	2.5127E+01	2.4647E+00
	7.0986E-03	-1.6615E-01	9.5904E-03	1.7324E-01	1.6994E-02
4	2.5356E+02	-2.3546E+02	1.1114E+02	4.8902E+02	6.1775E+02
	1.7482E+00	-1.6234E+00	7.6632E-01	3.3717E+00	4.2592E+00
5	1.9614E+02	-2.0968E+02	9.9341E+01	4.0582E+02	5.0492E+02
	1.3523E+00	-1.4457E+00	6.8493E-01	2.7980E+00	3.4813E+00
6	-5.1041E+01	-2.8662E+02	-1.8391E+01	2.3557E+02	4.5831E+01
	-3.5191E-01	-1.9761E+00	-1.2680E-01	1.6242E+00	3.1599E-01
7	2.0691E-01	-6.0014E+01	7.5375E+00	6.0221E+01	5.1122E+00
	1.4266E-03	-4.1378E-01	5.1969E-02	4.1521E-01	3.5247E-02
8	4.7558E-01	-2.6018E+01	4.6278E+00	2.6494E+01	3.3650E-01
	3.2790E-03	-1.7939E-01	3.1907E-02	1.8267E-01	2.3201E-03
9	1.9898E-01	-1.6510E+01	1.8319E+00	1.6709E+01	2.8611E-02
	1.3719E-03	-1.1383E-01	1.2631E-02	1.1520E-01	1.9726E-04
10	-9.3850E+00	-3.8473E+01	-8.9005E+00	2.9088E+01	1.2230E+01
	-6.4707E-02	-2.6526E-01	-6.1366E-02	2.0055E-01	8.4325E-02
11	1.2535E+01	-2.4792E+01	1.0524E+00	3.7328E+01	2.5760E+01
	8.6427E-02	-1.7094E-01	7.2561E-03	2.5736E-01	1.7761E-01
12	4.6026E+00	-3.1446E+01	2.5636E+00	3.6048E+01	5.6967E+01
	3.1734E-02	-2.1681E-01	1.7675E-02	2.4854E-01	3.9277E-01
13	3.1915E+01	-1.7849E+00	1.5743E+01	3.3700E+01	2.6706E+01
	2.2005E-01	-1.2307E-02	1.0854E-01	2.3236E-01	1.8413E-01
14	3.4638E+01	-8.5368E-01	1.9081E+01	3.5492E+01	1.1553E+01
	2.3882E-01	-5.8859E-03	1.3156E-01	2.4471E-01	7.9658E-02
15	-8.2584E+02	-2.8139E+03	-8.0753E+02	1.9881E+03	6.9531E+02
	-5.6940E+00	-1.9401E+01	-5.5677E+00	1.3707E+01	4.7940E+00

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16	8.5492E+01	-1.6592E+02	5.6721E+00	2.5141E+02	1.9582E+02
	5.8945E-01	-1.1440E+00	3.9108E-02	1.7334E+00	1.3501E+00
17	-1.1799E+01	-1.7767E+02	1.4960E+01	1.6587E+02	2.5020E+02
	-8.1352E-02	-1.2250E+00	1.0314E-01	1.1437E+00	1.7250E+00
18	-2.1209E+01	-1.4657E+02	1.7898E+00	1.2536E+02	6.9072E+01
	-1.4623E-01	-1.0106E+00	1.2340E-02	8.6435E-01	4.7624E-01
19	1.1426E+02	-1.1151E+02	3.1410E+01	2.2577E+02	2.3992E+02
	7.8781E-01	-7.6881E-01	2.1656E-01	1.5566E+00	1.6542E+00
20	1.8394E+02	-1.4415E+02	2.5671E+00	3.2809E+02	3.4758E+02
	1.2682E+00	-9.9387E-01	1.7700E-02	2.2621E+00	2.3965E+00
21	1.3355E+01	-2.5150E+01	-2.4664E+01	3.8505E+01	5.3879E+01
	9.2079E-02	-1.7341E-01	-1.7005E-01	2.6549E-01	3.7149E-01
22	-3.0449E+02	-1.2061E+03	-3.2701E+02	9.0158E+02	3.9271E+02
	-2.0994E+00	-8.3156E+00	-2.2546E+00	6.2162E+00	2.7077E+00

MARKUP

Table 2-144. Load Combination 301, Head-On Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 301, 102, 201, 211
30-ft. Head-On Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	6.27	2.88	9.15	20.00	66.30	6.25
	43.21	19.87	63.09	137.90	457.12	
2	3.94	0.45	4.39	20.00	66.30	>10
	27.19	3.09	30.27	137.90	457.12	
3	3.47	0.79	4.26	20.00	66.30	>10
	23.92	5.43	29.34	137.90	457.12	
4	11.08	6.32	17.41	20.00	66.30	2.81
	76.43	43.59	120.01	137.90	457.12	
5	4.07	4.33	8.41	20.00	66.30	6.89
	28.08	29.87	57.95	137.90	457.12	
6	3.29	1.51	4.80	20.00	66.30	>10
	22.66	10.42	33.09	137.90	457.12	
7	2.71	0.08	2.78	20.00	66.30	>10
	18.67	0.53	19.19	137.90	457.12	
8	2.83	0.05	2.88	20.00	66.30	>10
	19.52	0.33	19.86	137.90	457.12	
9	2.78	0.07	2.85	20.00	66.30	>10
	19.15	0.49	19.64	137.90	457.12	
10	6.72	2.63	9.34	20.00	66.30	5.91
	46.30	18.10	64.41	137.90	457.12	
11	4.86	2.69	7.55	20.00	66.30	7.78
	33.48	18.55	52.03	137.90	457.12	
12	2.12	3.77	5.90	20.00	66.30	>10
	14.63	26.01	40.65	137.90	457.12	
13	5.53	3.81	9.34	20.00	66.30	6.10
	38.09	26.29	64.39	137.90	457.12	

MARKUP

14	5.28	2.93	8.20	20.00	66.30	7.08
	36.37	20.20	56.57	137.90	457.12	
15	1.81	2.01	3.82	20.00	66.30	>10
	12.50	13.87	26.36	137.90	457.12	
16	2.98	2.72	5.69	20.00	66.30	>10
	20.53	18.72	39.25	137.90	457.12	
17	2.78	3.07	5.86	20.00	66.30	>10
	19.19	21.19	40.38	137.90	457.12	
18	3.92	4.06	7.98	20.00	66.30	7.30
	27.02	28.02	55.04	137.90	457.12	
19	4.66	3.86	8.51	20.00	66.30	6.79
	32.10	26.59	58.69	137.90	457.12	
20	3.56	4.45	8.01	20.00	66.30	7.28
	24.52	30.72	55.23	137.90	457.12	
21	2.94	1.53	4.48	20.00	66.30	>10
	20.30	10.56	30.87	137.90	457.12	
22	0.91	0.77	1.68	20.00	66.30	>10
	6.27	5.34	11.61	137.90	457.12	

Min MS: 2.809, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-145. Load Combination 302, Side Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 302, 102, 201, 211
30-ft. Side Drop + Slap-Down
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	10.29	3.57	13.87	20.00	66.30	3.51
	70.97	24.63	95.60	137.90	457.12	
2	8.94	2.20	11.14	20.00	66.30	4.19
	61.67	15.16	76.82	137.90	457.12	
3	9.68	2.57	12.25	20.00	66.30	3.80
	66.73	17.70	84.43	137.90	457.12	
4	6.07	2.31	8.38	20.00	66.30	6.65
	41.83	15.95	57.78	137.90	457.12	
5	6.60	1.16	7.76	20.00	66.30	6.04
	45.47	8.03	53.50	137.90	457.12	
6	6.54	1.43	7.97	20.00	66.30	6.10
	45.09	9.83	54.92	137.90	457.12	
7	7.31	0.58	7.88	20.00	66.30	5.35
	50.38	3.97	54.35	137.90	457.12	
8	7.56	0.54	8.10	20.00	66.30	5.14
	52.12	3.70	55.82	137.90	457.12	
9	7.31	0.58	7.90	20.00	66.30	5.35
	50.41	4.03	54.44	137.90	457.12	
10	7.08	0.57	7.66	20.00	66.30	5.55
	48.85	3.94	52.79	137.90	457.12	
11	6.42	3.21	9.63	20.00	66.30	5.89
	44.23	22.16	66.39	137.90	457.12	
12	5.36	1.94	7.31	20.00	66.30	7.65
	36.97	13.41	50.38	137.90	457.12	
13	6.34	1.27	7.61	20.00	66.30	6.32
	43.73	8.73	52.46	137.90	457.12	

WALKUP

14	6.35	1.92	8.26	20.00	66.30	6.31
	43.77	13.21	56.98	137.90	457.12	
15	4.67	1.98	6.65	20.00	66.30	8.93
	32.21	13.64	45.85	137.90	457.12	
16	6.13	2.81	8.95	20.00	66.30	6.41
	42.29	19.40	61.69	137.90	457.12	
17	6.01	1.94	7.96	20.00	66.30	6.72
	41.47	13.41	54.88	137.90	457.12	
18	6.38	1.61	7.99	20.00	66.30	6.27
	44.01	11.09	55.10	137.90	457.12	
19	6.86	2.23	9.09	20.00	66.30	5.76
	47.32	15.36	62.68	137.90	457.12	
20	6.37	3.19	9.56	20.00	66.30	5.93
	43.94	22.00	65.93	137.90	457.12	
21	3.40	0.52	3.91	20.00	66.30	>10
	23.41	3.57	26.98	137.90	457.12	
22	3.57	0.57	4.14	20.00	66.30	>10
	24.63	3.90	28.53	137.90	457.12	

Min MS: 3.509, Location: 1, Combination: Pm

MARKUP

Table 2-146. Load Combination 303, Cg/Corner Drop Orientation, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 303, 102, 201, 211
30-ft. Cg/Corner Drop
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	8.62	3.28	11.89	20.00	66.30	4.38
	59.43	22.58	82.01	137.90	457.12	
2	9.71	0.95	10.66	20.00	66.30	3.78
	66.96	6.52	73.48	137.90	457.12	
3	10.29	2.02	12.31	20.00	66.30	3.51
	70.96	13.90	84.85	137.90	457.12	
4	6.53	2.14	8.66	20.00	66.30	6.11
	44.99	14.75	59.74	137.90	457.12	
5	6.59	1.21	7.80	20.00	66.30	6.04
	45.47	8.34	53.81	137.90	457.12	
6	6.23	1.64	7.87	20.00	66.30	6.45
	42.98	11.31	54.29	137.90	457.12	
7	6.81	0.25	7.06	20.00	66.30	5.81
	46.97	1.74	48.71	137.90	457.12	
8	6.01	0.23	6.24	20.00	66.30	6.72
	41.43	1.61	43.04	137.90	457.12	
9	4.68	0.35	5.03	20.00	66.30	8.91
	32.30	2.39	34.69	137.90	457.12	
10	4.55	1.45	6.00	20.00	66.30	9.21
	31.34	10.03	41.37	137.90	457.12	
11	3.61	2.43	6.04	20.00	66.30	9.97
	24.89	16.76	41.66	137.90	457.12	
12	2.60	1.63	4.23	20.00	66.30	>10
	17.90	11.27	29.16	137.90	457.12	
13	3.59	1.19	4.78	20.00	66.30	>10
	24.73	8.20	32.93	137.90	457.12	

MARKUP

14	3.48	1.78	5.26	20.00	66.30	>10
	24.02	12.25	36.27	137.90	457.12	
15	4.28	2.01	6.30	20.00	66.30	9.53
	29.52	13.88	43.41	137.90	457.12	
16	5.37	3.00	8.37	20.00	66.30	6.92
	37.01	20.69	57.69	137.90	457.12	
17	5.32	2.08	7.41	20.00	66.30	7.72
	36.69	14.37	51.06	137.90	457.12	
18	5.10	1.60	6.70	20.00	66.30	8.11
	35.14	11.04	46.18	137.90	457.12	
19	6.40	2.50	8.90	20.00	66.30	6.25
	44.16	17.21	61.37	137.90	457.12	
20	6.63	3.11	9.74	20.00	66.30	5.81
	45.72	21.42	67.13	137.90	457.12	
21	0.84	0.50	1.35	20.00	66.30	>10
	5.81	3.48	9.28	137.90	457.12	
22	3.30	0.77	4.08	20.00	66.30	>10
	22.76	5.34	28.10	137.90	457.12	

Min MS: 3.510, Location: 3, Combination: Pm

MARKUP

Table 2-147. Load Combination 304, Head-On Drop Orientation at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-025

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	8.48	3.59	12.07	20.00	70.00	4.66
	58.46	24.77	83.23	137.90	482.63	
2	5.47	0.55	6.02	20.00	70.00	7.78
	37.69	3.79	41.48	137.90	482.63	
3	4.82	1.07	5.90	20.00	70.00	8.95
	33.26	7.41	40.67	137.90	482.63	
4	14.91	7.80	22.71	20.00	70.00	2.08
	102.78	53.79	156.57	137.90	482.63	
5	5.16	5.48	10.64	20.00	70.00	5.58
	35.60	37.75	73.35	137.90	482.63	
6	4.23	1.49	5.71	20.00	70.00	>10
	29.14	10.24	39.39	137.90	482.63	
7	3.68	0.08	3.76	20.00	70.00	>10
	25.36	0.55	25.91	137.90	482.63	
8	3.87	0.05	3.92	20.00	70.00	>10
	26.65	0.36	27.01	137.90	482.63	
9	3.77	0.07	3.84	20.00	70.00	>10
	25.98	0.48	26.47	137.90	482.63	
10	9.00	3.71	12.71	20.00	70.00	4.33
	62.07	25.58	87.65	137.90	482.63	
11	6.41	3.26	9.67	20.00	70.00	6.24
	44.18	22.46	66.64	137.90	482.63	
12	2.55	4.59	7.14	20.00	70.00	8.80
	17.56	31.67	49.23	137.90	482.63	
13	7.22	5.04	12.26	20.00	70.00	4.71
	49.76	34.78	84.54	137.90	482.63	

MARKUP

14	6.77	3.32	10.09	20.00	70.00	5.94
	46.66	22.87	69.54	137.90	482.63	
15	2.10	2.71	4.81	20.00	70.00	>10
	14.50	18.66	33.16	137.90	482.63	
16	3.24	2.33	5.57	20.00	70.00	>10
	22.35	16.06	38.42	137.90	482.63	
17	3.27	3.30	6.57	20.00	70.00	9.66
	22.57	22.72	45.29	137.90	482.63	
18	4.94	4.79	9.73	20.00	70.00	6.19
	34.03	33.06	67.09	137.90	482.63	
19	5.59	3.98	9.57	20.00	70.00	6.32
	38.55	27.41	65.96	137.90	482.63	
20	3.87	4.38	8.25	20.00	70.00	7.49
	26.69	30.17	56.85	137.90	482.63	
21	3.99	1.82	5.81	20.00	70.00	>10
	27.53	12.53	40.07	137.90	482.63	
22	1.08	0.81	1.89	20.00	70.00	>10
	7.41	5.61	13.02	137.90	482.63	

Min MS: 2.082, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-148. Load Combination 305, Side Drop Orientation at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-025

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	4.53	2.25	6.79	20.00	70.00	9.32
	31.24	15.54	46.78	137.90	482.63	
2	2.34	1.05	3.39	20.00	70.00	>10
	16.15	7.25	23.40	137.90	482.63	
3	3.88	1.23	5.12	20.00	70.00	>10
	26.77	8.50	35.27	137.90	482.63	
4	3.61	1.72	5.33	20.00	70.00	>10
	24.87	11.89	36.76	137.90	482.63	
5	4.04	0.94	4.97	20.00	70.00	>10
	27.82	6.46	34.28	137.90	482.63	
6	3.59	1.12	4.71	20.00	70.00	>10
	24.74	7.74	32.48	137.90	482.63	
7	2.51	0.25	2.76	20.00	70.00	>10
	17.33	1.71	19.04	137.90	482.63	
8	1.94	0.21	2.15	20.00	70.00	>10
	13.37	1.48	14.86	137.90	482.63	
9	2.52	0.25	2.77	20.00	70.00	>10
	17.37	1.75	19.12	137.90	482.63	
10	3.95	0.96	4.91	20.00	70.00	>10
	27.23	6.59	33.83	137.90	482.63	
11	3.49	2.28	5.77	20.00	70.00	>10
	24.09	15.72	39.81	137.90	482.63	
12	2.83	1.55	4.38	20.00	70.00	>10
	19.51	10.68	30.19	137.90	482.63	
13	4.02	1.28	5.31	20.00	70.00	>10
	27.75	8.85	36.60	137.90	482.63	

MARKUP

14	3.85	1.67	5.53	20.00	70.00	>10
	26.57	11.53	38.10	137.90	482.63	
15	3.66	2.71	6.38	20.00	70.00	9.98
	25.26	18.71	43.97	137.90	482.63	
16	4.19	2.35	6.54	20.00	70.00	9.70
	28.89	16.21	45.11	137.90	482.63	
17	3.86	1.63	5.49	20.00	70.00	>10
	26.60	11.25	37.86	137.90	482.63	
18	3.77	1.17	4.94	20.00	70.00	>10
	26.03	8.06	34.09	137.90	482.63	
19	4.12	1.74	5.86	20.00	70.00	>10
	28.38	12.01	40.39	137.90	482.63	
20	3.86	2.32	6.18	20.00	70.00	>10
	26.61	15.99	42.59	137.90	482.63	
21	2.19	0.44	2.63	20.00	70.00	>10
	15.11	3.03	18.14	137.90	482.63	
22	2.39	0.55	2.93	20.00	70.00	>10
	16.46	3.78	20.24	137.90	482.63	

Min MS: 9.317, Location: 1, Combination: Pm+Pb

MARKUP

Table 2-149. Load Combination 306, Cg/Corner Drop Orientation at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-025

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	6.45	1.97	8.42	20.00	70.00	6.44
	44.47	13.56	58.03	137.90	482.63	
2	1.81	0.33	2.15	20.00	70.00	>10
	12.49	2.30	14.79	137.90	482.63	
3	0.78	0.25	1.04	20.00	70.00	>10
	5.40	1.75	7.14	137.90	482.63	
4	4.78	1.60	6.38	20.00	70.00	9.05
	32.95	11.05	44.00	137.90	482.63	
5	3.72	0.88	4.60	20.00	70.00	>10
	25.65	6.05	31.70	137.90	482.63	
6	3.10	1.33	4.43	20.00	70.00	>10
	21.37	9.17	30.54	137.90	482.63	
7	2.80	0.13	2.94	20.00	70.00	>10
	19.32	0.93	20.24	137.90	482.63	
8	2.20	0.08	2.28	20.00	70.00	>10
	15.15	0.54	15.69	137.90	482.63	
9	1.65	0.09	1.74	20.00	70.00	>10
	11.37	0.61	11.98	137.90	482.63	
10	2.45	0.76	3.21	20.00	70.00	>10
	16.90	5.22	22.12	137.90	482.63	
11	1.73	1.47	3.21	20.00	70.00	>10
	11.96	10.17	22.12	137.90	482.63	
12	1.23	1.48	2.71	20.00	70.00	>10
	8.45	10.22	18.68	137.90	482.63	
13	1.91	1.21	3.11	20.00	70.00	>10
	13.13	8.32	21.45	137.90	482.63	

MARKUP

14	1.78	1.39	3.17	20.00	70.00	>10
	12.28	9.60	21.89	137.90	482.63	
15	3.14	2.64	5.77	20.00	70.00	>10
	21.62	18.18	39.80	137.90	482.63	
16	3.99	2.39	6.38	20.00	70.00	9.97
	27.53	16.45	43.98	137.90	482.63	
17	3.90	1.57	5.47	20.00	70.00	>10
	26.89	10.81	37.70	137.90	482.63	
18	3.35	1.19	4.53	20.00	70.00	>10
	23.09	8.18	31.26	137.90	482.63	
19	3.68	1.89	5.57	20.00	70.00	>10
	25.40	13.01	38.41	137.90	482.63	
20	3.84	2.28	6.12	20.00	70.00	>10
	26.49	15.71	42.20	137.90	482.63	
21	0.51	0.31	0.82	20.00	70.00	>10
	3.54	2.11	5.65	137.90	482.63	
22	1.42	0.45	1.87	20.00	70.00	>10
	9.80	3.07	12.88	137.90	482.63	

Min MS: 6.442, Location: 1, Combination: Pm

MARKUP

Table 2-150. Load Combination 310, Additional Increased External Pressure (290 psi), Hypothetical Accident Conditions of Transport – Model AOS-025

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	0.84	1.18	2.02	20.00	70.00	>10
	5.81	8.13	13.94	137.90	482.63	
2	0.25	0.18	0.43	20.00	70.00	>10
	1.69	1.25	2.94	137.90	482.63	
3	0.25	0.06	0.31	20.00	70.00	>10
	1.72	0.42	2.14	137.90	482.63	
4	10.94	20.86	31.80	20.00	70.00	1.20
	75.44	143.83	219.28	137.90	482.63	
5	10.91	16.80	27.70	20.00	70.00	1.53
	75.22	115.80	191.02	137.90	482.63	
6	4.69	7.38	12.07	20.00	70.00	4.80
	32.35	50.91	83.25	137.90	482.63	
7	1.21	0.08	1.29	20.00	70.00	>10
	8.32	0.56	8.88	137.90	482.63	
8	1.19	0.04	1.23	20.00	70.00	>10
	8.20	0.27	8.47	137.90	482.63	
9	1.21	0.07	1.29	20.00	70.00	>10
	8.37	0.51	8.88	137.90	482.63	
10	1.29	0.65	1.94	20.00	70.00	>10
	8.89	4.51	13.40	137.90	482.63	
11	1.47	1.96	3.43	20.00	70.00	>10
	10.17	13.48	23.65	137.90	482.63	
12	1.28	2.10	3.38	20.00	70.00	>10
	8.81	14.48	23.29	137.90	482.63	
13	3.71	2.55	6.26	20.00	70.00	>10
	25.58	17.59	43.17	137.90	482.63	

WATERMARK UP

14	3.81	4.30	8.11	20.00	70.00	7.64
	26.25	29.64	55.89	137.90	482.63	
15	2.78	3.68	6.45	20.00	70.00	9.85
	19.14	25.35	44.49	137.90	482.63	
16	2.09	3.33	5.42	20.00	70.00	>10
	14.41	22.93	37.34	137.90	482.63	
17	1.33	2.16	3.49	20.00	70.00	>10
	9.15	14.91	24.06	137.90	482.63	
18	1.07	1.78	2.85	20.00	70.00	>10
	7.41	12.27	19.68	137.90	482.63	
19	1.81	2.74	4.55	20.00	70.00	>10
	12.47	18.92	31.39	137.90	482.63	
20	2.35	3.93	6.28	20.00	70.00	>10
	16.19	27.08	43.27	137.90	482.63	
21	1.92	3.79	5.72	20.00	70.00	>10
	13.27	26.15	39.42	137.90	482.63	
22	2.13	3.73	5.86	20.00	70.00	>10
	14.69	25.70	40.39	137.90	482.63	

Min MS: 1.201, Location: 4, Combination: Pm+Pb

MARKUP

Table 2-151. Load Combination 311, 4-ft. Drop onto Rod, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 311, 101, 201, 211
4-ft. Drop onto Rod
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.83	1.16	1.99	20.00	70.00	>10
	5.74	7.97	13.71	137.90	482.63	
2	0.20	0.21	0.41	20.00	70.00	>10
	1.41	1.42	2.82	137.90	482.63	
3	0.11	0.08	0.19	20.00	70.00	>10
	0.75	0.56	1.31	137.90	482.63	
4	1.65	2.40	4.05	20.00	70.00	>10
	11.37	16.54	27.91	137.90	482.63	
5	1.59	1.50	3.09	20.00	70.00	>10
	10.97	10.36	21.33	137.90	482.63	
6	1.02	1.21	2.23	20.00	70.00	>10
	7.02	8.36	15.38	137.90	482.63	
7	0.40	0.07	0.47	20.00	70.00	>10
	2.75	0.49	3.24	137.90	482.63	
8	0.35	0.04	0.39	20.00	70.00	>10
	2.40	0.27	2.67	137.90	482.63	
9	0.38	0.07	0.45	20.00	70.00	>10
	2.60	0.49	3.08	137.90	482.63	
10	1.26	0.16	1.42	20.00	70.00	>10
	8.69	1.11	9.81	137.90	482.63	
11	0.97	1.26	2.23	20.00	70.00	>10
	6.69	8.69	15.38	137.90	482.63	
12	1.04	1.55	2.59	20.00	70.00	>10
	7.20	10.67	17.87	137.90	482.63	
13	1.22	1.08	2.30	20.00	70.00	>10
	8.44	7.42	15.86	137.90	482.63	

MARKUP

14	1.25	1.55	2.80	20.00	70.00	>10
	8.60	10.69	19.29	137.90	482.63	
15	3.68	2.64	6.32	20.00	70.00	>10
	25.40	18.17	43.57	137.90	482.63	
16	1.95	2.89	4.84	20.00	70.00	>10
	13.45	19.90	33.35	137.90	482.63	
17	1.28	2.04	3.32	20.00	70.00	>10
	8.85	14.03	22.88	137.90	482.63	
18	0.99	1.47	2.46	20.00	70.00	>10
	6.86	10.12	16.98	137.90	482.63	
19	1.69	2.41	4.10	20.00	70.00	>10
	11.65	16.61	28.26	137.90	482.63	
20	2.15	3.25	5.40	20.00	70.00	>10
	14.84	22.39	37.23	137.90	482.63	
21	0.36	0.49	0.85	20.00	70.00	>10
	2.50	3.37	5.87	137.90	482.63	
22	1.37	0.86	2.23	20.00	70.00	>10
	9.42	5.94	15.35	137.90	482.63	

Min MS: 10.076, Location: 15, Combination: Pm+Pb

MARKUP

Table 2-152. Load Combination 312, 4-ft. Drop onto Rod at -40°F, Cold Environment, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 311, 104, 201, 211
4-ft. Drop onto Rod
-40°F Ambient, Zero Decay Heat, Zero Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.83	1.16	1.99	20.00	70.00	>10
	5.74	7.97	13.71	137.90	482.63	
2	0.20	0.21	0.41	20.00	70.00	>10
	1.41	1.42	2.82	137.90	482.63	
3	0.11	0.08	0.19	20.00	70.00	>10
	0.75	0.56	1.31	137.90	482.63	
4	1.65	2.40	4.05	20.00	70.00	>10
	11.37	16.54	27.91	137.90	482.63	
5	1.59	1.50	3.09	20.00	70.00	>10
	10.97	10.36	21.33	137.90	482.63	
6	1.02	1.21	2.23	20.00	70.00	>10
	7.02	8.36	15.38	137.90	482.63	
7	0.40	0.07	0.47	20.00	70.00	>10
	2.75	0.49	3.24	137.90	482.63	
8	0.35	0.04	0.39	20.00	70.00	>10
	2.40	0.27	2.67	137.90	482.63	
9	0.38	0.07	0.45	20.00	70.00	>10
	2.60	0.49	3.08	137.90	482.63	
10	1.26	0.16	1.42	20.00	70.00	>10
	8.69	1.11	9.81	137.90	482.63	
11	0.97	1.26	2.23	20.00	70.00	>10
	6.69	8.69	15.38	137.90	482.63	
12	1.04	1.55	2.59	20.00	70.00	>10
	7.20	10.67	17.87	137.90	482.63	
13	1.22	1.08	2.30	20.00	70.00	>10
	8.44	7.42	15.86	137.90	482.63	

MARKUP

14	1.25	1.55	2.80	20.00	70.00	>10
	8.60	10.69	19.29	137.90	482.63	
15	3.68	2.64	6.32	20.00	70.00	>10
	25.40	18.17	43.57	137.90	482.63	
16	1.95	2.89	4.84	20.00	70.00	>10
	13.45	19.90	33.35	137.90	482.63	
17	1.28	2.04	3.32	20.00	70.00	>10
	8.85	14.03	22.88	137.90	482.63	
18	0.99	1.47	2.46	20.00	70.00	>10
	6.86	10.12	16.98	137.90	482.63	
19	1.69	2.41	4.10	20.00	70.00	>10
	11.65	16.61	28.26	137.90	482.63	
20	2.15	3.25	5.40	20.00	70.00	>10
	14.84	22.39	37.23	137.90	482.63	
21	0.36	0.49	0.85	20.00	70.00	>10
	2.50	3.37	5.87	137.90	482.63	
22	1.37	0.86	2.23	20.00	70.00	>10
	9.42	5.94	15.35	137.90	482.63	

Min MS: 10.076, Location: 15, Combination: Pm+Pb

MARKUP

Table 2-153. Load Combination 350, Fire at 30 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 111, 201, 211
Fire at 30 Minutes, 1,475°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	1.10	1.85	20.00	66.30	>10
	5.16	7.60	12.75	137.90	457.12	
2	0.14	0.20	0.34	20.00	66.30	>10
	0.96	1.35	2.31	137.90	457.12	
3	0.08	0.08	0.16	20.00	66.30	>10
	0.58	0.54	1.12	137.90	457.12	
4	1.16	1.78	2.94	20.00	66.30	>10
	8.00	12.28	20.28	137.90	457.12	
5	1.18	1.00	2.18	20.00	66.30	>10
	8.17	6.88	15.05	137.90	457.12	
6	0.78	1.17	1.95	20.00	66.30	>10
	5.40	8.05	13.44	137.90	457.12	
7	0.34	0.07	0.40	20.00	66.30	>10
	2.34	0.45	2.79	137.90	457.12	
8	0.32	0.04	0.36	20.00	66.30	>10
	2.21	0.27	2.48	137.90	457.12	
9	0.36	0.07	0.43	20.00	66.30	>10
	2.48	0.48	2.97	137.90	457.12	
10	1.23	0.15	1.38	20.00	66.30	>10
	8.49	1.03	9.52	137.90	457.12	
11	0.93	1.23	2.17	20.00	66.30	>10
	6.44	8.51	14.95	137.90	457.12	
12	1.01	1.49	2.50	20.00	66.30	>10
	6.95	10.27	17.23	137.90	457.12	
13	1.19	1.05	2.24	20.00	66.30	>10
	8.21	7.23	15.44	137.90	457.12	

MARKUP

14	1.21	1.54	2.75	20.00	66.30	>10
	8.36	10.61	18.97	137.90	457.12	
15	1.70	1.94	3.64	20.00	66.30	>10
	11.69	13.38	25.07	137.90	457.12	
16	1.70	2.69	4.39	20.00	66.30	>10
	11.72	18.55	30.27	137.90	457.12	
17	1.12	1.79	2.90	20.00	66.30	>10
	7.71	12.31	20.02	137.90	457.12	
18	0.87	1.40	2.27	20.00	66.30	>10
	5.99	9.65	15.64	137.90	457.12	
19	1.46	2.17	3.63	20.00	66.30	>10
	10.09	14.96	25.05	137.90	457.12	
20	1.82	2.90	4.72	20.00	66.30	>10
	12.58	19.99	32.57	137.90	457.12	
21	0.32	0.44	0.76	20.00	66.30	>10
	2.24	3.00	5.24	137.90	457.12	
22	0.46	0.47	0.93	20.00	66.30	>10
	3.20	3.23	6.43	137.90	457.12	

Min MS: 13.034, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-154. Load Combination 351, Fire at 60 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 112, 201, 211
Fire at 60 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	1.10	1.85	20.00	66.30	>10
	5.16	7.60	12.75	137.90	457.12	
2	0.14	0.20	0.34	20.00	66.30	>10
	0.96	1.35	2.31	137.90	457.12	
3	0.08	0.08	0.16	20.00	66.30	>10
	0.58	0.54	1.12	137.90	457.12	
4	1.16	1.78	2.94	20.00	66.30	>10
	8.00	12.28	20.28	137.90	457.12	
5	1.18	1.00	2.18	20.00	66.30	>10
	8.17	6.88	15.05	137.90	457.12	
6	0.78	1.17	1.95	20.00	66.30	>10
	5.40	8.05	13.44	137.90	457.12	
7	0.34	0.07	0.40	20.00	66.30	>10
	2.34	0.45	2.79	137.90	457.12	
8	0.32	0.04	0.36	20.00	66.30	>10
	2.21	0.27	2.48	137.90	457.12	
9	0.36	0.07	0.43	20.00	66.30	>10
	2.48	0.48	2.97	137.90	457.12	
10	1.23	0.15	1.38	20.00	66.30	>10
	8.49	1.03	9.52	137.90	457.12	
11	0.93	1.23	2.17	20.00	66.30	>10
	6.44	8.51	14.95	137.90	457.12	
12	1.01	1.49	2.50	20.00	66.30	>10
	6.95	10.27	17.23	137.90	457.12	
13	1.19	1.05	2.24	20.00	66.30	>10
	8.21	7.23	15.44	137.90	457.12	

MARKUP

14	1.21	1.54	2.75	20.00	66.30	>10
	8.36	10.61	18.97	137.90	457.12	
15	1.70	1.94	3.64	20.00	66.30	>10
	11.69	13.38	25.07	137.90	457.12	
16	1.70	2.69	4.39	20.00	66.30	>10
	11.72	18.55	30.27	137.90	457.12	
17	1.12	1.79	2.90	20.00	66.30	>10
	7.71	12.31	20.02	137.90	457.12	
18	0.87	1.40	2.27	20.00	66.30	>10
	5.99	9.65	15.64	137.90	457.12	
19	1.46	2.17	3.63	20.00	66.30	>10
	10.09	14.96	25.05	137.90	457.12	
20	1.82	2.90	4.72	20.00	66.30	>10
	12.58	19.99	32.57	137.90	457.12	
21	0.32	0.44	0.76	20.00	66.30	>10
	2.24	3.00	5.24	137.90	457.12	
22	0.46	0.47	0.93	20.00	66.30	>10
	3.20	3.23	6.43	137.90	457.12	

Min MS: 13.034, Location: 20, Combination: Pm+Pb

MARKUP

Table 2-155. Load Combination 352, Fire at 90 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 113, 201, 211
Fire at 90 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	1.10	1.85	20.00	66.30	>10
	5.16	7.60	12.75	137.90	457.12	
2	0.14	0.20	0.34	20.00	66.30	>10
	0.96	1.35	2.31	137.90	457.12	
3	0.08	0.08	0.16	20.00	66.30	>10
	0.58	0.54	1.12	137.90	457.12	
4	1.16	1.78	2.94	20.00	66.30	>10
	8.00	12.28	20.28	137.90	457.12	
5	1.18	1.00	2.18	20.00	66.30	>10
	8.17	6.88	15.05	137.90	457.12	
6	0.78	1.17	1.95	20.00	66.30	>10
	5.40	8.05	13.44	137.90	457.12	
7	0.34	0.07	0.40	20.00	66.30	>10
	2.34	0.45	2.79	137.90	457.12	
8	0.32	0.04	0.36	20.00	66.30	>10
	2.21	0.27	2.48	137.90	457.12	
9	0.36	0.07	0.43	20.00	66.30	>10
	2.48	0.48	2.97	137.90	457.12	
10	1.23	0.15	1.38	20.00	66.30	>10
	8.49	1.03	9.52	137.90	457.12	
11	0.93	1.23	2.17	20.00	66.30	>10
	6.44	8.51	14.95	137.90	457.12	
12	1.01	1.49	2.50	20.00	66.30	>10
	6.95	10.27	17.23	137.90	457.12	
13	1.19	1.05	2.24	20.00	66.30	>10
	8.21	7.23	15.44	137.90	457.12	

MARKUP

14	1.21	1.54	2.75	20.00	66.30	>10
	8.36	10.61	18.97	137.90	457.12	
15	1.70	1.94	3.64	20.00	66.30	>10
	11.69	13.38	25.07	137.90	457.12	
16	1.70	2.69	4.39	20.00	66.30	>10
	11.72	18.55	30.27	137.90	457.12	
17	1.12	1.79	2.90	20.00	66.30	>10
	7.71	12.31	20.02	137.90	457.12	
18	0.87	1.40	2.27	20.00	66.30	>10
	5.99	9.65	15.64	137.90	457.12	
19	1.46	2.17	3.63	20.00	66.30	>10
	10.09	14.96	25.05	137.90	457.12	
20	1.82	2.90	4.72	20.00	66.30	>10
	12.58	19.99	32.57	137.90	457.12	
21	0.32	0.44	0.76	20.00	66.30	>10
	2.24	3.00	5.24	137.90	457.12	
22	0.46	0.47	0.93	20.00	66.30	>10
	3.20	3.23	6.43	137.90	457.12	

Min MS: 13.034, Location: 20, Combination: Pm+Pb

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Table 2-156. Load Combination 353, Fire at 120 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 114, 201, 211
Fire at 120 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	1.10	1.85	20.00	61.80	>10
	5.16	7.60	12.75	137.90	426.10	
2	0.14	0.20	0.34	20.00	66.30	>10
	0.96	1.35	2.31	137.90	457.12	
3	0.08	0.08	0.16	20.00	66.30	>10
	0.58	0.54	1.12	137.90	457.12	
4	1.16	1.78	2.94	20.00	61.80	>10
	8.00	12.28	20.28	137.90	426.10	
5	1.18	1.00	2.18	20.00	61.80	>10
	8.17	6.88	15.05	137.90	426.10	
6	0.78	1.17	1.95	20.00	61.80	>10
	5.40	8.05	13.44	137.90	426.10	
7	0.34	0.07	0.40	20.00	61.80	>10
	2.34	0.45	2.79	137.90	426.10	
8	0.32	0.04	0.36	20.00	61.80	>10
	2.21	0.27	2.48	137.90	426.10	
9	0.36	0.07	0.43	20.00	61.80	>10
	2.48	0.48	2.97	137.90	426.10	
10	1.23	0.15	1.38	20.00	66.30	>10
	8.49	1.03	9.52	137.90	457.12	
11	0.93	1.23	2.17	20.00	61.80	>10
	6.44	8.51	14.95	137.90	426.10	
12	1.01	1.49	2.50	20.00	61.80	>10
	6.95	10.27	17.23	137.90	426.10	
13	1.19	1.05	2.24	20.00	66.30	>10
	8.21	7.23	15.44	137.90	457.12	

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14	1.21	1.54	2.75	20.00	66.30	>10
	8.36	10.61	18.97	137.90	457.12	
15	1.70	1.94	3.64	20.00	61.80	>10
	11.69	13.38	25.07	137.90	426.10	
16	1.70	2.69	4.39	20.00	61.80	>10
	11.72	18.55	30.27	137.90	426.10	
17	1.12	1.79	2.90	20.00	61.80	>10
	7.71	12.31	20.02	137.90	426.10	
18	0.87	1.40	2.27	20.00	61.80	>10
	5.99	9.65	15.64	137.90	426.10	
19	1.46	2.17	3.63	20.00	61.80	>10
	10.09	14.96	25.05	137.90	426.10	
20	1.82	2.90	4.72	20.00	61.80	>10
	12.58	19.99	32.57	137.90	426.10	
21	0.32	0.44	0.76	20.00	66.30	>10
	2.24	3.00	5.24	137.90	457.12	
22	0.46	0.47	0.93	20.00	61.80	>10
	3.20	3.23	6.43	137.90	426.10	

Min MS: 12.082, Location: 20, Combination: Pm+Pb

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Table 2-157. Load Combination 354, Fire at 150 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 115, 201, 211
Fire at 150 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	1.10	1.85	20.00	66.30	>10
	5.16	7.60	12.75	137.90	457.12	
2	0.14	0.20	0.34	20.00	66.30	>10
	0.96	1.35	2.31	137.90	457.12	
3	0.08	0.08	0.16	20.00	66.30	>10
	0.58	0.54	1.12	137.90	457.12	
4	1.16	1.78	2.94	20.00	66.30	>10
	8.00	12.28	20.28	137.90	457.12	
5	1.18	1.00	2.18	20.00	66.30	>10
	8.17	6.88	15.05	137.90	457.12	
6	0.78	1.17	1.95	20.00	66.30	>10
	5.40	8.05	13.44	137.90	457.12	
7	0.34	0.07	0.40	20.00	66.30	>10
	2.34	0.45	2.79	137.90	457.12	
8	0.32	0.04	0.36	20.00	66.30	>10
	2.21	0.27	2.48	137.90	457.12	
9	0.36	0.07	0.43	20.00	66.30	>10
	2.48	0.48	2.97	137.90	457.12	
10	1.23	0.15	1.38	20.00	66.30	>10
	8.49	1.03	9.52	137.90	457.12	
11	0.93	1.23	2.17	20.00	66.30	>10
	6.44	8.51	14.95	137.90	457.12	
12	1.01	1.49	2.50	20.00	66.30	>10
	6.95	10.27	17.23	137.90	457.12	
13	1.19	1.05	2.24	20.00	66.30	>10
	8.21	7.23	15.44	137.90	457.12	

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14	1.21	1.54	2.75	20.00	66.30	>10
	8.36	10.61	18.97	137.90	457.12	
15	1.70	1.94	3.64	20.00	66.30	>10
	11.69	13.38	25.07	137.90	457.12	
16	1.70	2.69	4.39	20.00	66.30	>10
	11.72	18.55	30.27	137.90	457.12	
17	1.12	1.79	2.90	20.00	66.30	>10
	7.71	12.31	20.02	137.90	457.12	
18	0.87	1.40	2.27	20.00	66.30	>10
	5.99	9.65	15.64	137.90	457.12	
19	1.46	2.17	3.63	20.00	66.30	>10
	10.09	14.96	25.05	137.90	457.12	
20	1.82	2.90	4.72	20.00	61.80	>10
	12.58	19.99	32.57	137.90	426.10	
21	0.32	0.44	0.76	20.00	66.30	>10
	2.24	3.00	5.24	137.90	457.12	
22	0.46	0.47	0.93	20.00	66.30	>10
	3.20	3.23	6.43	137.90	457.12	

Min MS: 12.082, Location: 20, Combination: Pm+Pb

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Table 2-158. Load Combination 355, Fire at 180 Minutes, Hypothetical Accident Conditions of Transport – Model AOS-025

Load Cases: 116, 201, 211
Fire at 180 Minutes, 100°F, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 207 kPa (30 psia)
Fabrication Stress

	Stress (ksi/MPa)					
Loc	Pm	Pb	Pm+Pb	Sm	Su	MS
1	0.75	1.10	1.85	20.00	66.30	>10
	5.16	7.60	12.75	137.90	457.12	
2	0.14	0.20	0.34	20.00	66.30	>10
	0.96	1.35	2.31	137.90	457.12	
3	0.08	0.08	0.16	20.00	66.30	>10
	0.58	0.54	1.12	137.90	457.12	
4	1.16	1.78	2.94	20.00	66.30	>10
	8.00	12.28	20.28	137.90	457.12	
5	1.18	1.00	2.18	20.00	66.30	>10
	8.17	6.88	15.05	137.90	457.12	
6	0.78	1.17	1.95	20.00	66.30	>10
	5.40	8.05	13.44	137.90	457.12	
7	0.34	0.07	0.40	20.00	66.30	>10
	2.34	0.45	2.79	137.90	457.12	
8	0.32	0.04	0.36	20.00	66.30	>10
	2.21	0.27	2.48	137.90	457.12	
9	0.36	0.07	0.43	20.00	66.30	>10
	2.48	0.48	2.97	137.90	457.12	
10	1.23	0.15	1.38	20.00	66.30	>10
	8.49	1.03	9.52	137.90	457.12	
11	0.93	1.23	2.17	20.00	66.30	>10
	6.44	8.51	14.95	137.90	457.12	
12	1.01	1.49	2.50	20.00	66.30	>10
	6.95	10.27	17.23	137.90	457.12	
13	1.19	1.05	2.24	20.00	66.30	>10
	8.21	7.23	15.44	137.90	457.12	

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14	1.21	1.54	2.75	20.00	66.30	>10
	8.36	10.61	18.97	137.90	457.12	
15	1.70	1.94	3.64	20.00	66.30	>10
	11.69	13.38	25.07	137.90	457.12	
16	1.70	2.69	4.39	20.00	66.30	>10
	11.72	18.55	30.27	137.90	457.12	
17	1.12	1.79	2.90	20.00	66.30	>10
	7.71	12.31	20.02	137.90	457.12	
18	0.87	1.40	2.27	20.00	66.30	>10
	5.99	9.65	15.64	137.90	457.12	
19	1.46	2.17	3.63	20.00	66.30	>10
	10.09	14.96	25.05	137.90	457.12	
20	1.82	2.90	4.72	20.00	66.30	>10
	12.58	19.99	32.57	137.90	457.12	
21	0.32	0.44	0.76	20.00	66.30	>10
	2.24	3.00	5.24	137.90	457.12	
22	0.46	0.47	0.93	20.00	66.30	>10
	3.20	3.23	6.43	137.90	457.12	

Min MS: 13.034, Location: 20, Combination: Pm+Pb

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2.10.1.3 Minimum Margins of Safety – Model AOS-025

Table 2-159 and Table 2-160 list the Model AOS-025 transport package Minimum Margins of Safety (Min MS), for Normal and Hypothetical Accident conditions of transport, respectively.

Table 2-159. Min MS for Normal Conditions of Transport – Model AOS-025

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
101	101 201 211 0 0	5.350E+00	20	Pm+Pb
102	104 201 211 0 0	2.262E+00	5	Pm+Pb+Q
103	103 201 211 0 0	2.884E+00	5	Pm+Pb+Q
104	101 201 202 211 0	2.752E+00	20	Pm+Pb
105	105 201 202 211 0	2.752E+00	20	Pm+Pb
106	101 201 203 211 0	2.698E+00	16	Pm+Pb
107	105 201 203 211 0	2.698E+00	16	Pm+Pb
215	215 101 201 211 0	5.192E+00	20	Pm+Pb
216	216 101 201 211 0	3.252E+00	15	Pm+Pb
217	216 104 201 211 0	2.216E+00	5	Pm+Pb+Q
221	221 101 201 211 0	5.334E+00	20	Pm+Pb
222	222 101 201 211 0	5.292E+00	20	Pm+Pb
223	223 101 201 211 0	5.235E+00	20	Pm+Pb
231	231 102 201 211 0	3.208E+00	4	Pm+Pb
232	232 102 201 211 0	2.649E+00	4	Pm+Pb

Table 2-160. Min MS for Hypothetical Accident Conditions of Transport – Model AOS-025

Ld_Cmb	Load_Cases	Min MS	Loc	Str_Cmb
301	301 102 201 211 0	2.809E+00	4	Pm+Pb
302	302 102 201 211 0	3.509E+00	1	Pm
303	303 102 201 211 0	3.510E+00	3	Pm
304	304 105 202 211 0	2.082E+00	4	Pm+Pb
305	305 105 202 211 0	9.317E+00	1	Pm+Pb
306	306 105 202 211 0	6.442E+00	1	Pm
310	204 101 211 0 0	1.201E+00	4	Pm+Pb
311	311 101 201 211 0	1.008E+01	15	Pm+Pb
312	311 104 201 211 0	1.008E+01	15	Pm+Pb
350	111 201 211 0 0	1.303E+01	20	Pm+Pb
351	112 201 211 0 0	1.303E+01	20	Pm+Pb
352	113 201 211 0 0	1.303E+01	20	Pm+Pb
353	114 201 211 0 0	1.208E+01	20	Pm+Pb
354	115 201 211 0 0	1.208E+01	20	Pm+Pb
355	116 201 211 0 0	1.303E+01	20	Pm+Pb

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2.10.1.4 Free Drop – Model AOS-025

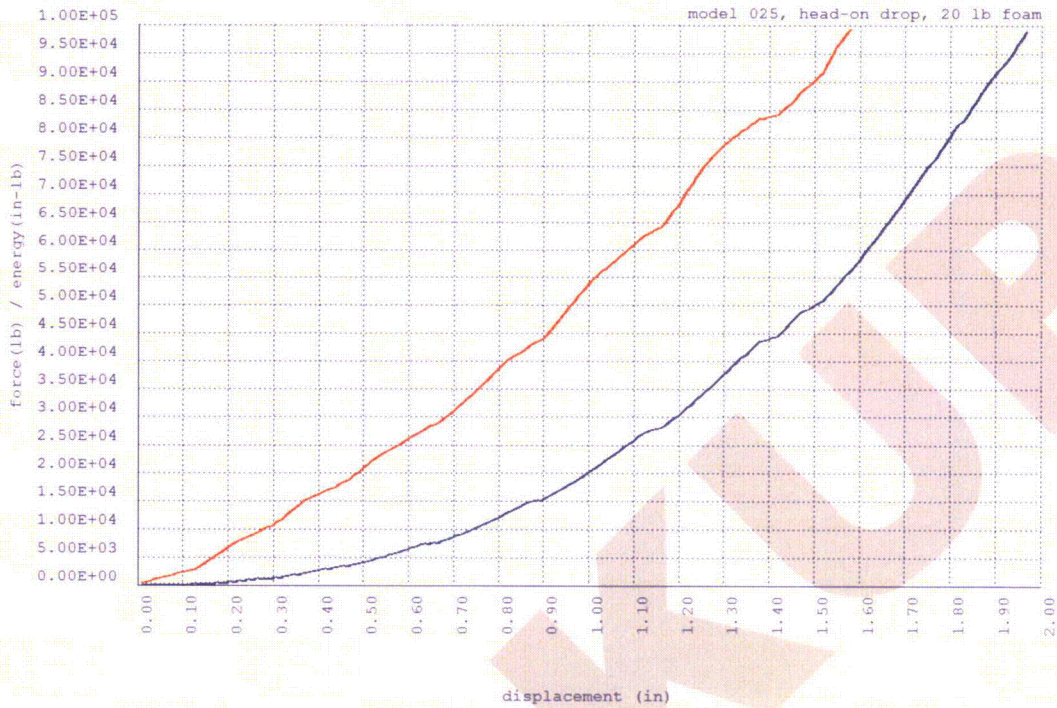

Figure 2-40. Head-On Drop Force and Energy, 20-lb. Foam – Model AOS-025

Figure 2-41. Side Drop Force and Energy, 20-lb. Foam – Model AOS-025

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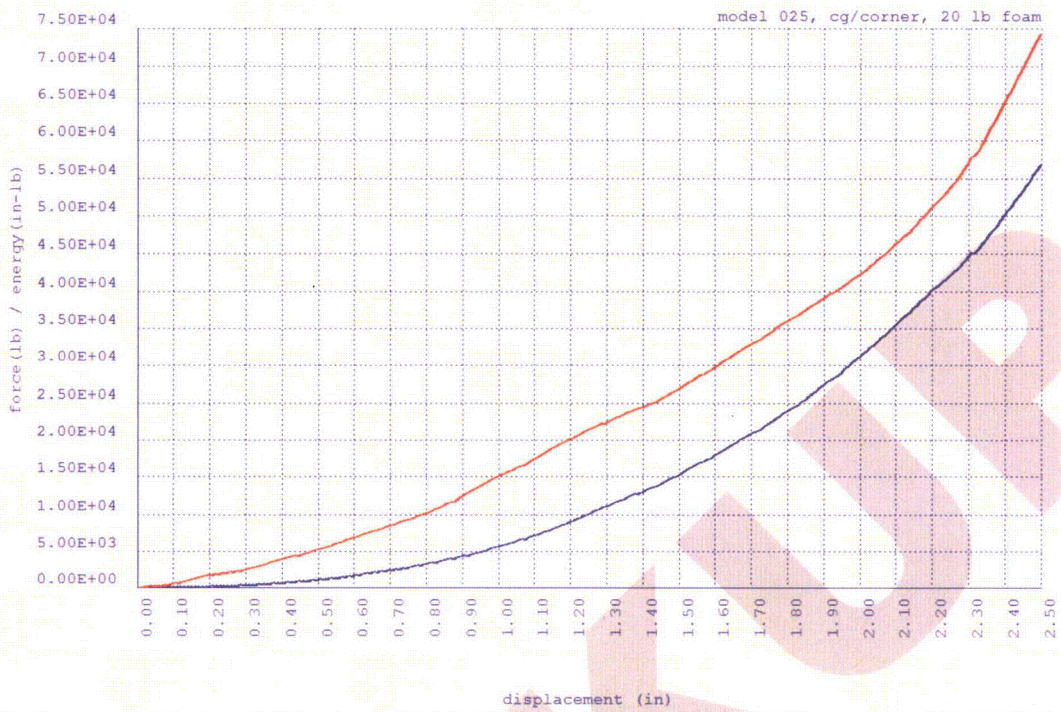

Figure 2-42. Cg/Corner Drop Force and Energy, 20-lb. Foam – Model AOS-025

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2.10.2 Model AOS-050 Transport Package

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

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

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

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

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

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

Load Case	Description	Data
101	100°F Ambient, Maximum Decay Heat	Table 2-163
102	100°F Ambient, Maximum Decay Heat, Maximum Insolation	Table 2-164
103	-20°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-165
104	-40°F Ambient, Zero Decay Heat, Zero Insolation	Table 2-166
105	-40°F Ambient, Maximum Decay Heat	Table 2-167
106	-20°F Ambient, Maximum Decay Heat	Table 2-168
201	Maximum Internal Pressure, 414 kPa (60 psia)	Table 2-169
202	Minimum External Pressure, 24 kPa (3.5 psia)	Table 2-170
203	Maximum Increased External Pressure, 140 kPa (20 psia)	Table 2-171
204	Additional Increased External Pressure, 2 MPa (290 psia)	Table 2-172
211	Fabrication Stress	Table 2-173
215	Compression Load (5x weight)	Table 2-174
216	Rod Drop onto Cask	Table 2-175
221	Forward 5g Vibration Inertia Load	Table 2-176
222	Lateral 5g Vibration Inertia Load	Table 2-177
223	Vertical 10g Vibration Inertia Load	Table 2-178
231	4-ft. Head-On Drop	Table 2-179
232	I30-ft. Head-On Drop Impact Test, Normal Conditions	Table 2-180

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

Load Combination	Load Cases	Description	Data
101	102, 201, 211	Hot Environment	Table 2-181
102	104, 201, 211	Cold Environment	Table 2-182
103	103, 201, 211	Increased External Pressure	Table 2-183
104	101, 201, 202, 211	Minimum External Pressure	Table 2-184
105	105, 201, 202, 211	Cold Environment with Maximum Decay Heat	Table 2-185
106	101, 201, 203, 211	Maximum Pressure, Hot Environment	Table 2-186
107	105, 201, 203, 211	Maximum Pressure, Cold Environment	Table 2-187
215	215, 101, 201, 211	Compression Load	Table 2-188
216	216, 101, 201, 211	Rod Drop	Table 2-189
217	216, 104, 201, 211	Rod Drop, Cold Environment	Table 2-190
221	221, 101, 201, 211	Forward Vibration	Table 2-191
222	222, 101, 201, 211	Lateral Vibration	Table 2-192
223	223, 101, 201, 211	Vertical Vibration	Table 2-193
231	231, 102, 201, 211	4-ft. Head-On Drop, Normal Conditions	Table 2-194
232	232, 102, 201, 211	30-ft. Head-On Drop, Normal Conditions (Impact Test)	Table 2-195

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

Stress (psi/MPa)

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

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

Allowable Stress for Load Case 101

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

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

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

WATERMARK

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

Allowable Stress for Load Case 102

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

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

Stress (psi/MPa)

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

WATERMARK

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

Allowable Stress for Load Case 103

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

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

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

WAIVER

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

Allowable Stress for Load Case 104

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

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

Stress (psi/MPa)

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

WATERMARK

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

Allowable Stress for Load Case 105

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

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

Stress (psi/MPa)

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

MAGNASTOR

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

Allowable Stress for Load Case 106

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

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

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

WAIVER

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

MARKUP

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

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

WATERMARK

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

MARKUP

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

Stress (psi/MPa)

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

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

MARKUP

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

Stress (psi/MPa)

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

MARS Draft

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

MARKUP

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

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

WATERMARK

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

MARKUP

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

Stress (psi/MPa)

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

MARKED FOR

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

MARKUP

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

Stress (psi/MPa)

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

MARS DRAFT

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

MARKUP

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

Stress (psi/MPa)

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

MARSHALL

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

MARKUP

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

Stress (psi/MPa)

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

WATERMARK

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

MARKUP

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

Stress (psi/MPa)

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

WORKING DRAFT

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

MARKUP

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

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

WAIVER

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

MARKUP

Table 2-180. Load Case 232, l30-ft. Head-On Drop Impact Test, Normal Conditions, Normal Conditions of Transport – Model AOS-050

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

WATERMARK

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

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

	Stress (ksi/MPa)							
Loc	Pm	Pb	Q	Pm+Pb	Pm+Pb+Q	Sm	Su	MS
1	1.19	1.70	0.15	2.90	3.04	20.00	70.00	9.36
	8.23	11.73	1.01	19.97	20.97	137.90	482.63	
2	0.08	0.05	0.21	0.13	0.34	20.00	70.00	>10
	0.53	0.37	1.47	0.90	2.37	137.90	482.63	
3	0.04	0.01	0.15	0.05	0.20	20.00	70.00	>10
	0.24	0.09	1.05	0.33	1.39	137.90	482.63	
4	1.71	2.69	1.20	4.40	5.60	20.00	70.00	5.82
	11.78	18.56	8.26	30.33	38.59	137.90	482.63	
5	1.65	2.53	1.08	4.18	5.26	20.00	70.00	6.18
	11.36	17.47	7.44	28.83	36.27	137.90	482.63	
6	0.61	1.02	0.57	1.63	2.20	20.00	70.00	>10
	4.21	7.03	3.95	11.24	15.19	137.90	482.63	
7	0.34	0.00	0.18	0.34	0.52	20.00	70.00	>10
	2.35	0.01	1.25	2.36	3.61	137.90	482.63	
8	0.34	0.00	0.18	0.34	0.52	20.00	70.00	>10
	2.35	0.00	1.22	2.35	3.57	137.90	482.63	
9	0.34	0.00	0.18	0.34	0.52	20.00	70.00	>10
	2.35	0.01	1.24	2.36	3.60	137.90	482.63	
10	0.49	0.21	0.63	0.71	1.33	20.00	70.00	>10
	3.40	1.48	4.31	4.88	9.19	137.90	482.63	
11	0.27	0.16	0.54	0.43	0.97	20.00	70.00	>10
	1.85	1.12	3.74	2.97	6.71	137.90	482.63	
12	0.23	0.11	0.75	0.34	1.09	20.00	70.00	>10
	1.61	0.76	5.15	2.37	7.52	137.90	482.63	
13	0.82	0.89	0.60	1.71	2.31	20.00	70.00	>10
	5.65	6.15	4.15	11.81	15.95	137.90	482.63	

WATERMARK

14	0.81	0.64	0.48	1.45	1.94	20.00	70.00	>10
	5.58	4.45	3.33	10.03	13.36	137.90	482.63	
15	1.35	0.65	1.78	2.00	3.79	20.00	70.00	>10
	9.34	4.46	12.30	13.80	26.10	137.90	482.63	
16	0.36	0.47	0.63	0.83	1.47	20.00	70.00	>10
	2.51	3.23	4.37	5.74	10.11	137.90	482.63	
17	0.28	0.35	0.37	0.63	1.00	20.00	70.00	>10
	1.95	2.40	2.55	4.36	6.91	137.90	482.63	
18	0.51	0.81	0.12	1.33	1.45	20.00	70.00	>10
	3.53	5.62	0.85	9.15	10.00	137.90	482.63	
19	0.74	0.97	0.21	1.71	1.92	20.00	70.00	>10
	5.13	6.65	1.43	11.78	13.21	137.90	482.63	
20	0.73	1.01	0.34	1.74	2.09	20.00	70.00	>10
	5.04	6.97	2.38	12.01	14.39	137.90	482.63	
21	0.17	0.29	0.03	0.46	0.49	20.00	70.00	>10
	1.19	1.98	0.22	3.17	3.39	137.90	482.63	
22	0.72	0.36	0.09	1.08	1.17	20.00	70.00	>10
	4.97	2.48	0.59	7.46	8.05	137.90	482.63	

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

MARKUP

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

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

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

WATERMARK

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

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

MARKUP

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

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

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

WATERMARK

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

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

MARKUP

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

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

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

WATERMARK

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

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

MARKUP

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

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

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

WORKING COPY

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

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

MARKUP

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

Load Cases: 101, 201, 203, 211
100°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Maximum 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	1.20	1.70	0.16	2.90	3.06	20.00	70.00	9.33
	8.29	11.74	1.10	20.02	21.12	137.90	482.63	
2	0.09	0.05	0.21	0.14	0.35	20.00	70.00	>10
	0.59	0.37	1.47	0.96	2.43	137.90	482.63	
3	0.04	0.02	0.15	0.06	0.21	20.00	70.00	>10
	0.30	0.11	1.05	0.41	1.47	137.90	482.63	
4	1.95	3.12	1.01	5.07	6.08	20.00	70.00	4.92
	13.42	21.53	6.96	34.95	41.91	137.90	482.63	
5	1.90	2.90	1.13	4.81	5.94	20.00	70.00	5.24
	13.12	20.01	7.81	33.14	40.94	137.90	482.63	
6	0.71	1.19	0.50	1.90	2.40	20.00	70.00	>10
	4.91	8.20	3.43	13.10	16.53	137.90	482.63	
7	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.01	1.05	2.81	3.86	137.90	482.63	
8	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.00	1.05	2.80	3.85	137.90	482.63	
9	0.41	0.00	0.15	0.41	0.56	20.00	70.00	>10
	2.80	0.02	1.04	2.81	3.85	137.90	482.63	
10	0.56	0.22	0.28	0.78	1.06	20.00	70.00	>10
	3.88	1.51	1.91	5.39	7.30	137.90	482.63	
11	0.30	0.17	0.32	0.47	0.79	20.00	70.00	>10
	2.05	1.20	2.20	3.25	5.45	137.90	482.63	
12	0.34	0.25	0.48	0.59	1.06	20.00	70.00	>10
	2.37	1.70	3.28	4.06	7.34	137.90	482.63	

WAIVER

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

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

MARKUP

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

Load Cases: 105, 201, 203, 211
-40°F Ambient, Maximum Decay Heat
Maximum Internal Pressure, 414 kPa (60 psia)
Maximum 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	1.20	1.70	0.18	2.90	3.08	20.00	70.00	9.33
	8.29	11.74	1.22	20.02	21.24	137.90	482.63	
2	0.09	0.05	0.23	0.14	0.37	20.00	70.00	>10
	0.59	0.37	1.60	0.96	2.56	137.90	482.63	
3	0.04	0.02	0.17	0.06	0.23	20.00	70.00	>10
	0.30	0.11	1.15	0.41	1.56	137.90	482.63	
4	1.95	3.12	0.41	5.07	5.48	20.00	70.00	4.92
	13.42	21.53	2.82	34.95	37.77	137.90	482.63	
5	1.90	2.90	0.45	4.81	5.25	20.00	70.00	5.24
	13.12	20.01	3.08	33.14	36.22	137.90	482.63	
6	0.71	1.19	0.31	1.90	2.21	20.00	70.00	>10
	4.91	8.20	2.13	13.10	15.23	137.90	482.63	
7	0.41	0.00	0.13	0.41	0.54	20.00	70.00	>10
	2.80	0.01	0.92	2.81	3.73	137.90	482.63	
8	0.41	0.00	0.14	0.41	0.54	20.00	70.00	>10
	2.80	0.00	0.94	2.80	3.74	137.90	482.63	
9	0.41	0.00	0.13	0.41	0.54	20.00	70.00	>10
	2.80	0.02	0.92	2.81	3.73	137.90	482.63	
10	0.56	0.22	0.46	0.78	1.24	20.00	70.00	>10
	3.88	1.51	3.18	5.39	8.57	137.90	482.63	
11	0.30	0.17	0.34	0.47	0.81	20.00	70.00	>10
	2.05	1.20	2.34	3.25	5.58	137.90	482.63	
12	0.34	0.25	0.48	0.59	1.07	20.00	70.00	>10
	2.37	1.70	3.33	4.06	7.40	137.90	482.63	

WATERMARK

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

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

MARKUP

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

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

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

WARMUP

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

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

MARKUP

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

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

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

WATERMARK

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

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

MARKUP

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

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

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

MARKUP

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

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

MARKUP

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

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

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

MARKUP

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

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

MARKUP

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

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

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

WORKING UP

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

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

MARKUP

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

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

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

WATERMARK

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

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

MARKUP

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

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

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

WORKING UP

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

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

MARKUP

Table 2-195. Load Combination 232, 30-ft. Head-On Drop, Normal Conditions (Impact Test), Normal Conditions of Transport – Model AOS-050

Load Cases: 232, 102, 201, 211
I30-ft. Head-On Drop Impact Test, Normal Conditions
100°F Ambient, Maximum Decay Heat, Maximum Insolation
Maximum Internal Pressure, 414 kPa (60 psia)
Fabrication Stress

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

WATERMARK

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

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

MARKUP