

1.0 OBJECTIVE

Perform the structural analyses of the *EnergySolutions* 8-120B Cask under fire accident test conditions, using a 3-dimensional finite element model.

2.0 INTRODUCTION

EnergySolutions 8-120B Cask (Reference 1) is designed as a Type B radioactive-material shipping package. To be certified by the U.S.N.R.C., the cask needs to meet the requirements of 10 CFR 71 (Reference 2) and follow the guidelines of U.S.N.R.C. Regulatory Guide 7.8 (Ref. 3).

This document presents the structural analysis of the 8-120B Cask for the hypothetical accident condition (HAC) fire test. The analyses in this document are performed using the finite element modeling techniques. A three-dimensional model of the cask that includes all its major components has been employed in the analyses. Temperature dependent material properties of the major components of the cask are used in the analyses.

The results of the analyses for various time instants during the fire test are presented pictorially in stress intensity contour plots as well as digital data format.

3.0 REFERENCES

1. *EnergySolutions* Drawing No. C-110-E-0007, Rev.14, 8-120B Shipping Cask.
2. Code of Federal Regulations, Title 10, Part 71, Packaging and Transportation of Radioactive Material, January 2003.
3. U.S. NRC Regulatory Guide 7.8, Revision 1, March 1989, Load Combinations for the Structural Analysis of Shipping Casks for Radioactive Material.
4. ASME Boiler & Pressure Vessel Code, Section II, Part D, Materials, The American Society of Mechanical Engineers, New York, NY, 2001.
5. NUREG 0481/SAND77-1872, An Assessment of Stress-Strain Data Suitable for Finite Element Elastic-Plastic Analysis of Shipping Containers, Sandia National Laboratories, 1978.
6. U.S. NRC Regulatory Guide 7.6, Revision 1, Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels, 1978.
7. ANSYS, Release 12.1, ANSYS Inc., Canonsburg, PA, 2009.
8. Energy Solutions Document No. ST-608, Rev. 0, 3-60B Cask ANSYS Finite Element Model Grid Convergence Study.
9. *EnergySolutions* Document TH-028, Rev.0, Hypothetical Fire Accident Thermal Analyses of the 8-120B Cask.

4.0 MATERIAL PROPERTIES

Material	Temp. (°F)	Strength (ksi)			Young's Modulus (10 ⁶ psi)	Coefficient of Thermal Expansion (10 ⁻⁶ in/in)
		Yield (S _y)	Ultimate (S _u)	Membrane Allowable (S _m)		
ASTM A240 Type 304L		(1)	(1)	(1)	(1)	(1)
	-20	25.0	70.0	16.7	28.8	-
	70	25.0	70.0	16.7	28.3	8.5
	100	25.0	70.0	16.7	-	8.6
	200	21.4	66.1	16.7	27.5	8.9
	300	19.2	61.2	16.7	27.0	9.2
	400	17.5	58.7	15.8	26.4	9.5
	500	16.4	57.5	14.7	25.9	9.7
ASTM A516 Gr. 70 Steel		(1)	(1)	(1)	(1)	(1)
	-20	38.0	70.0	20.0	30.3	-
	70	38.0	70.0	20.0	29.4	6.4
	100	38.0	70.0	20.0	-	6.5
	200	34.8	70.0	20.0	28.8	6.7
	300	33.6	70.0	20.0	28.3	6.9
	400	32.5	70.0	20.0	27.9	7.1
	500	31.0	70.0	20.0	27.3	7.3
ASTM A354 Gr. BD (Lid Bolts)		(1)	(1)	(1)	(1)	(1)
	-20	130	150	30	29.7	-
	70	130	150	30	29.2	6.4
	100	130	150	30	-	6.5
	200	119.1	150	30	28.6	6.7
	300	115	150	30	28.1	6.9
	400	111	150	30	27.7	7.1
	500	105.9	150	30	27.1	7.3
ASTM B29 Lead		(2)			(2)	(2)
	-20	-	-	-	2.43	15.65
	70	5	-	-	2.27	16.06
	100	-	-	-	2.21	16.22
	200	-	-	-	2.01	16.70
	300	-	-	-	1.85	17.33
	400	-	-	-	1.70	18.16
	500	-	-	-	1.52	19.12

Notes:

- (1) From ASME B&PV Code 2001, Section II, Part D (Reference 4).
(2) From NUREG/CR 0481 (Reference 5)

5.0 ALLOWABLE STRESSES

Material →		ASTM A240 Type 304L	ASTM A516 Gr. 70	ASTM A354 Gr. BD
Yield Stress, S_y	(psi)	25,000 ⁽¹⁾	38,000 ⁽¹⁾	130,000 ⁽¹⁾
Ultimate Stress, S_u	(psi)	70,000 ⁽¹⁾	70,000 ⁽¹⁾	150,000 ⁽¹⁾
Design Stress Intensity, S_m	(psi)	16,700 ⁽¹⁾	20,000 ⁽¹⁾	30,000 ⁽¹⁾
Hypothetical Accident Conditions	Membrane Stress	40,080 ⁽²⁾	48,000 ⁽²⁾	105,000 ⁽³⁾
	Mem. + Bending Stress	60,120 ⁽²⁾	70,000 ⁽²⁾	150,000 ⁽³⁾

Notes:

- (1) From ASME B&PV Code 2001, Section II, Part D (Reference 4).
- (2) Established from Regulatory Guide 7.6 (Reference 6), Position 6.
- (3) Regulatory Guide 7.6 (Reference 6) does not provide any criteria. ASME B&PV Code, Section III, Appendix F has been used to establish these criteria.

6.0 MODEL DESCRIPTION

The structural analyses of the 8-120B Cask under HAC fire test have been performed using finite element modeling techniques. ANSYS finite element analysis code (Reference 7) has been employed to perform the analyses. Since at least one plane of symmetry exists, a 180° model has been employed in all the analyses. Therefore, a one-half model of the cask is made using 3-dimensional 8-node structural solid elements (ANSYS SOLID185) to represent the major components of the cask, the cask body, the lid, and the bolts. The shell components of the cask - the inner and outer shells, and the baseplates have been represented in the finite element model by SOLSH190 elements.

The fire shield does not provide any structural strength to the cask. Therefore, it is not included in the model.

The poured lead in the body is not bonded to the steel. It is free to slide over the steel surface. Therefore, the interface between the lead and the steel is modeled by pairs of 3-d 8 node contact element (CONTA174) and 3-d target segment (TARGE170) elements. These elements allow the lead to slide over the steel at the same time prevent it from penetrating the steel surface. The interface between the two plates that form the lid is also modeled by the contact-target pairs. The transition from a coarser mesh to a finer mesh, as well as bondage between various parts of the model, is also modeled using these elements.

Figure 1 shows the outline of the model depicting the material numbering. Figure 2 shows partial finite element grid of the lid, seal plate, bolts and the cask. Figure 3 shows the finite element grid of the cask body without the lead and Figure 4 shows that of the lead. The interface between various components of the cask is modeled by target-contact surface

definition. Figure 5 shows target surfaces of various contact-target pairs. The printout of the pertinent model quantities is included in Appendix 1.

Boundary Conditions

For the analyses of the 8-120B Cask under various NCT loading cases, it is assumed that the cask is resting on the upper impact limiter in the vertical orientation, because in this orientation the payload applies deadweight loading, in addition to the internal pressure loading on the lid closure, which is the most vulnerable part of the cask. The model is conservatively restrained in the vertical direction at the skirt instead of the entire bearing surface of the upper impact limiter. Since the model of the cask includes 180° geometry, symmetry boundary conditions are used on the cut-plane of the model in all the analyses.

Modeling Technique Validation and Grid Convergence Study

The finite element modeling techniques used in the 8-120B Cask have been previously used in the 3-60B cask analyses. A comprehensive modeling technique validation and the grid convergence study had been performed in Reference 8. The solid element types, grid size and the use of contact elements for modeling the interfaces used in the 8-120B Cask analyses are similar to those in the 3-60B Cask analyses. Therefore, the modeling technique validation and the grid convergence/sensitivity results provided in Reference 8 are also applicable to the 8-120B Cask finite element models used in the current analyses.

Loading

The loading on the model include the following, as applicable.

Deadweight

The deadweight of the cask is included in the analyses as the body load in the finite element model subjected to the acceleration due to gravity. The deadweight of the lower impact limiter is included as the uniform pressure on the surface where the impact limiter contacts the cask. The deadweight of the payload is included as the uniform pressure on the lid inside surface.

Mass of each Impact Limiter = 4,860 lb

Inside Radius of the Impact Limiter = 25.0 in

Outside Radius of the Cask = 36.6 in

Pressure on the cask due to impact limiter weight,

$$p_{ILL} = 4,860 / [\pi \times (36.6^2 - 25.0^2)] = 2.17 \text{ psi}$$

Payload Mass = 14,680 lb

Lid Radius = 30.9 in

Pressure on the lid surface due to payload weight,

$$p_{lid} = 14,680 / (\pi \times 30.9^2) = 4.90 \text{ psi}$$

Because of the segmentation of arc length in the finite element models, the mass of the model is always lower than the actual mass. To account for this, as well as to include the mass of

miscellaneous items not included in the model, an adjustment is made in the value of acceleration due to gravity.

$$\text{Cask Body Mass} = 74,000 - 14,680 - 2 \times 4,860 = 49,600 \text{ lb}$$

$$\text{Mass of the FEM} = 2 \times 23,938 = 47,876 \text{ lb}$$

$$\text{Use acceleration due to gravity} = 49,600/47,876 = 1.03g$$

Internal Pressure

The cask internal pressure under various HAC fire test (155 psig) is applied as the uniform pressure over the nodes representing the cavity of the cask (Figure 6). Combination of pressure and thermal loads are per the load combinations of Reference 3.

Temperature

The temperature distribution at various time instants during the fire test is obtained from the thermal analyses performed in Reference 9 and is applied as the nodal temperature in the finite element model. Figures 7 through 13 show the temperature profile in the cask body at various time instants during the fire test.

7.0 RESULTS

The results obtained from various load case analyses include displacements and stress intensities at the nodal points of the finite element model. The total printout from all the load cases is included in Appendix 2. Stress intensity contour plots are presented in Figures 14 through 20. The stress intensities in various components of the 8-120B Cask under these loading conditions are tabulated in Tables 1 through 7. It should be noted that the maximum stress intensities obtained from the finite element models are peak stresses, as classified by the ASME code. However, these stress intensities are reported as membrane + bending stress intensities and compared with the corresponding allowable values.

The results of the analyses show that the stresses everywhere in the cask body during the fire test are well within the allowable values.

8.0 ANSYS PRINTOUT AND DATA FILES

The printout of the important data from the program is included with this document in electronic form as Appendix 1. The electronic data of the input, output and other files is included in Appendix 2.

9.0 APPENDICES

Appendix 1 Print-out of the ANSYS model data input

Appendix 2 Electronic data on CDROM

Title Structural Analyses of the 8-120B Cask Under Hypothetical Fire Accident Conditions

Calc. No. ST-637

Rev. 0

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Tables

(7 Pages)

Title	Structural Analyses of the 8-120B Cask Under HAC Fire Conditions			
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Table 1

Stress Intensities in 8-120B Cask HAC Fire (t = 0.1 sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	15,072	4.64
Secondary Lid	$P_m + P_b$	70,000	7,907	8.85
Bolting Ring	$P_m + P_b$	70,000	19,002	3.68
Inner Shell	$P_m + P_b$	70,000	13,319	5.26
Outer Shell	$P_m + P_b$	70,000	15,389	4.55
Baseplate	$P_m + P_b$	70,000	8,941	7.83
Primary Lid Bolts	$P_m + P_b$	150,000	24,876	6.03
Secondary Lid Bolts	$P_m + P_b$	150,000	14,870	10.09

See Figure 7 for temperature distribution in the cask body and Figure 14 for stress intensity contour plot.

Notes:

- (1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.
- (2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

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Table 2

Stress Intensities in 8-120B Cask HAC Fire ($t = 1,800.3$ sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	15,179	4.61
Secondary Lid	$P_m + P_b$	70,000	7,813	8.96
Bolting Ring	$P_m + P_b$	70,000	35,247	1.99
Inner Shell	$P_m + P_b$	70,000	25,958	2.70
Outer Shell	$P_m + P_b$	70,000	33,165	2.11
Baseplate	$P_m + P_b$	70,000	15,951	4.39
Primary Lid Bolts	$P_m + P_b$	150,000	45,904	3.27
Secondary Lid Bolts	$P_m + P_b$	150,000	14,691	10.21

See Figure 8 for temperature distribution in the cask body and Figure 15 for stress intensity contour plot.

Notes:

- (1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.
- (2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

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Table 3

Stress Intensities in 8-120B Cask HAC Fire (t = 1,810 sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	15,195	4.61
Secondary Lid	$P_m + P_b$	70,000	7,819	8.95
Bolting Ring	$P_m + P_b$	70,000	35,452	1.97
Inner Shell	$P_m + P_b$	70,000	25,929	2.70
Outer Shell	$P_m + P_b$	70,000	33,351	2.10
Baseplate	$P_m + P_b$	70,000	16,007	4.37
Primary Lid Bolts	$P_m + P_b$	150,000	45,600	3.29
Secondary Lid Bolts	$P_m + P_b$	150,000	14,702	10.20

See Figure 9 for temperature distribution in the cask body and Figure 16 for stress intensity contour plot.

Notes:

(1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.

(2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

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Table 4

Stress Intensities in 8-120B Cask HAC Fire (t = 5,000 sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	19,735	3.55
Secondary Lid	$P_m + P_b$	70,000	8,781	7.97
Bolting Ring	$P_m + P_b$	70,000	40,535	1.73
Inner Shell	$P_m + P_b$	70,000	26,802	2.61
Outer Shell	$P_m + P_b$	70,000	36,692	1.91
Baseplate	$P_m + P_b$	70,000	18,332	3.82
Primary Lid Bolts	$P_m + P_b$	150,000	26,018	5.77
Secondary Lid Bolts	$P_m + P_b$	150,000	16,357	9.17

See Figure 10 for temperature distribution in the cask body and Figure 17 for stress intensity contour plot.

Notes:

- (1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.
- (2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

Title	Structural Analyses of the 8-120B Cask Under HAC Fire Conditions			
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Table 5

Stress Intensities in 8-120B Cask HAC Fire (t = 7,500 sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	20,391	3.43
Secondary Lid	$P_m + P_b$	70,000	8,731	8.02
Bolting Ring	$P_m + P_b$	70,000	38,116	1.84
Inner Shell	$P_m + P_b$	70,000	25,853	2.71
Outer Shell	$P_m + P_b$	70,000	33,975	2.06
Baseplate	$P_m + P_b$	70,000	17,808	3.93
Primary Lid Bolts	$P_m + P_b$	150,000	24,778	6.05
Secondary Lid Bolts	$P_m + P_b$	150,000	16,075	9.33

See Figure 11 for temperature distribution in the cask body and Figure 18 for stress intensity contour plot.

Notes:

- (1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.
- (2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

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Table 6

Stress Intensities in 8-120B Cask HAC Fire (t = 12,500 sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	19,555	3.58
Secondary Lid	$P_m + P_b$	70,000	8,372	8.36
Bolting Ring	$P_m + P_b$	70,000	34,972	2.00
Inner Shell	$P_m + P_b$	70,000	24,204	2.89
Outer Shell	$P_m + P_b$	70,000	30,651	2.28
Baseplate	$P_m + P_b$	70,000	16,895	4.14
Primary Lid Bolts	$P_m + P_b$	150,000	23,027	6.51
Secondary Lid Bolts	$P_m + P_b$	150,000	15,334	9.78

See Figure 12 for temperature distribution in the cask body and Figure 19 for stress intensity contour plot.

Notes:

- (1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.
- (2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

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Table 7

Stress Intensities in 8-120B Cask HAC Fire (t = 22,500 sec)

Component	Stress Category	Allowable S.I. (psi)	Calculated S.I. ⁽¹⁾ (psi)	F.S. ⁽²⁾
Primary Lid	$P_m + P_b$	70,000	17,421	4.02
Secondary Lid	$P_m + P_b$	70,000	8,074	8.67
Bolting Ring	$P_m + P_b$	70,000	31,217	2.24
Inner Shell	$P_m + P_b$	70,000	22,070	3.17
Outer Shell	$P_m + P_b$	70,000	26,766	2.62
Baseplate	$P_m + P_b$	70,000	15,707	4.46
Primary Lid Bolts	$P_m + P_b$	150,000	20,864	7.19
Secondary Lid Bolts	$P_m + P_b$	150,000	14,942	10.04

See Figure 13 for temperature distribution in the cask body and Figure 20 for stress intensity contour plot.

Notes:

- (1) Unless otherwise indicated in this column, the maximum stress intensity values, obtained from the finite element model, have been conservatively reported as $P_m + P_b$ stress intensities.
- (2) Factor of Safety, F.S. = (Allowable S.I.) / (Calculated S.I.)

Title Structural Analyses of the 8-120B Cask Under Hypothetical Fire Accident Conditions

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Figures

(20 Pages)

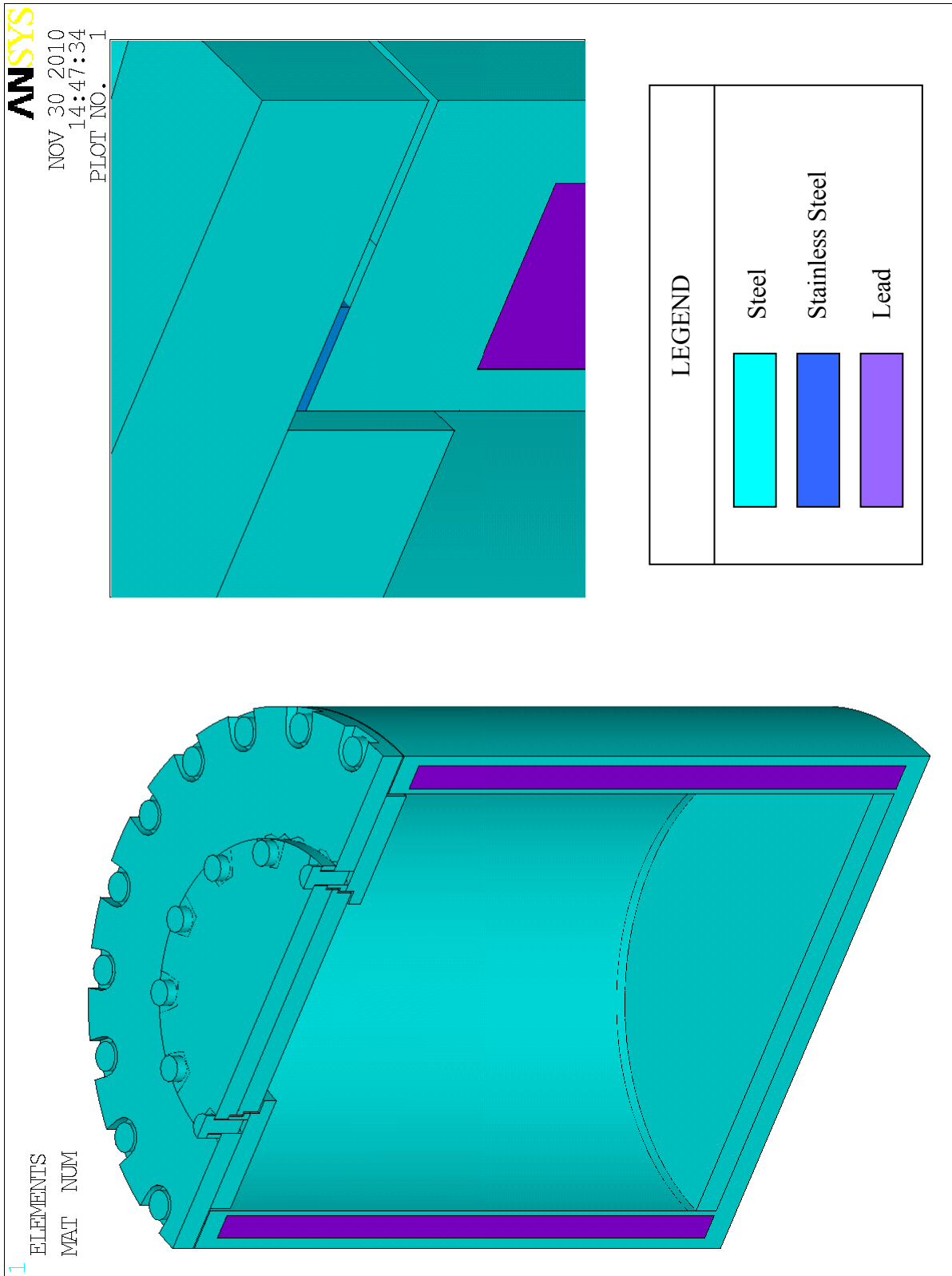


Figure 1
 Finite Element Model of the 8-120B Cask Identifying the Components by Material Numbers

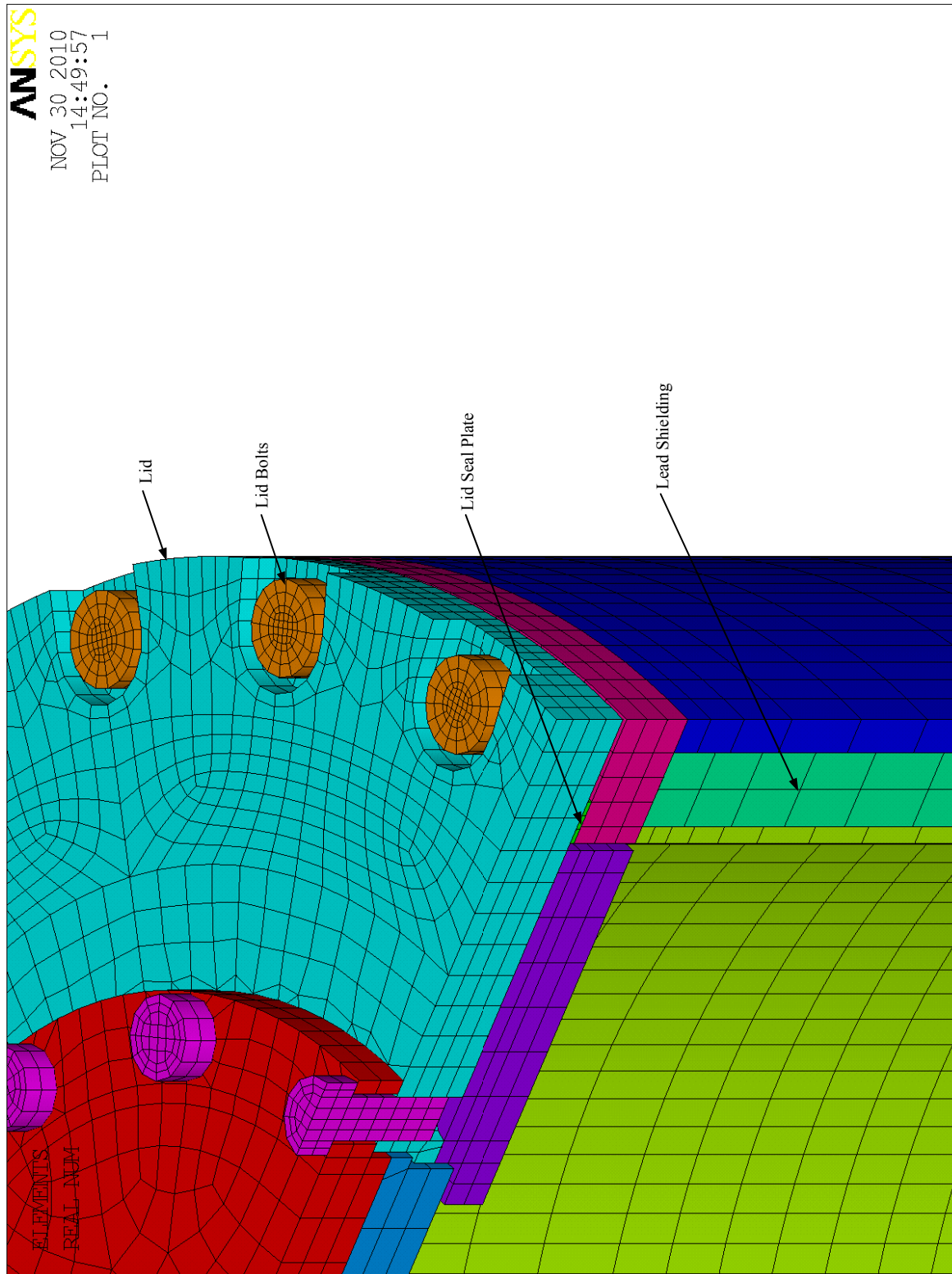


Figure 2
Finite Element Model of the Lid, Seal-Plate, Bolts and the Cask

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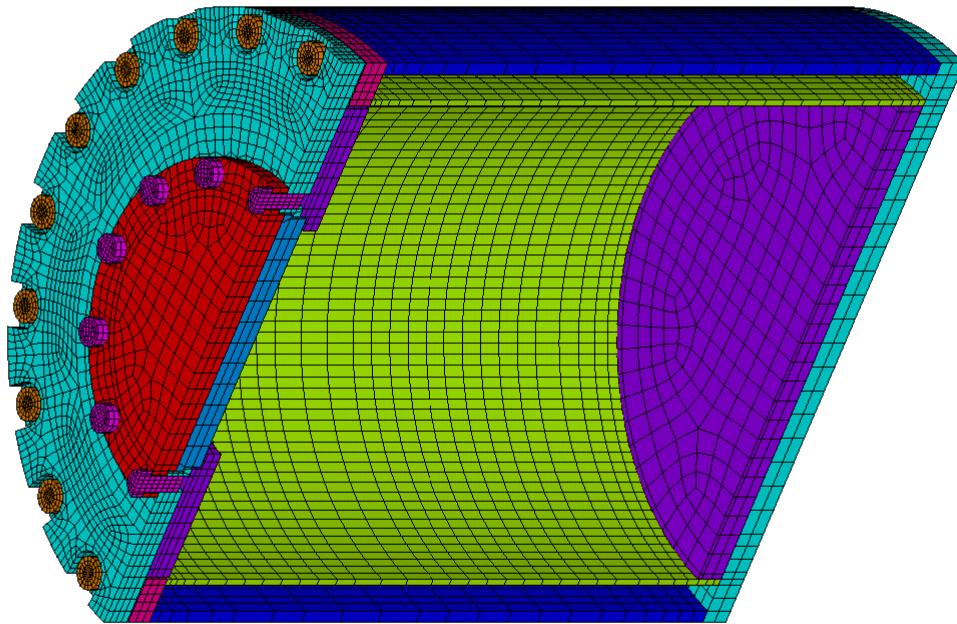


Figure 3
Finite Element Model of the Cask Body without Lead

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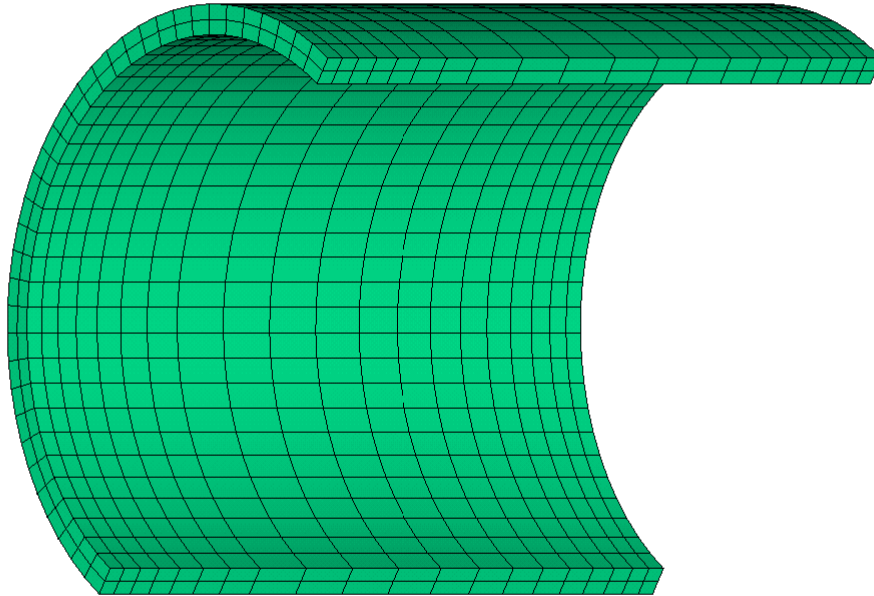


Figure 4
Finite Element Model of the Lead

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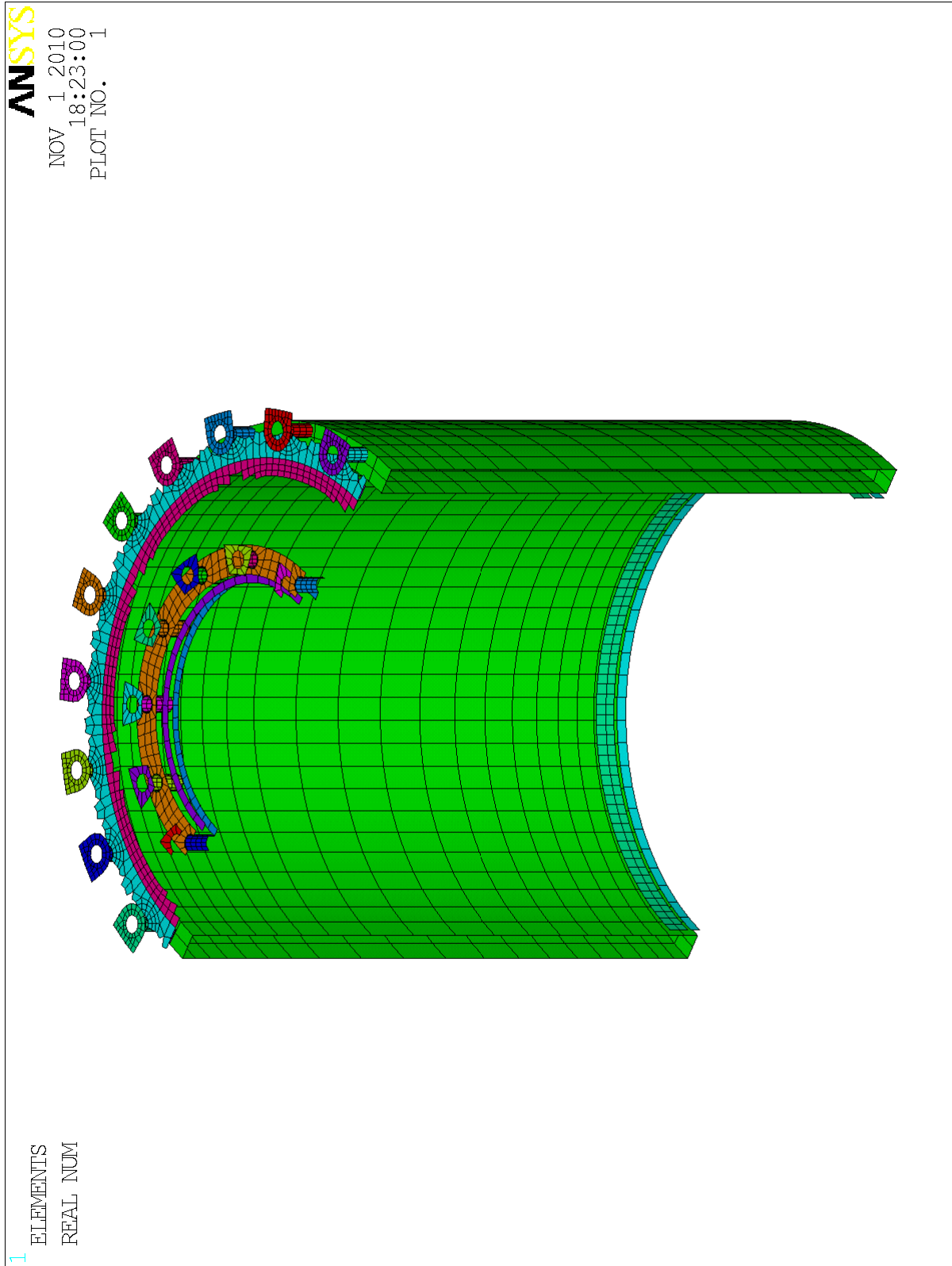


Figure 5
Finite Element Model of the Contact-Target Elements (Only Target Shown)

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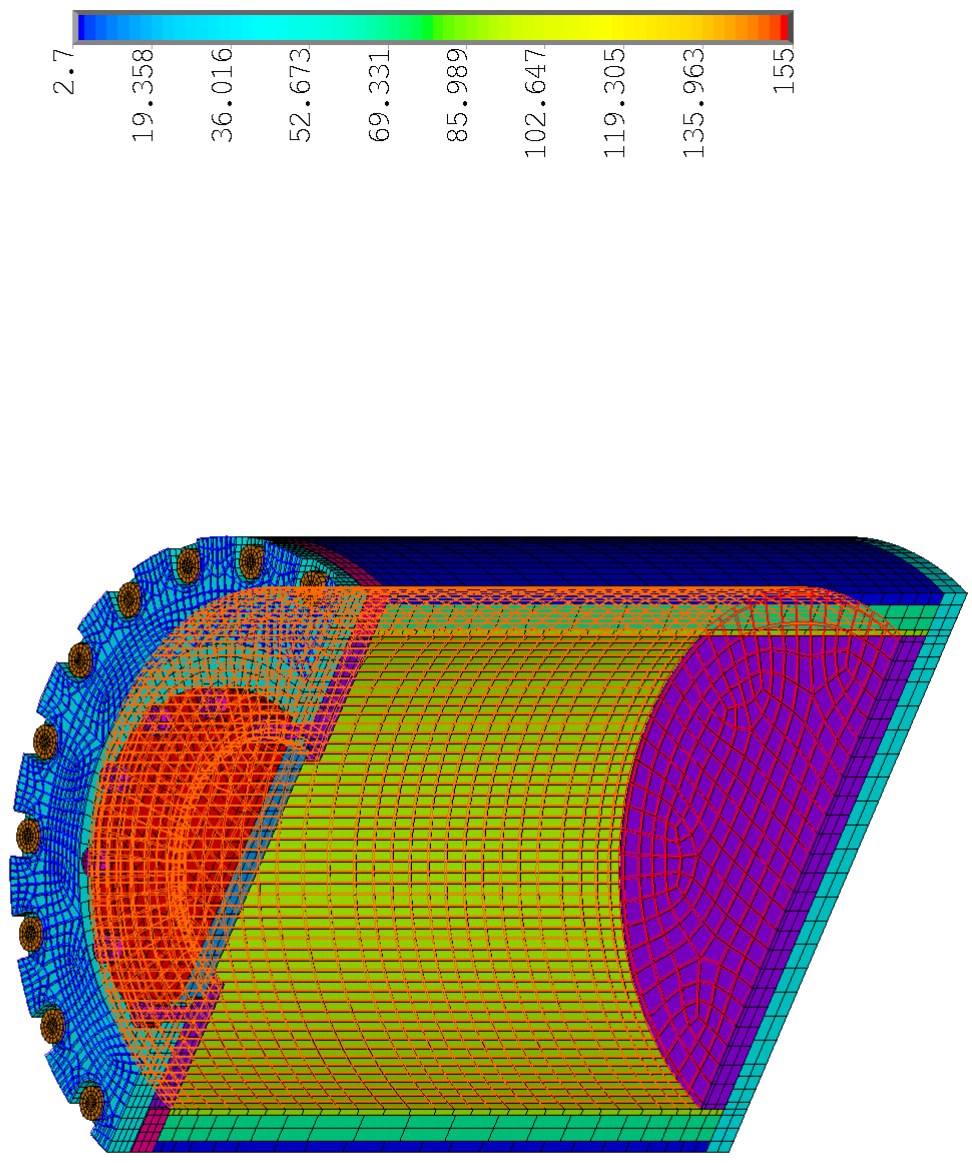


Figure 6
Cask Internal Pressure Distribution Used for All Load Cases

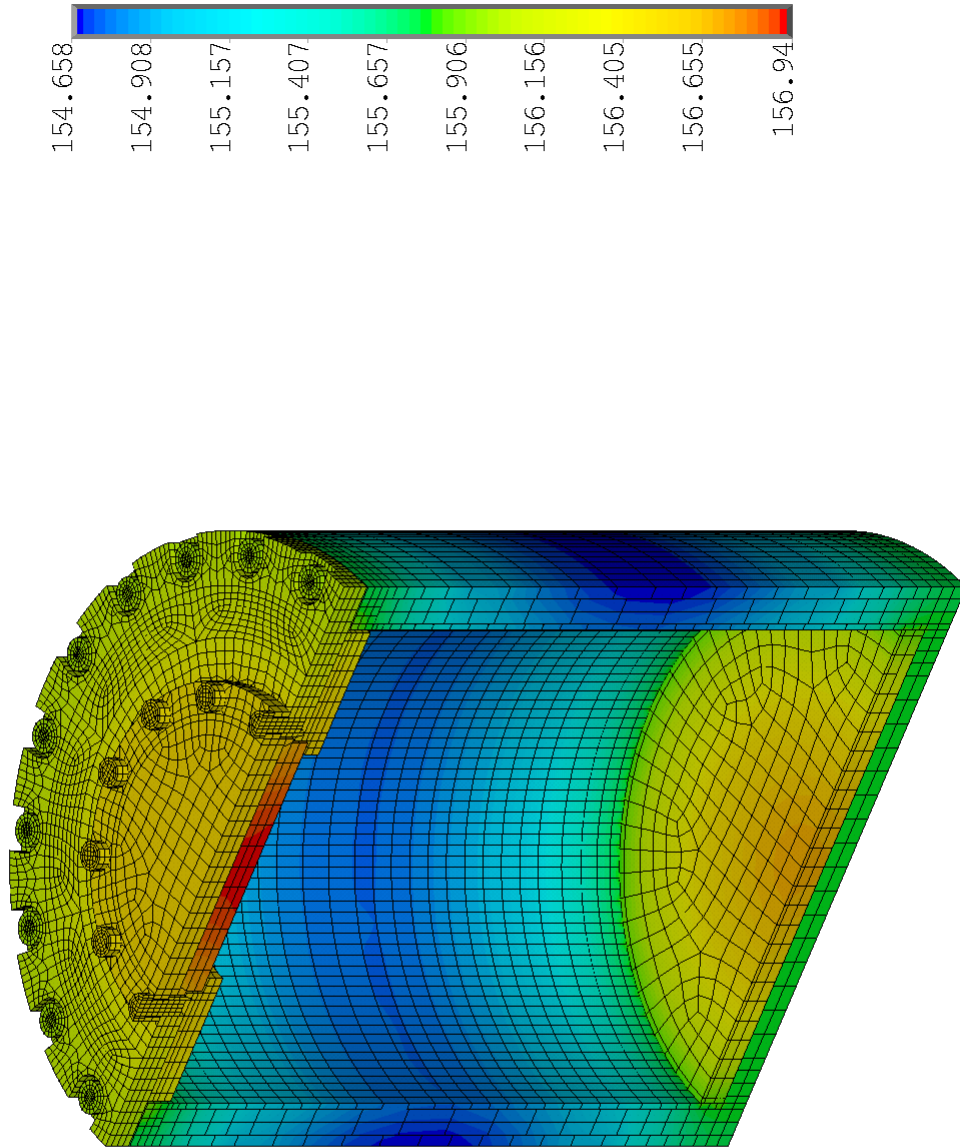
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ELEMENTS

TEMPERATURES
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TMAX=156.94



8-120B Cask - HAC Fire Stress Analysis at Time = 0.1 sec.

Figure 7
Temperature Profile Used for HAC Thermal Analysis (Time = 0.1sec)

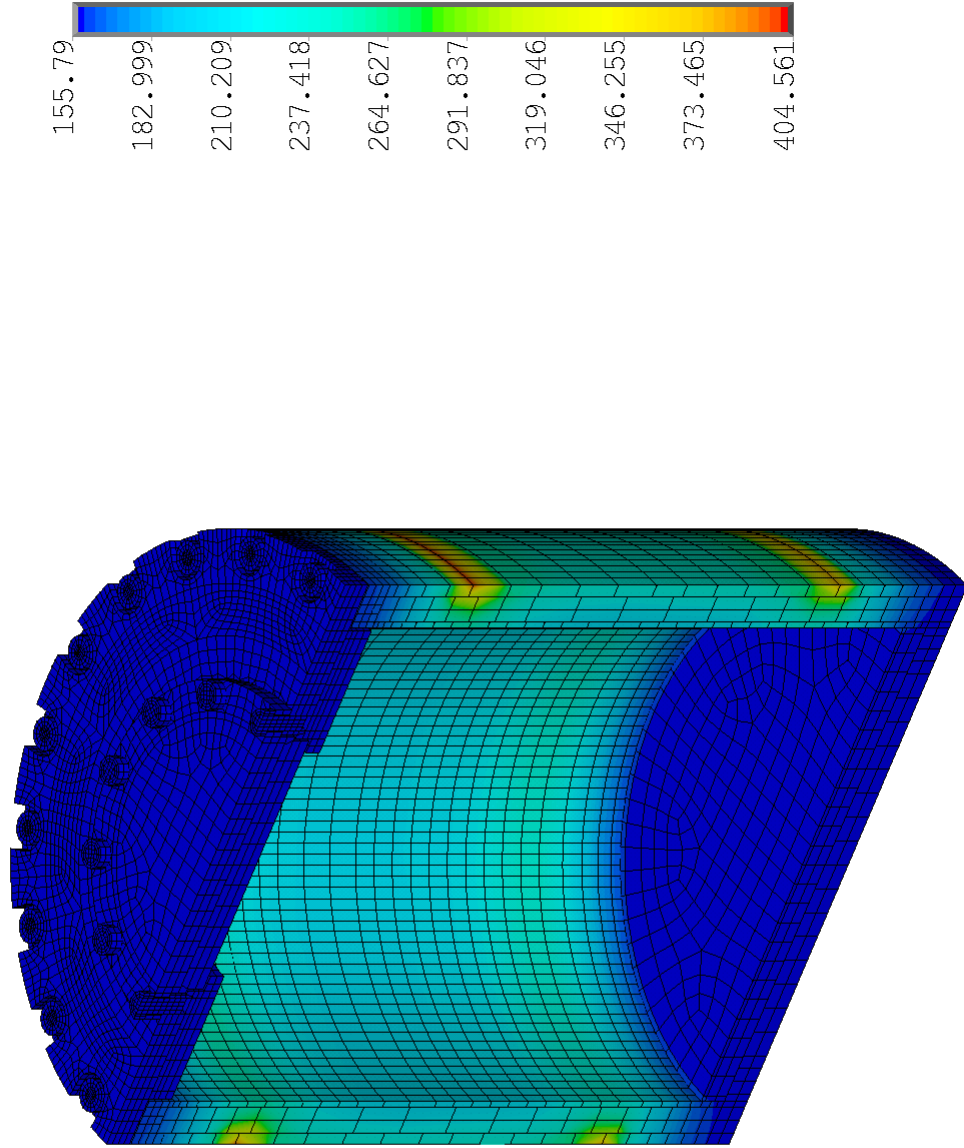
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ELEMENTS

TEMPERATURES
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8-120B Cask - HAC Fire Stress Analysis at Time = 1800.3 sec.

Figure 8

Temperature Profile Used for HAC Thermal Analysis (Time = 1,800.3 sec)

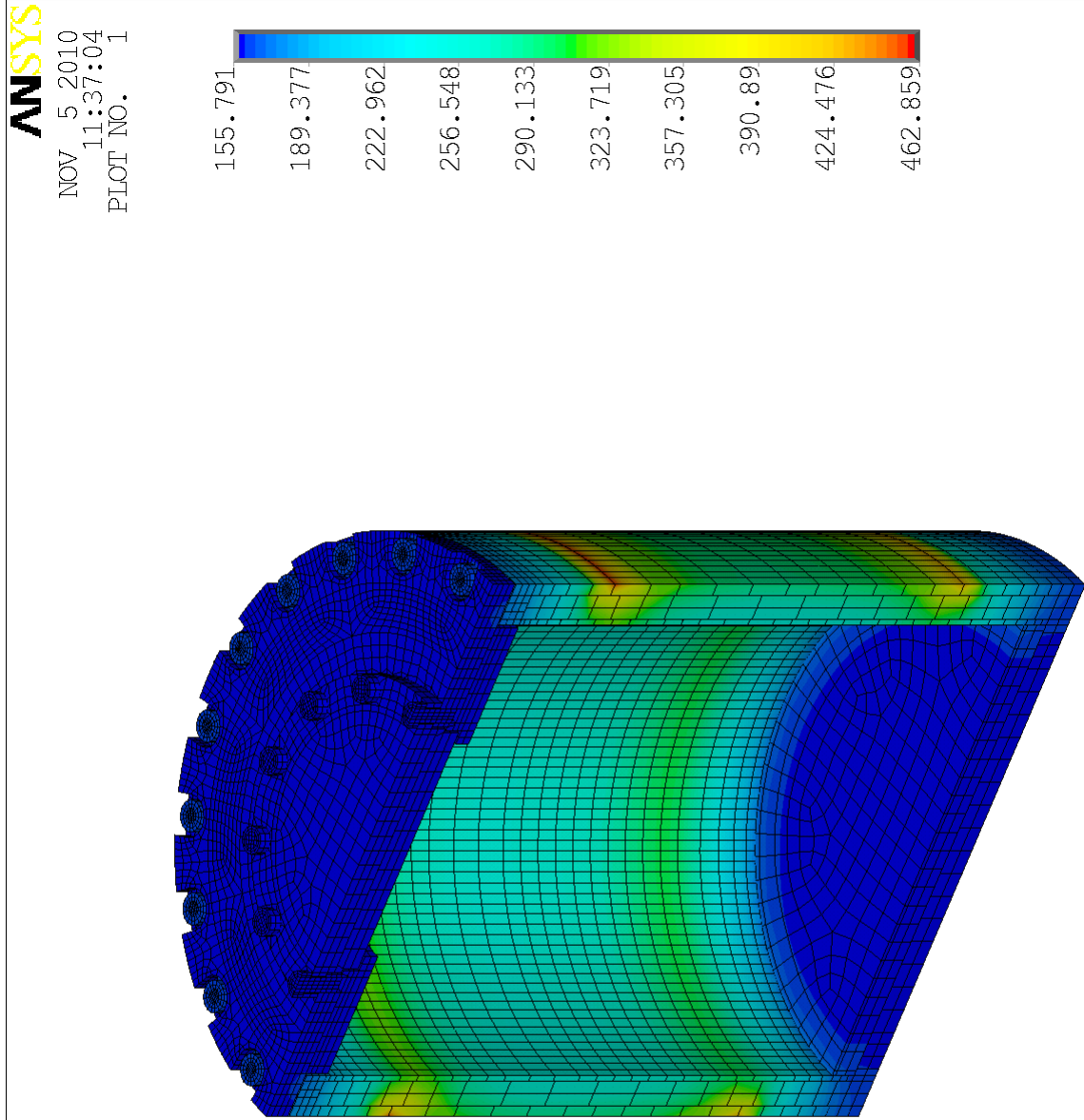
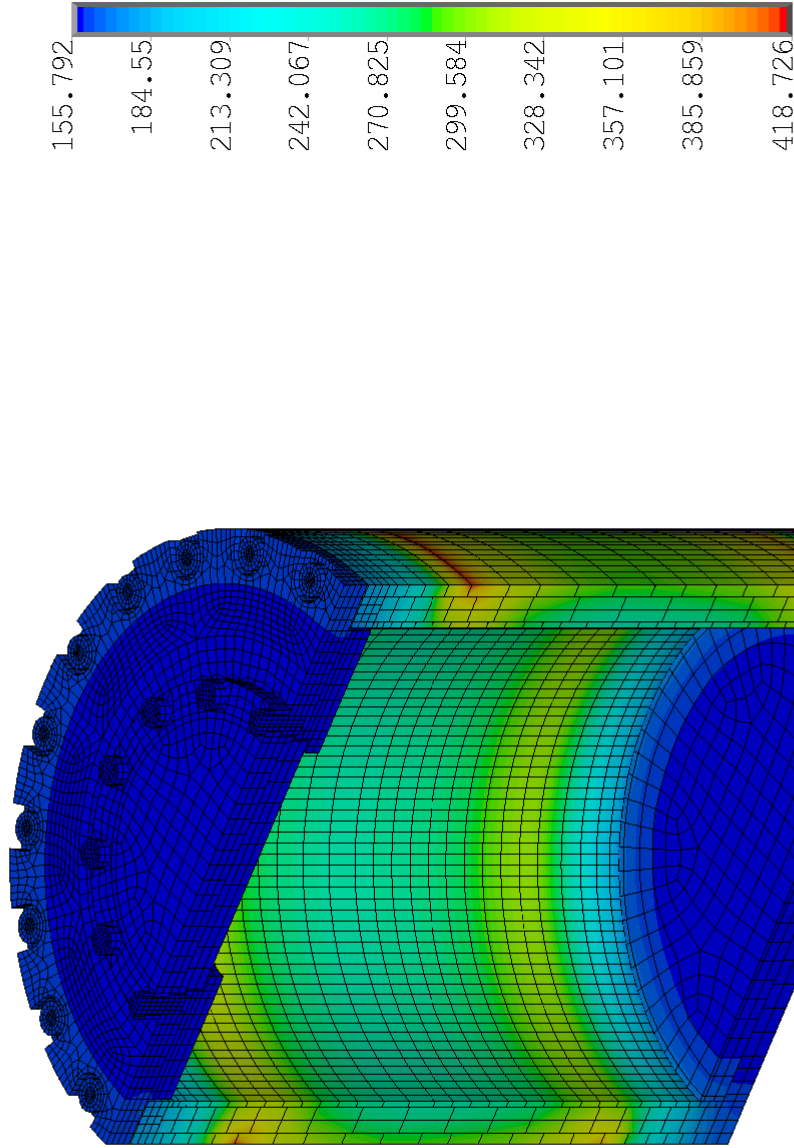


Figure 9
Temperature Profile Used for HAC Thermal Analysis (Time = 1,810 sec)

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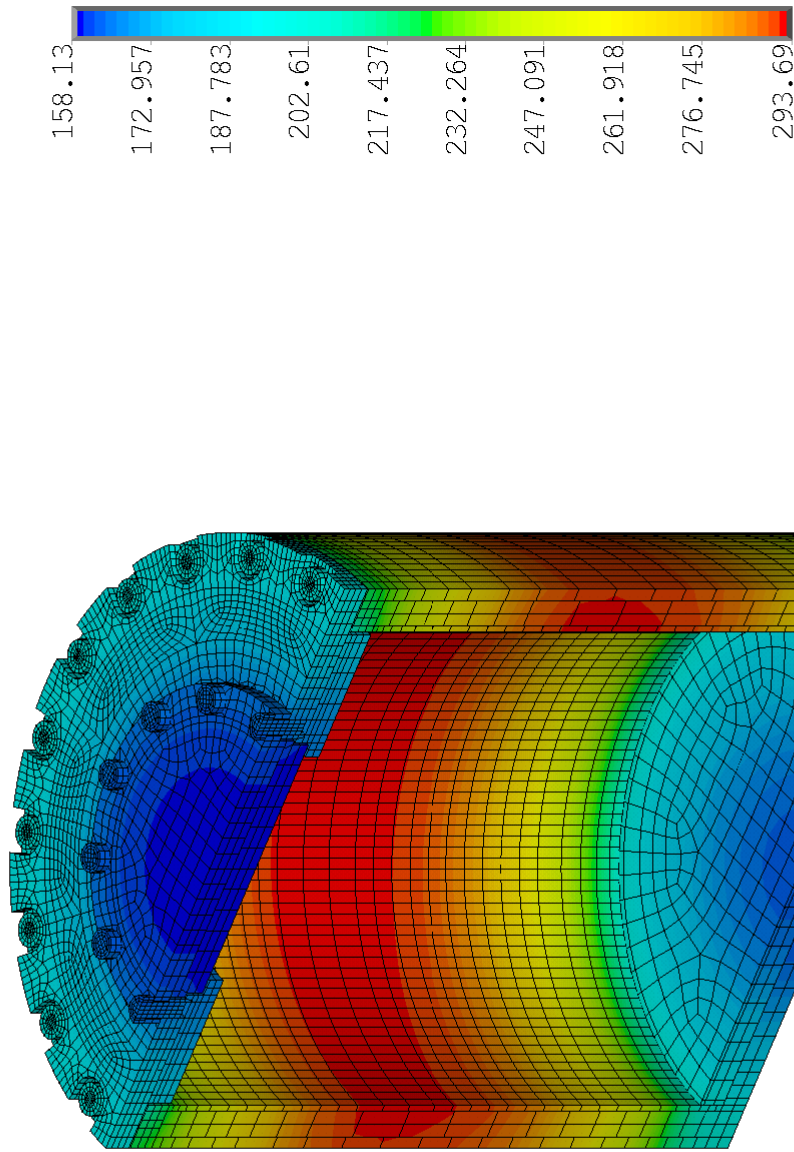


8-120B Cask - HAC Fire Stress Analysis at Time = 5000 sec.

Figure 10
Temperature Profile Used for HAC Thermal Analysis (Time = 5,000 sec)

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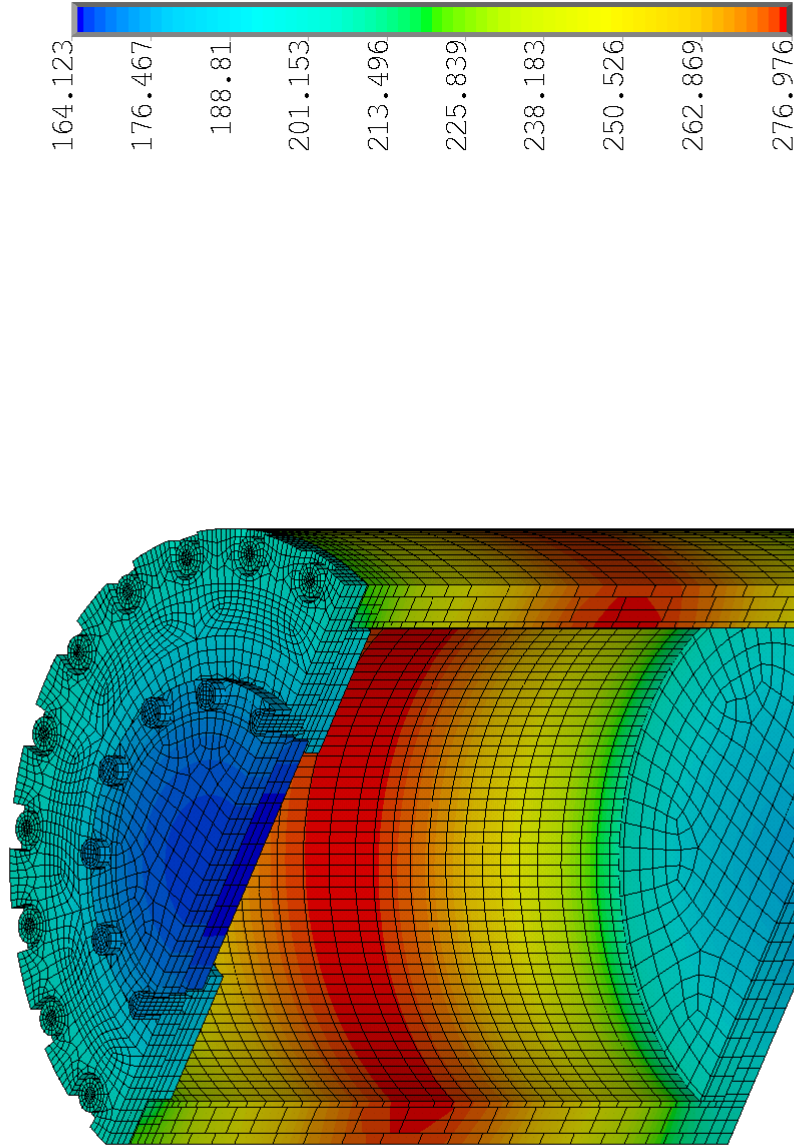


8-120B Cask - HAC Fire Stress Analysis at Time = 7500 sec.

Figure 11
Temperature Profile Used for HAC Thermal Analysis (Time = 7,500 sec)

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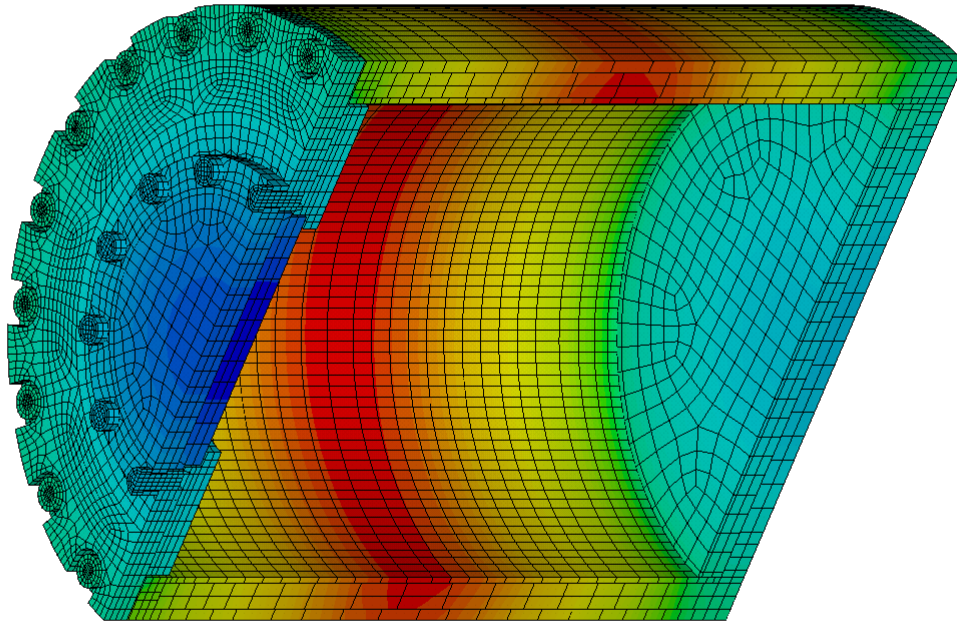
8-120B Cask - HAC Fire Stress Analysis at Time = 12500 sec.

Figure 12
Temperature Profile Used for HAC Thermal Analysis (Time = 12,500 sec)

ANSYS

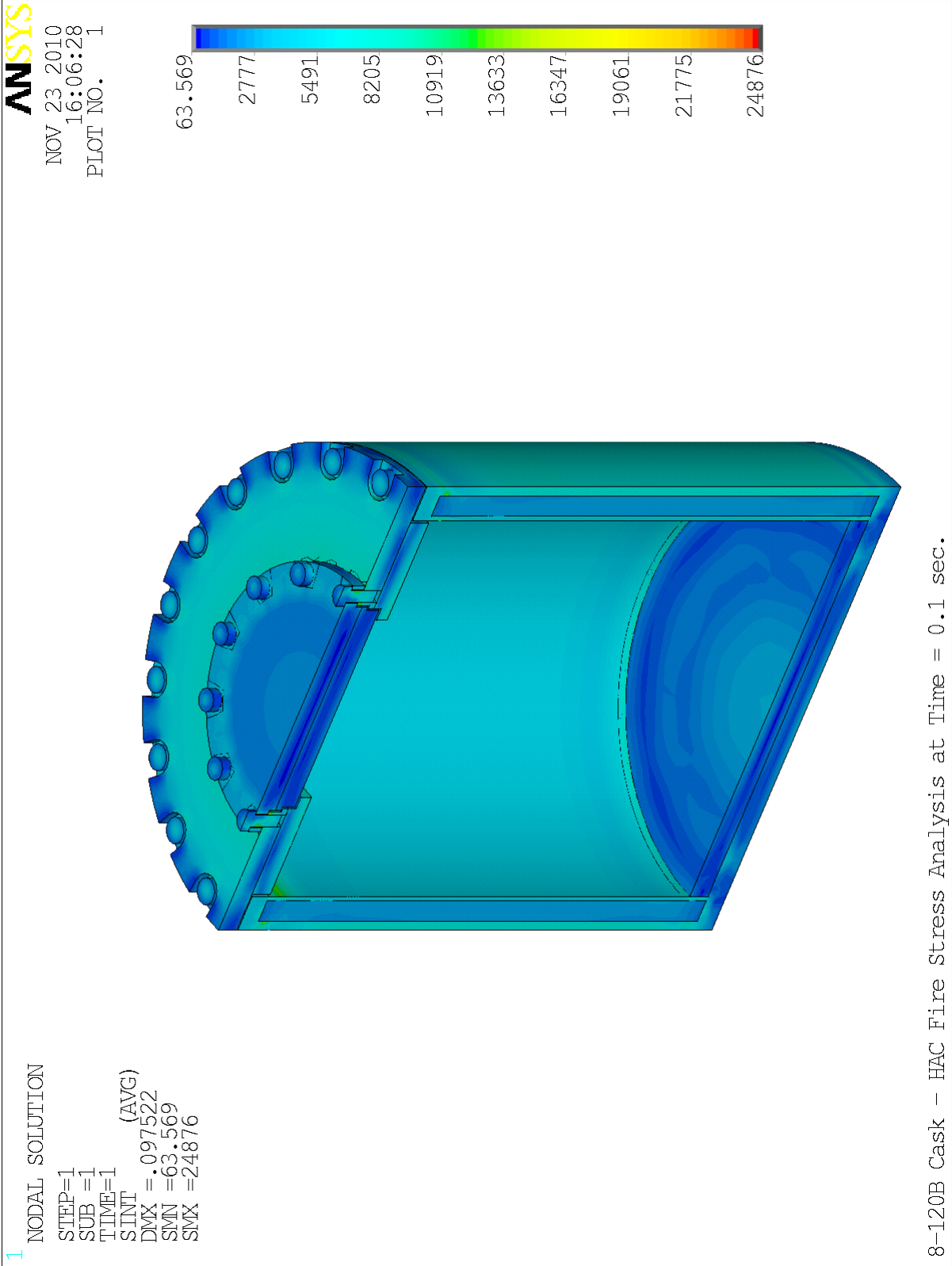
NOV 5 2010
11:38:57
PLOT NO. 1

173.145
182.598
192.051
201.504
210.957
220.41
229.863
239.316
248.77
259.573



8-120B Cask - HAC Fire Stress Analysis at Time = 22500 sec.

Figure 13
Temperature Profile Used for HAC Thermal Analysis (Time = 22,500 sec)



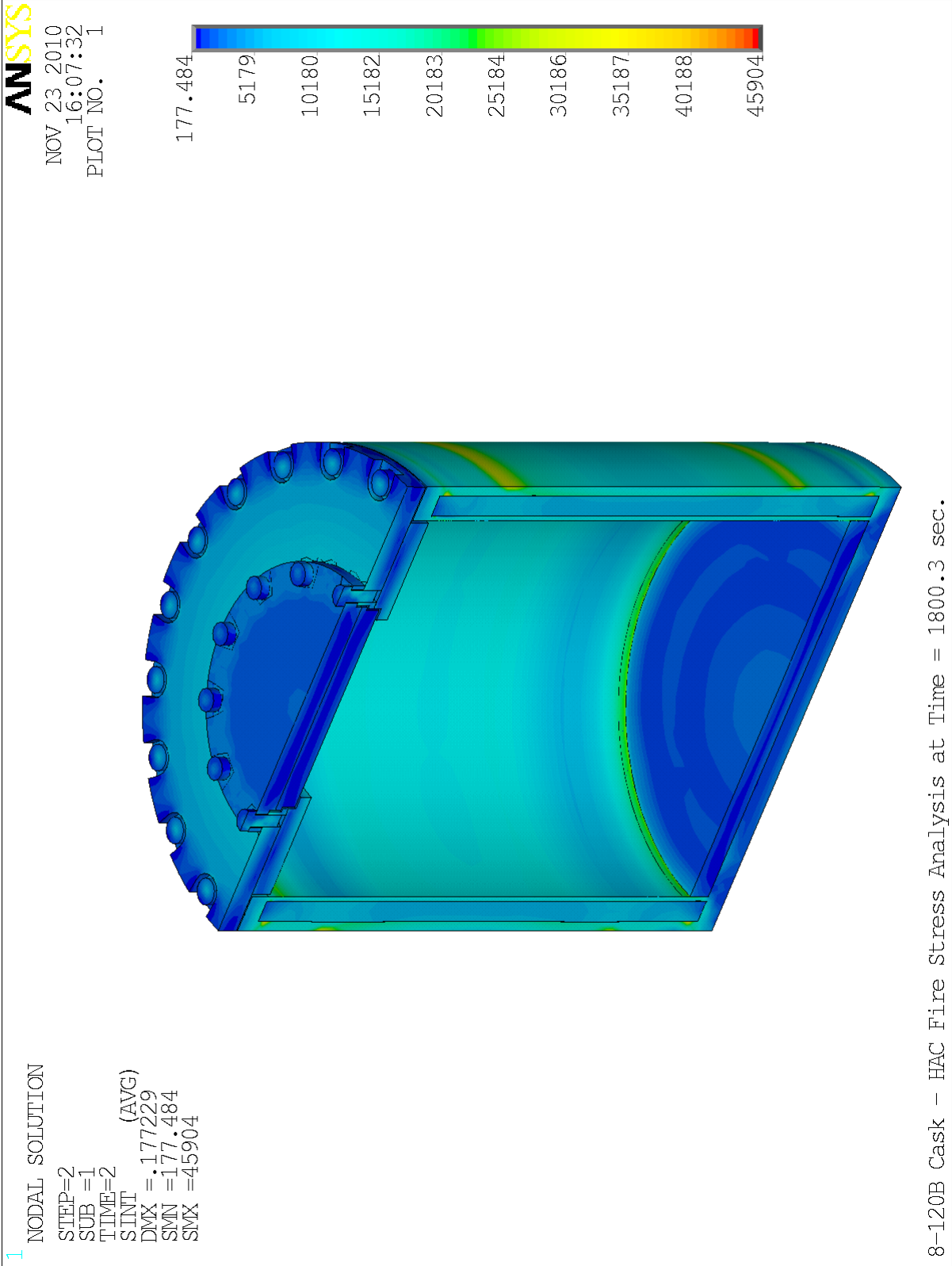
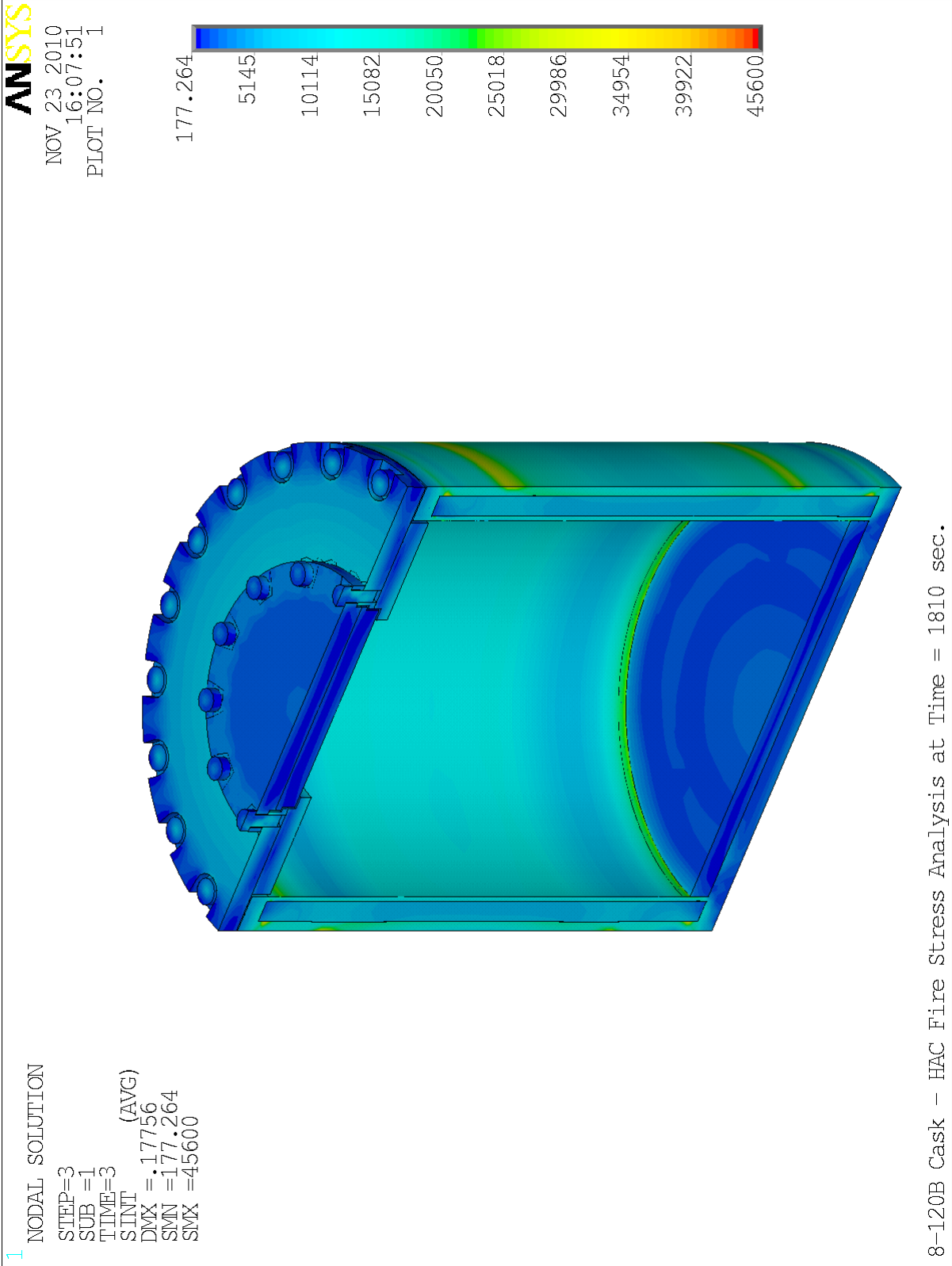
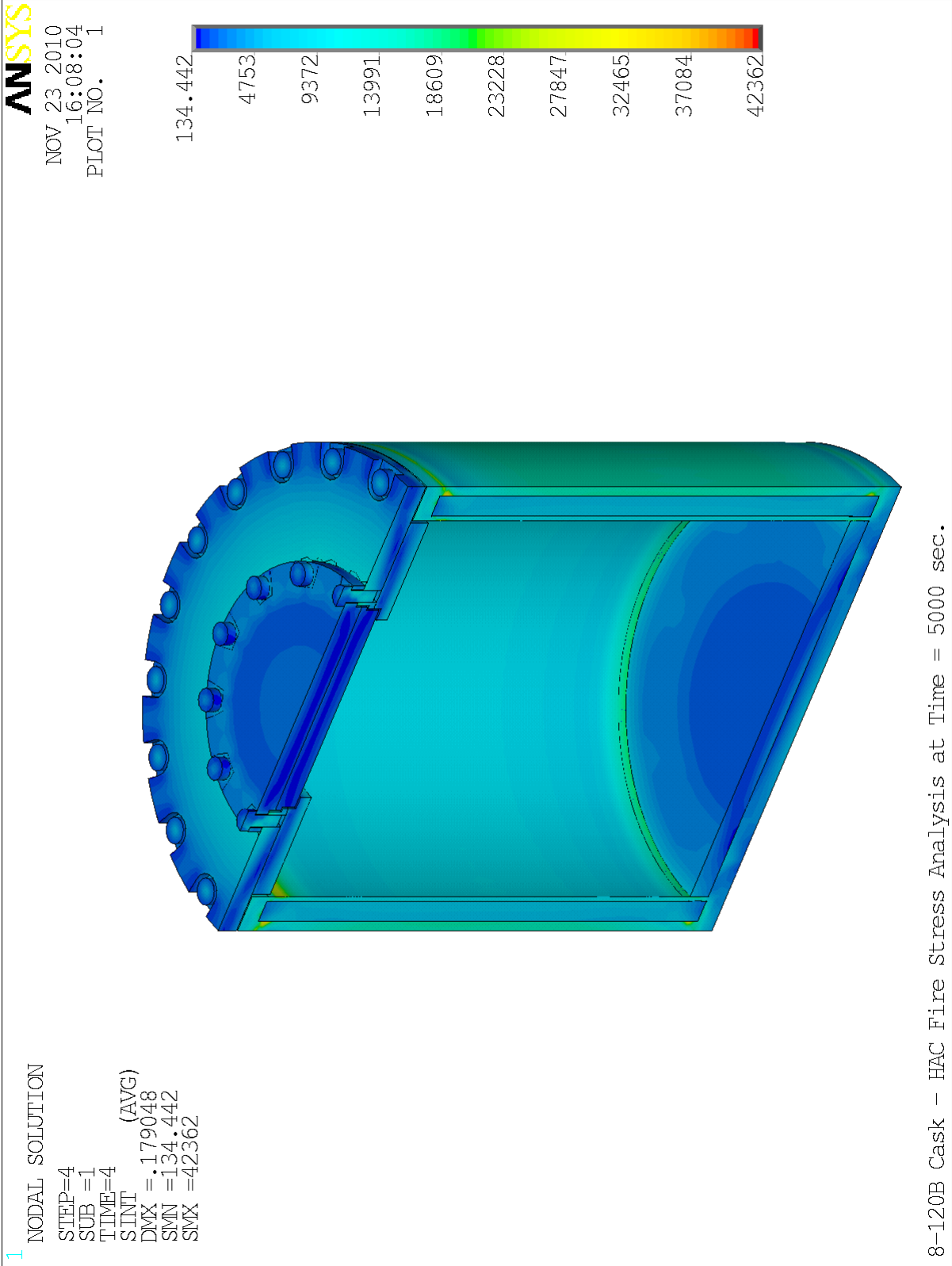


Figure 15
Stress Intensity Contour Plot Cask Body (Time = 1,800.3 sec)





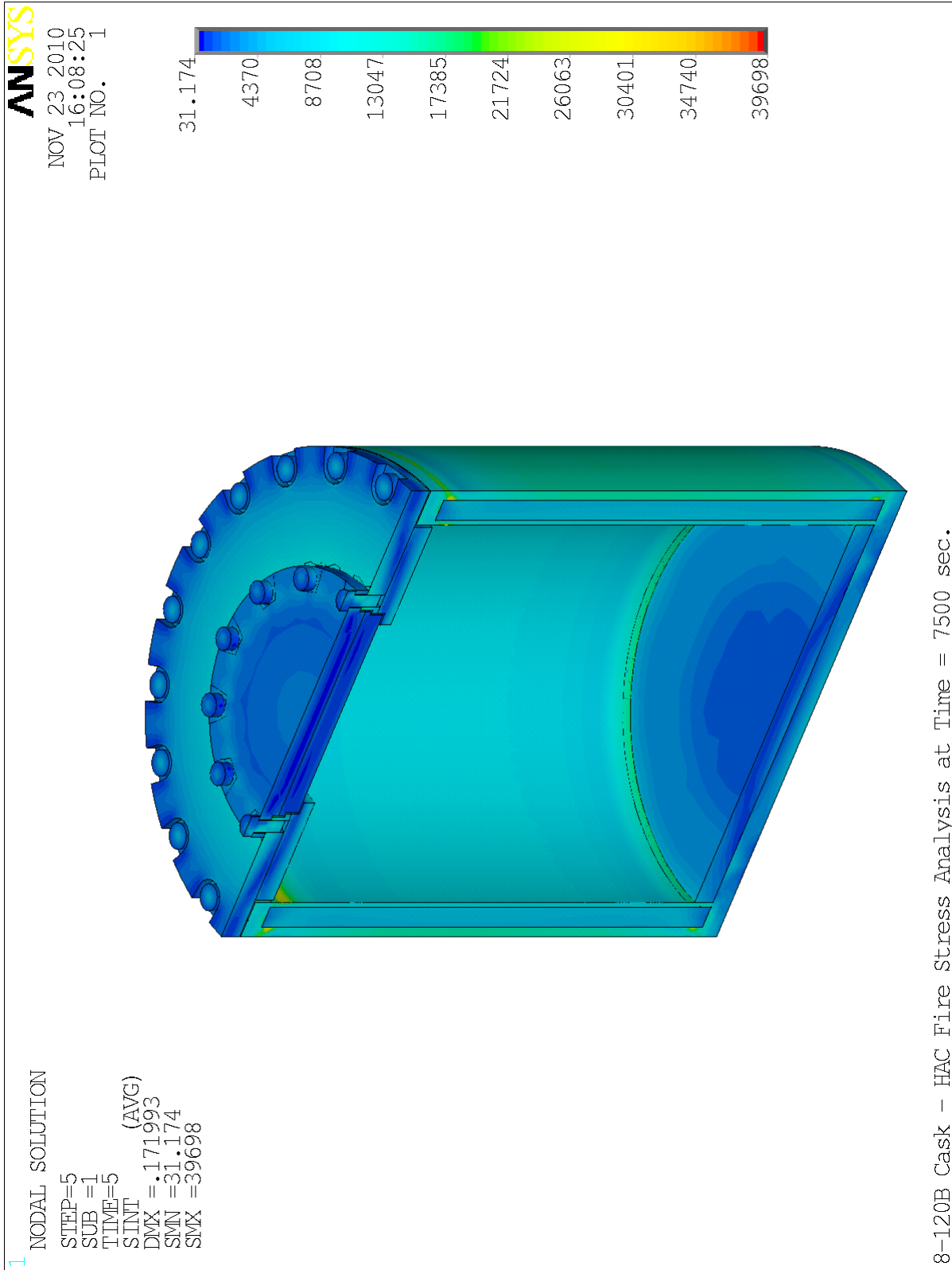
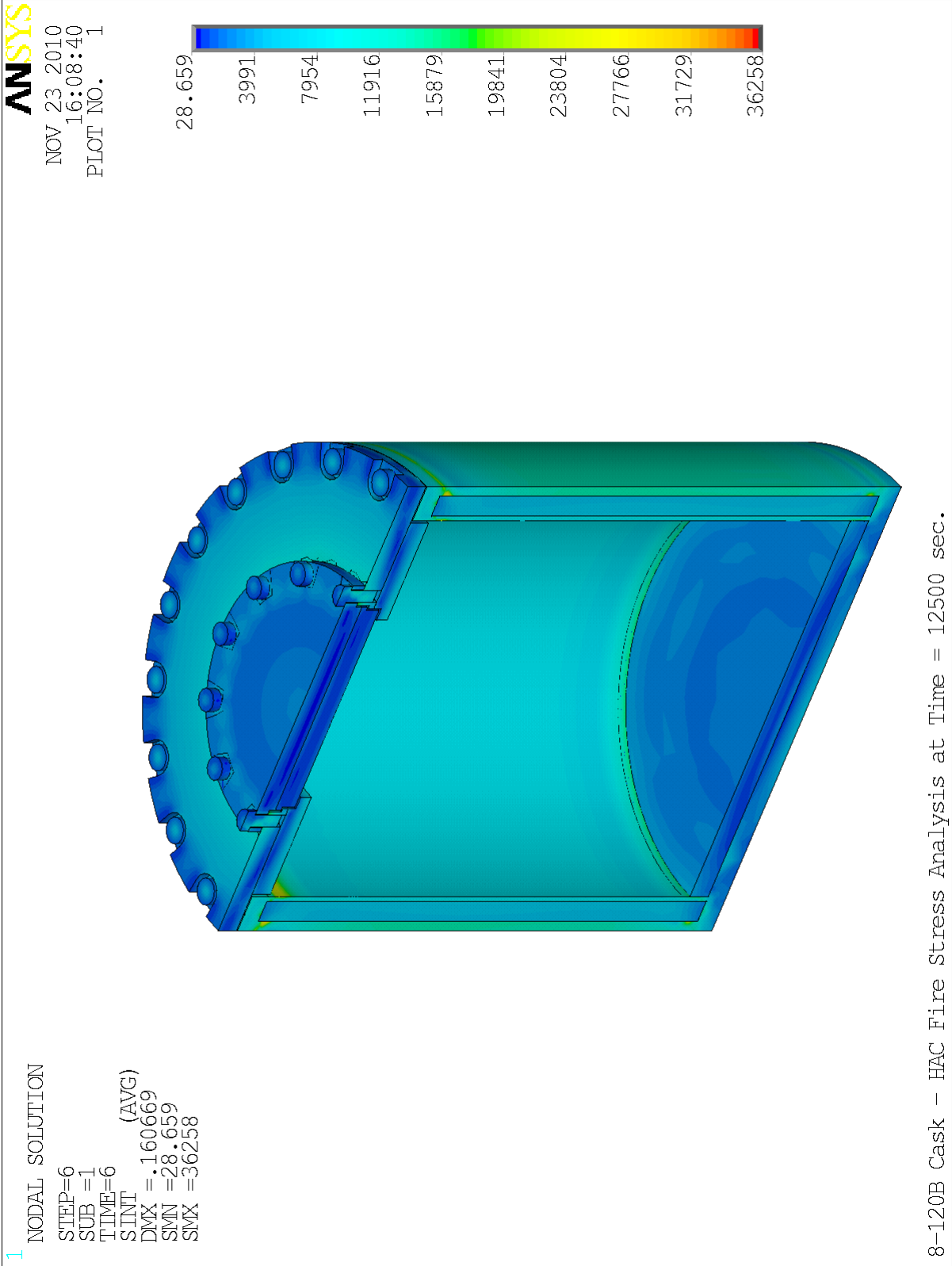


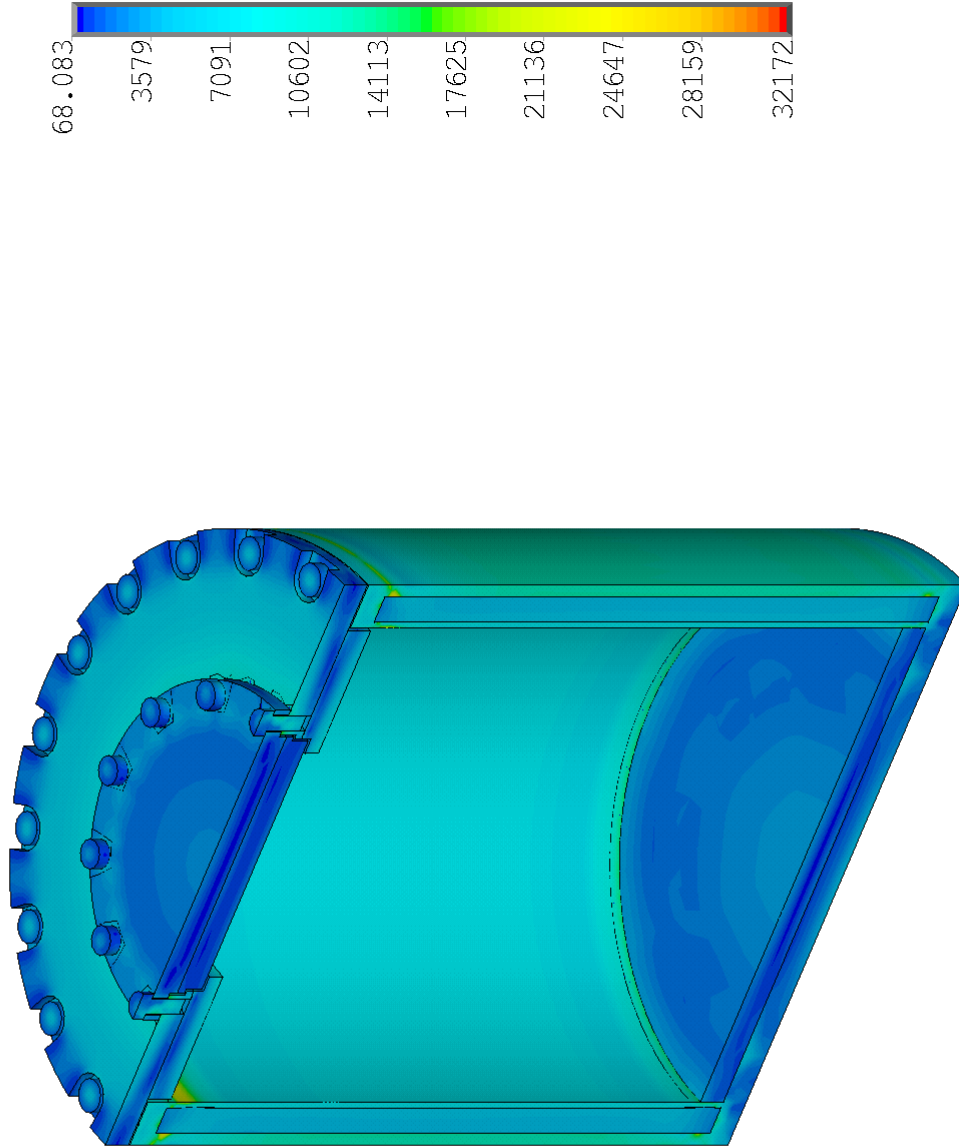
Figure 18
 Stress Intensity Contour Plot Cask Body (Time = 7,500 sec)



ANSYS

NOV 23 2010
 16:08:55
 PLOT NO. 1

1 NODAL SOLUTION
 STEP=7
 SUB =1
 TIME=7
 SINT (AVG)
 DMX =.146815
 SMN =68.083
 SMX =321.72



8-120B Cask - HAC Fire Stress Analysis at Time = 22500 sec.

Figure 20
 Stress Intensity Contour Plot Cask Body (Time = 22,500 sec)

Title Structural Analyses of the 8-120B Cask Under Hypothetical Fire Accident Conditions

Calc. No. ST-637

Rev. 0

Sheet 8 **of** 9

Appendix 1

Printout of the ANSYS Model Data

(32 Pages)

ANSYS Finite Element Model Partial Printout

(Note: The complete data printout is included on the file Model.out, which is included on the electronic media included in the package)

```

***** TITLES *****

*** YOU ARE IN   ANSYS - ENGINEERING ANALYSIS SYSTEM ***
ANSYS Mechanical
RELEASE  12.1      UPDATE 20091102   CUSTOMER  00222442

INITIAL JOBNAME = file
CURRENT JOBNAME = file

Current Working Directory: D:\ANSYS Analyses\8-120B\Assembly\Fire

TITLE= 8-120B Cask - HAC Fire Stress Analysis at Time = 22500 sec.

MENULIST File: C:\Program Files\ANSYS Inc\v121\ANSYS\gui\en-
us\UIDL\menulist121.ans

                        G L O B A L   S T A T U S

ANSYS - Engineering Analysis System          Nov 24, 2010          11:50
Release 12.1                                00222442              WINDOWS x64   Version

Current working directory: D:\ANSYS Analyses\8-120B\Assembly\Fire

MENULIST File: C:\Program Files\ANSYS Inc\v121\ANSYS\gui\en-
us\UIDL\menulist121.ans

Product(s) enabled: ANSYS Mechanical

Total connect time. . . . .   0 hours   0 minutes
Total CP usage. . . . .     0 hours   0 minutes   1.9 seconds

J O B   I N F O R M A T I O N  -----

8-120B Cask - HAC Fire Stress Analysis at Time = 22500 sec.

Current jobname . . . . . .file
Initial jobname . . . . . .file

Units . . . . . . . . . . .unknown

                        Available                Used
Scratch Memory Space. . . .   512.000 mb         31.152 mb (  6.1%)
Database space . . . . .   65535.750 mb         144.846 mb (  0.2%)

User menu file in use . . .%ANSYS121_DIR%\gui\en-us\UIDL\UIMENU.GRN
User menu file in use . . .%ANSYS121_DIR%\gui\en-us\UIDL\UIFUNC1.GRN
User menu file in use . . .%ANSYS121_DIR%\gui\en-us\UIDL\UIFUNC2.GRN
User menu file in use . . .%ANSYS121_DIR%\gui\en-us\UIDL\MECHTOOL.AUI
Beta features . . . . . .are not shown in the user interface

```

M O D E L I N F O R M A T I O N -----

Solid model summary:

	Largest Number	Number Defined	Number Selected
Keypoints	0	0	0
Lines	0	0	0
Areas	0	0	0
Volumes	0	0	0

Finite element model summary:

	Largest Number	Number Defined	Number Selected
Nodes	37896	37896	37896
Elements.	39115	38144	38144
Element types	148	137	n.a.
Real constant sets.	87	67	n.a.
Material property sets.	4	3	n.a.
Coupling.	0	0	n.a.
Constraint equations.	0	0	n.a.
Master DOFs	0	0	n.a.
Dynamic gap conditions.	0	0	n.a.

B O U N D A R Y C O N D I T I O N I N F O R M A T I O N -----

	Number Defined
Constraints on nodes.	2355
Constraints on keypoints.	0
Constraints on lines.	0
Constraints on areas.	0
Forces on nodes	0
Forces on keypoints	0
Surface loads on elements	4198
Number of element flagged surfaces	0
Surface loads on lines.	0
Surface loads on areas.	0
Body loads on elements.	656
Body loads on areas	0
Body loads on lines	0
Body loads on nodes	37896
Body loads on keypoints	0
Temperatures	
Uniform temperature.	70.000
Reference temperature.	70.000
Offset from absolute scale	0.000

X

Y

Z

Linear acceleration	0.0000	0.0000	1.0300
Angular velocity (about global CS)	0.0000	0.0000	0.0000
Angular acceleration (about global CS) . .	0.0000	0.0000	0.0000
Location of reference CS.	0.0000	0.0000	0.0000
Angular velocity (about reference CS) . .	0.0000	0.0000	0.0000
Angular acceleration (about reference CS)	0.0000	0.0000	0.0000

R O U T I N E I N F O R M A T I O N -----

Current routine.Preprocessing (PREP7)

Active coordinate system 1 (Cylindrical)

Display coordinate system. 0 (Cartesian)

Current element attributes:

Type number	2	(SOLID45)
Real number	6	
Material number	4	
Element coordinate system number. .	0	

Current mesher type.based on default element shape

Current element meshing shape 2D . . .use default element shape.

Current element meshing shape 3D . . .use default element shape.

SmrtSize Level OFF

Global element size. 0 divisions per line

Active coordinate system 1 (Cylindrical)

Display coordinate system. 0 (Cartesian)

Analysis type.Static (steady-state)

Active options for this analysis type:

Large deformation effectsNot included
Plasticity.Not included
CreepNot included
Equation solver to use.Program Chosen

Results filefile.rst

Load step number 8

Number of substeps 1

Step change boundary conditions . .No

S O L U T I O N O P T I O N S

PROBLEM DIMENSIONALITY.3-D
DEGREES OF FREEDOM. UX UY UZ	ROTX ROTY ROTZ
ANALYSIS TYPESTATIC (STEADY-STATE)
NEWTON-RAPHSON OPTIONPROGRAM CHOSEN
GLOBALLY ASSEMBLED MATRIXSYMMETRIC

L O A D S T E P O P T I O N S

```

LOAD STEP NUMBER. . . . . 8
TIME AT END OF THE LOAD STEP. . . . . 1.0000
NUMBER OF SUBSTEPS. . . . . 1
MAXIMUM NUMBER OF EQUILIBRIUM ITERATIONS. . . . 15
STEP CHANGE BOUNDARY CONDITIONS . . . . . NO
TERMINATE ANALYSIS IF NOT CONVERGED . . . . .YES (EXIT)
CONVERGENCE CONTROLS. . . . .USE DEFAULTS
INERTIA LOADS
    ACEL . . . . . 0.0000      0.0000      1.0300
PRINT OUTPUT CONTROLS . . . . .NO PRINTOUT
DATABASE OUTPUT CONTROLS. . . . .ALL DATA WRITTEN
                                FOR THE LAST SUBSTEP

```

LIST ELEMENT TYPES FROM 1 TO 148 BY 1

ELEMENT TYPE	1 IS SHELL63	ELASTIC SHELL
KEYOPT(1- 6)=	0 0	0 0 0 0
KEYOPT(7-12)=	0 0	0 0 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	2 IS SOLID45	3-D STRUCTURAL SOLID
KEYOPT(1- 6)=	0 0	0 0 0 0
KEYOPT(7-12)=	0 0	0 0 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	3 IS SOLSH190	3-D 8-NODE SOLID SHELL
KEYOPT(1- 6)=	0 0	0 0 0 0
KEYOPT(7-12)=	0 0	0 0 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	7 IS TARGE170	3-D TARGET SEGMENT
KEYOPT(1- 6)=	0 0	0 0 0 0
KEYOPT(7-12)=	0 0	0 0 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	8 IS CONTA174	3D 8-NODE SURF-SURF CONTACT
KEYOPT(1- 6)=	0 0	0 0 3 0
KEYOPT(7-12)=	0 0	1 2 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	11 IS TARGE170	3-D TARGET SEGMENT
KEYOPT(1- 6)=	0 0	0 0 0 0
KEYOPT(7-12)=	0 0	0 0 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	12 IS CONTA174	3D 8-NODE SURF-SURF CONTACT
KEYOPT(1- 6)=	0 0	0 0 3 0
KEYOPT(7-12)=	0 0	1 2 0 0
KEYOPT(13-18)=	0 0	0 0 0 0
ELEMENT TYPE	15 IS TARGE170	3-D TARGET SEGMENT
KEYOPT(1- 6)=	0 0	0 0 0 0
KEYOPT(7-12)=	0 0	0 0 0 0

KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	16	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	17	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	18	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	19	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	20	IS	CONTA175	NODE-TO-SURFACE	CONTACT	
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	21	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	22	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	23	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	24	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	25	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	26	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0

ELEMENT TYPE	27	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	28	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0
KEYOPT(7-12)=			0 0	1	2	0	3
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	29	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	30	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	31	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	32	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	33	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	34	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	35	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	36	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	37	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	38	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0

KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	39	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	40	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	41	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	42	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	43	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	44	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	45	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	46	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	47	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	48	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	49	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0

ELEMENT TYPE	50	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3 0
KEYOPT(7-12)=			0 0	1	2	0 3
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	51	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0 0
KEYOPT(7-12)=			0 0	0	0	0 0
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	52	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3 0
KEYOPT(7-12)=			0 0	1	2	0 3
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	53	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0 0
KEYOPT(7-12)=			0 0	0	0	0 0
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	54	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3 0
KEYOPT(7-12)=			0 0	1	2	0 3
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	55	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0 0
KEYOPT(7-12)=			0 0	0	0	0 0
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	56	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3 0
KEYOPT(7-12)=			0 0	1	2	0 3
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	57	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0 0
KEYOPT(7-12)=			0 0	0	0	0 0
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	58	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3 0
KEYOPT(7-12)=			0 0	1	2	0 3
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	59	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0 0
KEYOPT(7-12)=			0 0	0	0	0 0
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	60	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3 0
KEYOPT(7-12)=			0 0	1	2	0 3
KEYOPT(13-18)=			0 0	0	0	0 0
ELEMENT TYPE	61	IS	TARGE170	3-D TARGET	SEGMENT	

KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	62	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	63	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	64	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	65	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	66	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	67	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	68	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	69	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	70	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	71	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	72	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0

KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	73	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	74	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	75	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	76	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	77	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	78	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	79	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	80	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	81	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	82	IS	CONTA174	3D	8-NODE	SURF-SURF CONTACT
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	83	IS	TARGE170	3-D	TARGET	SEGMENT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0

ELEMENT TYPE	84	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0 3	0
KEYOPT(7-12)=			0 0	1	2 0	0
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	85	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0 0	0
KEYOPT(7-12)=			0 0	0	0 0	0
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	86	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0 3	0
KEYOPT(7-12)=			0 0	1	2 0	3
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	89	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0 0	0
KEYOPT(7-12)=			0 0	0	0 0	0
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	90	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0 3	0
KEYOPT(7-12)=			0 0	1	2 0	3
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	91	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0 0	0
KEYOPT(7-12)=			0 0	0	0 0	0
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	92	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0 3	0
KEYOPT(7-12)=			0 0	1	2 0	3
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	93	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0 0	0
KEYOPT(7-12)=			0 0	0	0 0	0
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	94	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0 3	0
KEYOPT(7-12)=			0 0	1	2 0	3
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	95	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0 0	0
KEYOPT(7-12)=			0 0	0	0 0	0
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	96	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0 3	0
KEYOPT(7-12)=			0 0	1	2 0	3
KEYOPT(13-18)=			0 0	0	0 0	0
ELEMENT TYPE	97	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0 0	0

KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 98 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 99 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 100 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 101 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 102 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 103 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 104 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 105 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 106 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 109 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 110 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	3	0
KEYOPT(7-12)=	0	0	1	2	0	3
KEYOPT(13-18)=	0	0	0	0	0	0

ELEMENT TYPE	111	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	112	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	113	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	114	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	115	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	116	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	117	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	118	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	119	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	120	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	121	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0
ELEMENT TYPE	122	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT

KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 123 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 124 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 125 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 126 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 127 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 128 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 129 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 130 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 131 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 132 IS CONTA174 3D 8-NODE SURF-SURF CONTACT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE 133 IS TARGE170 3-D TARGET SEGMENT						
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0

KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	134	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	135	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	136	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	137	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	138	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	139	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	140	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	141	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	142	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	143	IS	TARGE170	3-D TARGET	SEGMENT	
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	0	0	0	0
KEYOPT(13-18)=	0	0	0	0	0	0
ELEMENT TYPE	144	IS	CONTA174	3D 8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=	0	0	0	0	0	0
KEYOPT(7-12)=	0	0	1	2	0	0
KEYOPT(13-18)=	0	0	0	0	0	0

ELEMENT TYPE	145	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0

ELEMENT TYPE	146	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	1	2	0	0
KEYOPT(13-18)=			0 0	0	0	0	0

ELEMENT TYPE	147	IS	TARGE170	3-D	TARGET	SEGMENT	
KEYOPT(1- 6)=			0 0	0	0	0	0
KEYOPT(7-12)=			0 0	0	0	0	0
KEYOPT(13-18)=			0 0	0	0	0	0

ELEMENT TYPE	148	IS	CONTA174	3D	8-NODE	SURF-SURF	CONTACT
KEYOPT(1- 6)=			0 0	0	0	3	0
KEYOPT(7-12)=			0 0	1	2	0	3
KEYOPT(13-18)=			0 0	0	0	0	0

CURRENT NODAL DOF SET IS	UX	UY	UZ	ROTX	ROTY	ROTZ
THREE-DIMENSIONAL MODEL						

LIST REAL SETS	1	TO	87	BY	1	
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REAL CONSTANT SET	17	ITEMS	1	TO	6	
0.0000	0.0000	1.0000	0.10000	-0.10000	0.0000	

REAL CONSTANT SET	17	ITEMS	7	TO	12	
0.0000	0.0000	0.10000E+21	0.0000	1.0000	0.0000	

REAL CONSTANT SET	17	ITEMS	13	TO	18	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

REAL CONSTANT SET	17	ITEMS	19	TO	24	
0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	

REAL CONSTANT SET	19	ITEMS	1	TO	6	
0.0000	0.0000	1.0000	0.10000	-0.10000	0.0000	

REAL CONSTANT SET	19	ITEMS	7	TO	12	
0.0000	0.0000	0.10000E+21	0.0000	1.0000	0.0000	

REAL CONSTANT SET	19	ITEMS	13	TO	18	
0.0000	0.0000	1.0000	0.0000	1.0000	0.50000	

REAL CONSTANT SET	19	ITEMS	19	TO	24	
0.0000	1.0000	1.0000	0.0000	0.0000	1.0000	

REAL CONSTANT SET	21	ITEMS	1	TO	6	
0.0000	0.0000	1.0000	0.10000	-0.10000	0.0000	

REAL CONSTANT SET	21	ITEMS	7	TO	12	
0.0000	0.0000	0.10000E+21	0.0000	1.0000	0.0000	

REAL CONSTANT SET	21	ITEMS	13	TO	18	
0.0000	0.0000	1.0000	0.0000	1.0000	0.50000	

REAL CONSTANT SET	21	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	0.0000	1.0000
REAL CONSTANT SET	22	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	22	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	22	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	22	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	23	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	23	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	23	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	23	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	23	ITEMS 25 TO 30			
10.000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	24	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	24	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	24	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	24	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	25	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	25	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	25	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	25	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	26	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	

REAL CONSTANT	SET	26	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	26	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	26	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	27	ITEMS 1 TO	6		
0.0000	0.0000		1.0000	0.10000	-0.10000	0.0000
REAL CONSTANT	SET	27	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	27	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	27	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	28	ITEMS 1 TO	6		
0.0000	0.0000		1.0000	0.10000	-0.10000	0.0000
REAL CONSTANT	SET	28	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	28	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	28	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	29	ITEMS 1 TO	6		
0.0000	0.0000		1.0000	0.10000	-0.10000	0.0000
REAL CONSTANT	SET	29	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	29	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	29	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	30	ITEMS 1 TO	6		
0.0000	0.0000		1.0000	0.10000	-0.10000	0.0000
REAL CONSTANT	SET	30	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	30	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	30	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000

REAL CONSTANT	SET	31	ITEMS	1 TO	6		
0.0000	0.0000		1.0000		0.10000	-0.10000	0.0000
REAL CONSTANT	SET	31	ITEMS	7 TO	12		
0.0000	0.0000		0.10000E+21		0.0000	1.0000	0.0000
REAL CONSTANT	SET	31	ITEMS	13 TO	18		
0.0000	0.0000		1.0000		0.0000	1.0000	0.50000
REAL CONSTANT	SET	31	ITEMS	19 TO	24		
0.0000	1.0000		1.0000		0.0000	0.0000	1.0000
REAL CONSTANT	SET	32	ITEMS	1 TO	6		
0.0000	0.0000		1.0000		0.10000	-0.10000	0.0000
REAL CONSTANT	SET	32	ITEMS	7 TO	12		
0.0000	0.0000		0.10000E+21		0.0000	1.0000	0.0000
REAL CONSTANT	SET	32	ITEMS	13 TO	18		
0.0000	0.0000		1.0000		0.0000	1.0000	0.50000
REAL CONSTANT	SET	32	ITEMS	19 TO	24		
0.0000	1.0000		1.0000		0.0000	0.0000	1.0000
REAL CONSTANT	SET	33	ITEMS	1 TO	6		
0.0000	0.0000		1.0000		0.10000	-0.10000	0.0000
REAL CONSTANT	SET	33	ITEMS	7 TO	12		
0.0000	0.0000		0.10000E+21		0.0000	1.0000	0.0000
REAL CONSTANT	SET	33	ITEMS	13 TO	18		
0.0000	0.0000		1.0000		0.0000	1.0000	0.50000
REAL CONSTANT	SET	33	ITEMS	19 TO	24		
0.0000	1.0000		1.0000		0.0000	0.0000	1.0000
REAL CONSTANT	SET	34	ITEMS	1 TO	6		
0.0000	0.0000		1.0000		0.10000	-0.10000	0.0000
REAL CONSTANT	SET	34	ITEMS	7 TO	12		
0.0000	0.0000		0.10000E+21		0.0000	1.0000	0.0000
REAL CONSTANT	SET	34	ITEMS	13 TO	18		
0.0000	0.0000		1.0000		0.0000	1.0000	0.50000
REAL CONSTANT	SET	34	ITEMS	19 TO	24		
0.0000	1.0000		1.0000		0.0000	0.0000	1.0000
REAL CONSTANT	SET	35	ITEMS	1 TO	6		
0.0000	0.0000		1.0000		0.10000	-0.10000	0.0000
REAL CONSTANT	SET	35	ITEMS	7 TO	12		
0.0000	0.0000		0.10000E+21		0.0000	1.0000	0.0000
REAL CONSTANT	SET	35	ITEMS	13 TO	18		
0.0000	0.0000		1.0000		0.0000	1.0000	0.50000

REAL CONSTANT SET	35	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	0.0000	1.0000
REAL CONSTANT SET	36	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	36	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	36	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	36	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	37	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	37	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	37	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	37	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	38	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	38	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	38	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	38	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	39	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	39	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	39	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	39	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	40	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	40	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	

REAL CONSTANT SET	40	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	40	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	41	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	41	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	41	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	41	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	42	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	42	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	42	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	42	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	43	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	43	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	43	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	43	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	44	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	44	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	44	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	44	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	45	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	

REAL CONSTANT SET	50	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	50	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	50	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	50	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	51	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	51	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	51	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	51	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	52	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	52	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	52	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	52	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	53	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	53	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	53	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	53	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	54	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	54	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	54	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	

REAL CONSTANT SET	54	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	55	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	55	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	55	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	55	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	56	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	56	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	56	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	56	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	58	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	58	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	58	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	58	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	59	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	59	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	59	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	59	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	60	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	60	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	

REAL CONSTANT SET	60	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	60	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	61	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	61	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	61	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	61	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	62	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	62	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	62	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	62	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	63	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	63	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	63	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	63	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	64	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	
REAL CONSTANT SET	64	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	64	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	64	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	65	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	-0.10000	0.0000	

REAL CONSTANT	SET	65	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	65	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	65	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	66	ITEMS 1 TO	6		
0.0000	0.0000		1.0000	0.10000	-0.10000	0.0000
REAL CONSTANT	SET	66	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	66	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	66	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	68	ITEMS 1 TO	6		
0.0000	0.0000		1.0000	0.10000	-0.10000	0.0000
REAL CONSTANT	SET	68	ITEMS 7 TO	12		
0.0000	0.0000		0.10000E+21	0.0000	1.0000	0.0000
REAL CONSTANT	SET	68	ITEMS 13 TO	18		
0.0000	0.0000		1.0000	0.0000	1.0000	0.50000
REAL CONSTANT	SET	68	ITEMS 19 TO	24		
0.0000	1.0000		1.0000	0.0000	0.0000	1.0000
REAL CONSTANT	SET	69	ITEMS 1 TO	6		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	69	ITEMS 7 TO	12		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	69	ITEMS 13 TO	18		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	69	ITEMS 19 TO	24		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	70	ITEMS 1 TO	6		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	70	ITEMS 7 TO	12		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	70	ITEMS 13 TO	18		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000
REAL CONSTANT	SET	70	ITEMS 19 TO	24		
0.0000	0.0000		0.0000	0.0000	0.0000	0.0000

REAL CONSTANT	SET	71	ITEMS	1 TO	6		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	71	ITEMS	7 TO	12		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	71	ITEMS	13 TO	18		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	71	ITEMS	19 TO	24		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	72	ITEMS	1 TO	6		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	72	ITEMS	7 TO	12		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	72	ITEMS	13 TO	18		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	72	ITEMS	19 TO	24		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	73	ITEMS	1 TO	6		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	73	ITEMS	7 TO	12		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	73	ITEMS	13 TO	18		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	73	ITEMS	19 TO	24		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	74	ITEMS	1 TO	6		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	74	ITEMS	7 TO	12		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	74	ITEMS	13 TO	18		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	74	ITEMS	19 TO	24		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	75	ITEMS	1 TO	6		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	75	ITEMS	7 TO	12		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000
REAL CONSTANT	SET	75	ITEMS	13 TO	18		
0.0000	0.0000		0.0000		0.0000	0.0000	0.0000

REAL CONSTANT SET	75	ITEMS 19 TO 24			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	76	ITEMS 1 TO 6			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	76	ITEMS 7 TO 12			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	76	ITEMS 13 TO 18			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	76	ITEMS 19 TO 24			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	77	ITEMS 1 TO 6			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	77	ITEMS 7 TO 12			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	77	ITEMS 13 TO 18			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	77	ITEMS 19 TO 24			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	78	ITEMS 1 TO 6			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	78	ITEMS 7 TO 12			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	78	ITEMS 13 TO 18			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	78	ITEMS 19 TO 24			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	79	ITEMS 1 TO 6			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	79	ITEMS 7 TO 12			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	79	ITEMS 13 TO 18			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	79	ITEMS 19 TO 24			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	80	ITEMS 1 TO 6			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	80	ITEMS 7 TO 12			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	

REAL CONSTANT SET	80	ITEMS 13 TO	18			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	80	ITEMS 19 TO	24			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	81	ITEMS 1 TO	6			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	81	ITEMS 7 TO	12			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	81	ITEMS 13 TO	18			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	81	ITEMS 19 TO	24			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	82	ITEMS 1 TO	6			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	82	ITEMS 7 TO	12			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	82	ITEMS 13 TO	18			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	82	ITEMS 19 TO	24			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	83	ITEMS 1 TO	6			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	83	ITEMS 7 TO	12			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	83	ITEMS 13 TO	18			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	83	ITEMS 19 TO	24			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	84	ITEMS 1 TO	6			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	84	ITEMS 7 TO	12			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	84	ITEMS 13 TO	18			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	84	ITEMS 19 TO	24			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
REAL CONSTANT SET	85	ITEMS 1 TO	6			
0.0000 0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

REAL CONSTANT SET	85	ITEMS 7 TO 12			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	85	ITEMS 13 TO 18			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	85	ITEMS 19 TO 24			
0.0000 0.0000		0.0000 0.0000	0.0000	0.0000	
REAL CONSTANT SET	86	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	86	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	86	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	86	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	
REAL CONSTANT SET	87	ITEMS 1 TO 6			
0.0000 0.0000		1.0000 0.10000	0.0000	0.0000	
REAL CONSTANT SET	87	ITEMS 7 TO 12			
0.0000 0.0000		0.10000E+21 0.0000	1.0000	0.0000	
REAL CONSTANT SET	87	ITEMS 13 TO 18			
0.0000 0.0000		1.0000 0.0000	1.0000	0.50000	
REAL CONSTANT SET	87	ITEMS 19 TO 24			
0.0000 1.0000		1.0000 0.0000	0.0000	1.0000	

LIST MATERIALS 1 TO 4 BY 1
PROPERTY= ALL

MATERIAL NUMBER 1

TEMP	EX
-100.00	0.30300E+08
70.000	0.29400E+08
200.00	0.28800E+08
300.00	0.28300E+08
400.00	0.27900E+08
500.00	0.27300E+08
600.00	0.26500E+08

TEMP	NUXY
	0.3000000

TEMP	ALPX	REFERENCE TEMP. = 70.00
70.000	0.64000E-05	
100.00	0.65000E-05	
150.00	0.66000E-05	
200.00	0.67000E-05	
250.00	0.68000E-05	

300.00	0.69000E-05
350.00	0.70000E-05
400.00	0.71000E-05
450.00	0.72000E-05
500.00	0.73000E-05
550.00	0.73000E-05
600.00	0.74000E-05

TEMP	DENS
	0.2830000

MATERIAL NUMBER	2
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TEMP	EX
-40.000	0.24600E+07
-20.000	0.24300E+07
70.000	0.22700E+07
100.00	0.22100E+07
200.00	0.20100E+07
300.00	0.18500E+07
400.00	0.17000E+07
500.00	0.15200E+07

TEMP	NUXY
	0.4000000

TEMP	ALPX	REFERENCE TEMP. = 70.00
-40.000	0.15560E-04	
-20.000	0.15650E-04	
70.000	0.16060E-04	
100.00	0.16220E-04	
200.00	0.16700E-04	
300.00	0.17330E-04	
400.00	0.18160E-04	
500.00	0.19120E-04	

TEMP	DENS
	0.4100000

MATERIAL NUMBER	4
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TEMP	EX
-100.00	0.29200E+08
70.000	0.28300E+08
200.00	0.27500E+08
300.00	0.27000E+08
400.00	0.26400E+08
500.00	0.25900E+08
600.00	0.25300E+08

TEMP	NUXY
	0.3000000

TEMP	ALPX	REFERENCE TEMP. = 70.00
70.000	0.85000E-05	
100.00	0.86000E-05	
150.00	0.88000E-05	

200.00	0.89000E-05
250.00	0.91000E-05
300.00	0.92000E-05
350.00	0.94000E-05
400.00	0.95000E-05
450.00	0.96000E-05
500.00	0.97000E-05
550.00	0.98000E-05
600.00	0.98000E-05

TEMP	DENS
	0.2830000

Title Structural Analyses of the 8-120B Cask Under Hypothetical Fire Accident Conditions

Calc. No. ST-637

Rev. 0

Sheet 9 **of** 9

Appendix 2

Electronic Data on CDROM

(1 Page & 1 DVD)

Volume in drive F is My Disc
Volume Serial Number is CAE9-E8B1

Directory of F:\

11/05/2010	10:39 AM	149,815,296	file.db
09/29/2010	09:25 AM	703,332,352	file.rst
09/29/2010	07:11 AM	2,221,491	file.s01
09/29/2010	07:11 AM	2,221,491	file.s02
09/29/2010	07:11 AM	2,221,491	file.s03
09/29/2010	07:11 AM	2,221,491	file.s04
09/29/2010	07:11 AM	2,221,491	file.s05
09/29/2010	07:11 AM	2,221,491	file.s06
09/29/2010	07:11 AM	2,221,491	file.s07
09/29/2010	10:19 AM	2,964,482	ls1post.out
09/29/2010	10:19 AM	2,964,482	ls2post.out
09/29/2010	10:19 AM	2,964,482	ls3post.out
09/29/2010	10:19 AM	2,964,482	ls4post.out
09/29/2010	10:19 AM	2,964,482	ls5post.out
09/29/2010	10:19 AM	2,964,482	ls6post.out
09/29/2010	10:19 AM	2,964,482	ls7post.out
11/24/2010	11:50 AM	2,453,414	model.out
	17 File(s)	891,902,873	bytes
	0 Dir(s)	0	bytes free