

**TEST PLAN FOR THE POSITIVE PRESSURE TEST
OF THE O-RING TEST FIXTURE (OTF) FOR THE
ALPHA MAGNETIC SPECTROMETER (AMS)-02**

TWP MHECSMBSX

Prepared by

**Lockheed Martin Space Operations
Houston, TX**

For

**National Aeronautics and Space Administration
Lyndon B. Johnson Space Center**

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Test Plan for the O-Ring Test Fixture

Prepared by:

[Original Signed by Hsing Ju on January 29, 2002](#)

Hsing Ju, Test Engineer
LMSO

Reviewed by:

[Original Signed by Chittur Balasubramanian on January 29, 2002](#)

Chittur Balasubramanian, Stress Analysis Lead
LMSO

[Original Signed by Phil Mott on January 29, 2002](#)

Phil Mott, Certification & Test Lead
LMSO

Approval:

[Original Signed by Trent Martin on January 29, 2002](#)

Trent Martin, Structural Analysis Lead
LMSO

[Original Signed by Mike Trznadel on January ??, 2002](#)

Mike Trznadel, Manager
Structural Analysis Section
LMSO

[Original Signed by Kenneth Bollweg on January ??, 2002](#)

Kenneth Bollweg
Project Manager, AMS-02
LMSO

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ACRONYMS AND ABBREVIATIONS

AMS	Alpha Magnetic Spectrometer
FEM	Finite Element Model
JSC	Johnson Space Center
LBB	Leak Before Burst
LMSO	Lockheed Martin Space Operations
MSDS	Material Safety Data Sheet
OTF	O-Ring Test Fixture
P/N	Part Number
QA	Quality Assurance
STL	Structural Testing Laboratory
TPS	Task Preparation Sheet
TRR	Test Readiness Review

1. Test Objectives

- 1.1. The O-Ring Test Fixture (OTF) will determine the deflection and strain in each of the O-ring joints at 1.8 atm (26.5 psia).
- 1.2. The data taken from 1.1 will be used to verify the FEM of the OTF.
- 1.3. Yielding of the OTF is not expected at a pressure of 1.8 atm. Pretest analysis has been performed and is attached as Appendix A and B of this document.

2. Test Article

The test article consists of one Class III OTF, P/N SEG36144341. The test article is shown in Figure 2-1. The procedure for assembling the OTF is found in Appendix C of this document.

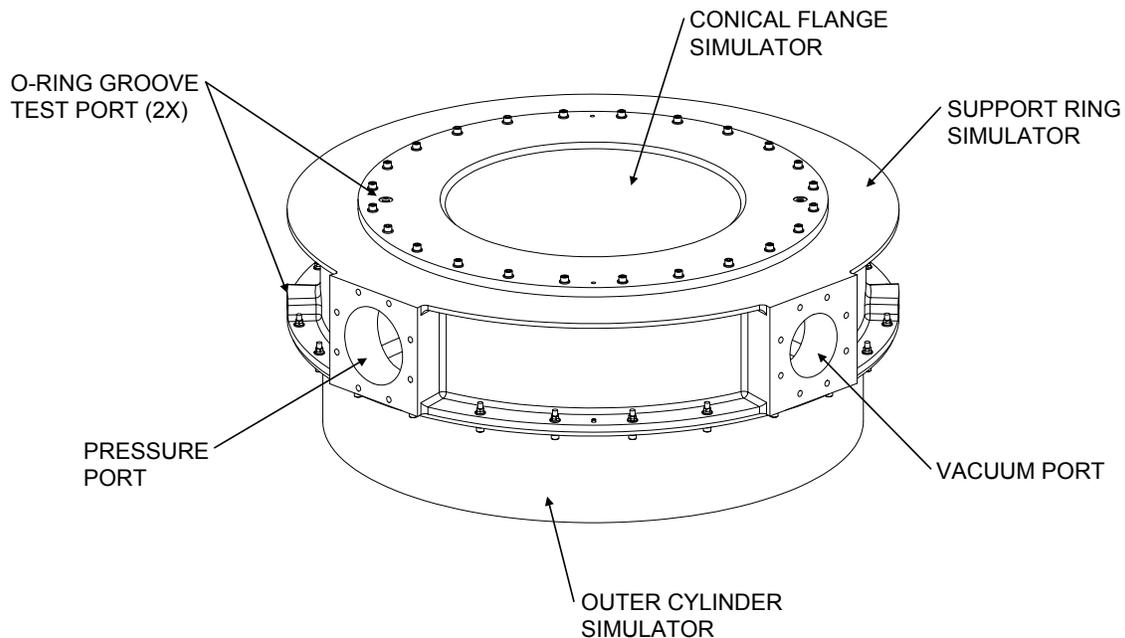


Figure 2-1: O-Ring Test Fixture

3. Test Set Up

- 3.1. The OTF will be supported around the entire circumference of the Outer Cylinder simulator by a wood frame. This will allow the OTF to deflect without affecting the results.
- 3.2. The setup for this test is shown in Figure 3.1.

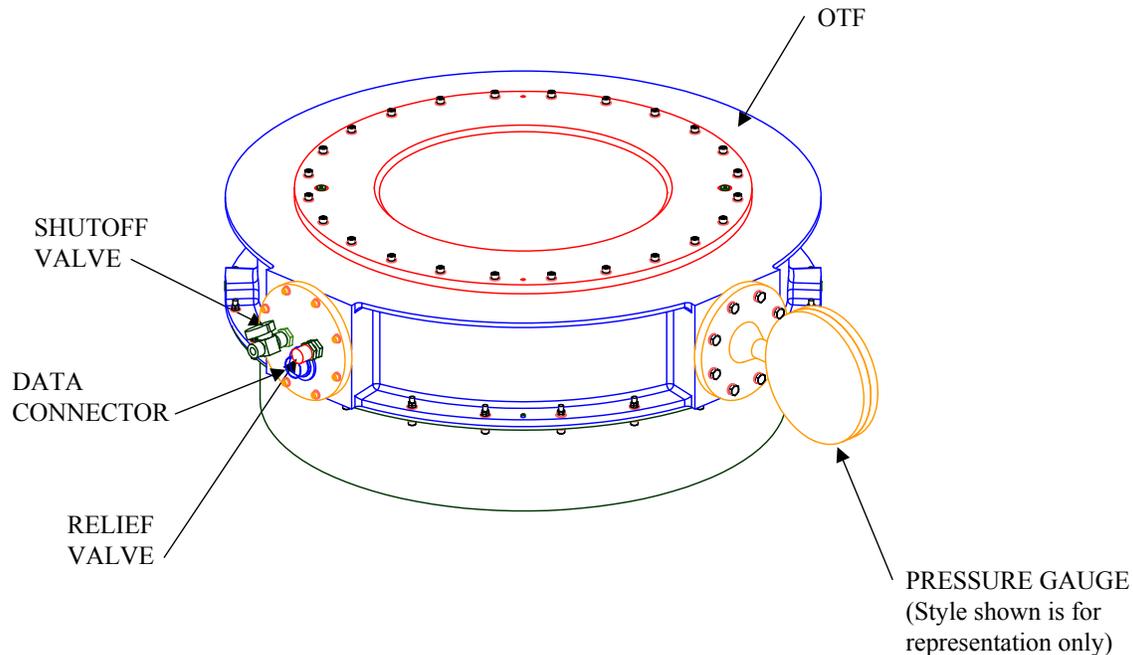


Figure 3.1: Positive Pressure Test Hardware

- 3.3. Position OTF, P/N SEG36144341-301, on support structure supplied by the AMS project.
- 3.4. Remove 1 CPA series $\frac{1}{4}$ male NPT pipe end adjustable check valve, P/N SS-4CPA2-DR-3, from container and set the cracking pressure to 1.8 atm (26.5 psia) or .8 atm (11.8 psig) delta per manufacturer's instructions. Reseal the check valve after setting the cracking pressure per manufacturer's instructions.
- 3.5. Remove all grease from the mating surface and O-ring grooves of the Vacuum Port Blanking Flange, SDG36144345-005, with Isopropyl Alcohol, Reagent Grade, by wiping surface with lint free cloth.
- 3.6. Wearing lint free gloves, remove 1 O-ring, P/N 2-238, from the pouch and apply a thin coat of high vacuum grease, P/N 1597418,

to the O-ring by squeezing some of the grease from the tube into the palm of the glove and pulling the O-ring through the grease. The grease should evenly coat the O-ring. After the application of the high vacuum grease, place O-ring into the smaller O-ring groove on the Vacuum Port Blanking Flange, SDG36144345-005.

- 3.7. Repeat the previous step except remove 1 O-ring, P/N 2-246, from the pouch and install in the larger O-ring groove of Vacuum Port Blanking Flange, SDG36144345-005.
- 3.8. Dispose of excess grease and soiled gloves per the Material Safety Data Sheet (MSDS).
- 3.9. Remove all grease from the surface of the vacuum port interface surface, identified by VAC on the interface surface, with Isopropyl Alcohol, Reagent Grade, by wiping surface with lint free cloth. Check the vacuum port interface surface on OTF for damage after cleaning. Record any visible damage.
- 3.10. Carefully wipe off any grease from the surfaces outside of the O-rings using Isopropyl Alcohol, Reagent Grade, along with lint free cloths. The area between the O-rings should be left alone unless there is a glob of grease on the surface (This will be determined by the test engineer). Do not touch any part of the O-rings during the cleaning procedure. Clean as close as possible to the O-rings without touching them.
- 3.11. Seal the vacuum port with the Vacuum Port Blanking Flange, SDG36144345-005 using M8 X 1.25 bolts and washers, P/N 854021. During the installation process, do not slide the Vacuum Port Blanking Flange across the mating surface of the Support Ring Simulator. Install bolts in a crisscross pattern to insure even O-ring compression. Measure and record the running torque for each fastener (Running torque is expected to be 7.5 to 80 in-lbs). Final torque will be 7-10 ft-lbs above the running torque.
- 3.12. Install calibrated pressure gauge provided by testing facility into the Vacuum Port Blanking Flange, SDG36144345-005. Install per NASA/JSC B13 STL's instruction. Record P/N and S/N on TPS.
- 3.13. Remove all grease from the mating surface and O-ring grooves of the Positive Pressure Port Interface Flange, SDG36144345-001, with Isopropyl Alcohol, Reagent Grade, by wiping surface with lint free cloth.

- 3.14. **CAUTION: Do not damage O-ring grooves on flange. Apply a layer of Kapton tape over the grooves for protection.** Install CPA series ¼ male NPT pipe end adjustable check valve, P/N SS-4CPA2-DR-3, in location indicated in Figure 3.2 on the Positive Pressure Interface Flange, SDG36144345-001. Inspect NPT port and nipple to ensure that threads are free of nicks, burrs, and dirt. Wrap Teflon tape 1 ½ turns around male threads in a clockwise direction when viewed from the end. Screw fitting into female port to the finger tight position. Wrench tighten fitting to 1.3 – 3.0 turns from finger tight. Final configuration should be approximately as that shown in Figure 3.2 in order for installation of the data connector. Excessive leak rate is not a concern as long as the chamber can reach 1.8 atm (26.5 psia) or 0.8 atm (11.8 psig) delta.
- 3.15. Install one (1) ¼ male NPT pipe fitting, P/N SS-4-HN, in location indicated in figure 3.2 on the Positive Pressure Port Interface Flange, SDG36144345-001. Inspect NPT port and nipple to ensure that threads are free of nicks, burrs, and dirt. Wrap Teflon tape 1 ½ turns around male threads in a clockwise direction when viewed from the end. Screw fitting into female port to the finger tight position. Wrench tighten fitting to 1.3 – 3.0 turns from finger tight. Final configuration should be approximately as that shown in Figure 3.2 in order for installation of the data connector. Excessive leak rate is not a concern as long as the chamber can reach 1.8 atm (26.5 psia) or 0.8 atm (11.8 psig) delta.
- 3.16. Install one (1) P4T Series plug valve, P/N 22-4P4T4, on the ¼ male NPT pipe fitting, P/N SS-4-HN. Inspect NPT port and nipple to ensure that threads are free of nicks, burrs, and dirt. Wrap Teflon tape 1 ½ turns around male threads in a clockwise direction when viewed from the end. Screw fitting into female port to the finger tight position. Wrench tighten fitting to 1.3 – 3.0 turns from finger tight. Final configuration should be approximately as that shown in Figure 3.2 in order for installation of the data connector. Excessive leak rate is not a concern as long as the chamber can reach 1.8 atm (26.5 psia) or 0.8 atm (11.8 psig) delta
- 3.17. Install data connector, P/N DM563-37PP, in location as indicated in figure 3.2, per directions from the STL.
- 3.18. Remove the Kapton tape and clean the mating surface and O-ring grooves of the Positive Pressure Port Interface Flange, SDG36144345-001, with Isopropyl Alcohol, Reagent Grade, by wiping surface with lint free cloth.

- 3.19. Wearing lint free gloves, remove 1 O-ring, P/N 2-244, from the pouch and apply a thin coat of high vacuum grease, P/N 1597418, to the O-ring by squeezing some of the grease from the tube into the palm of the glove and pulling the O-ring through the grease. The grease should evenly coat the O-ring. After the application of the high vacuum grease, place O-ring into the smaller O-ring groove on the Positive Pressure Port Interface Flange, SDG36144345-001.
- 3.20. Repeat previous step except remove 1 O-ring, P/N 2-248, from the pouch and install in the larger O-ring groove of Positive Pressure Port Interface Flange, SDG36144345-001.
- 3.21. Dispose of excess grease and soiled gloves per the Material Safety Data Sheet (MSDS).
- 3.22. Remove all grease from the surface of the pressure port interface surface, identified by PSI on the interface surface, with Isopropyl Alcohol, Reagent Grade, by wiping surface with lint free cloth. Check the pressure port interface on OTF for damage after cleaning. Record any visible damage.
- 3.23. Carefully wipe off any grease from the surfaces outside of the O-rings using Isopropyl Alcohol, Reagent Grade, along with lint free cloths. The area between the O-rings should be left alone unless there is a glob of grease on the surface (This will be determined by the test engineer). Do not touch any part of the O-rings during the cleaning procedure. Clean as close as possible to the O-rings without touching them.
- 3.24. Seal the positive pressure port with the Positive Pressure Interface Flange, SDG36144345-001 using 10-32UNJF-3B bolts, P/N NAS1351N3H12. During the installation process, do not slide the Positive Pressure Interface Flange across the mating surface of the Support Ring Simulator. Install bolts in a crisscross pattern to insure even O-ring compression. Measure and record the running torque for each fastener (Running torque is expected to be 2 to 18 in-lbs). Final torque will be 30-35 in-lbs above the running torque.
- 3.25. Seal the two helium leak check ports on the Conical Flange Simulator, SDG36144342-001, and Support Ring Simulator, SEG36144342-301 with hollow hex plug, P/N 2 HP50N SS V0894. Torque plugs to 30-35 in-lbs.

- 3.26. Connect the OTF, SEG36144341-301, to a regulated K bottle via the Plug Valve, P/N SS-4P4T4, which has a 1/4 NPT female thread on the Positive Pressure Interface Flange.

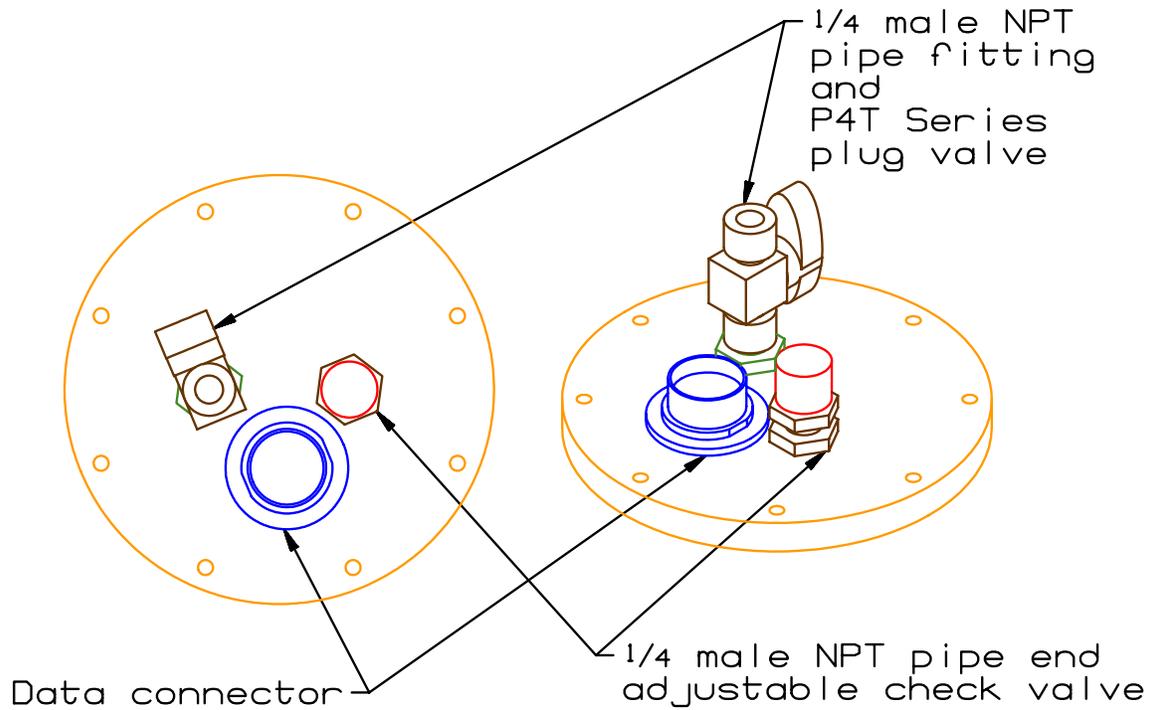


Figure 3.2 Positive Pressure Interface Flange

4. Test Instrumentation

- 4.1. The OTF will require the following instrumentation (see Table 4.1 for a list of gages):
- 11 Deflection gages
 - 4 Triaxial Strain gages
 - 3 Uniaxial gages
 - 1 Pressure gage (0-25 psig range)

Table 4.1-1 Summary of Strain and Deflection Gages

Location	Description	Type	Qty	Gage #	Channels
Conical Flange	Between o-ring grooves on outer surface	Deflection	1	1	1
Conical Flange	Outer diameter of flange	Deflection	1	2	1
Support Ring	Center of upper surface	Deflection	1	3	1
Support Ring	Upper surface directly above ring web	Deflection	1	4	1
Support Ring	Between o-ring grooves on outer surface	Deflection	1	5	1
Support Ring	Outer diameter at cylinder interface	Deflection	1	6	1
Outer Cylinder	Outer diameter of cylinder	Deflection	1	7	1
Outer Cylinder	Outer surface between o-ring grooves on ring	Deflection	1	8	1
Conical Flange	Center of flange	Deflection	1	9	1
Outer Cylinder	Center of bottom surface	Deflection	1	10	1
Support Ring	Center of vertical cross section	Deflection	1	11	1
Conical Flange	Center of flange	Triaxial	1	A	3
Support Ring	Lower surface next to bolt	Triaxial	1	B	3
Outer Cylinder	Outside surface across from inside radius	Triaxial	1	C	3
Outer Cylinder	Inside surface next to radius	Triaxial	1	D	3
Conical Flange	Outer surface next to fastener	Uniaxial	1	E	1
Support Ring	Center of vertical cross section	Triaxial	1	G	1
Support Ring	Interface Flange of vacuum port	Tansducer	1	N/a	1
		Total	18		26

4.2. For gage setup, use material properties shown in Table 4.2.

Table 4.2 Material Properties for Strain Gage Setup

Location	Material	E x 10 ⁶ psi		ν
		Tension	Compression	
Conical Flange	Aluminum 2219-T851 Plate	10.5	10.8	.33
Support Ring	Aluminum 7050-T7451 Plate	10.3	10.6	.33
Outer Cylinder	Aluminum 7050-T7451 Plate	10.3	10.6	.33

4.3. Each gage should be clearly labeled with the gage number. See Table 4.3 for a summary of deflection gages. The expected deflection is expected to be very small so the measured deflection will be fill in once the test pressure is reached.

Table 4.3 Deflection Gage Summary

Location	Description	Gage #	Axis	Measured Deflection
Conical Flange	Between o-ring grooves on outer surface	1	Z	
Conical Flange	Outer diameter of flange	2	Z	
Support Ring	Center of upper surface	3	Z	
Support Ring	Upper surface directly above ring web	4	Z	
Support Ring	Between o-ring grooves on outer surface	5	Z	
Support Ring	Outer diameter at cylinder interface	6	Z	
Outer Cylinder	Outer diameter of cylinder	7	Z	
Outer Cylinder	Outer surface between o-ring grooves on ring	8	Z	
Conical Flange	Center of flange	9	Z	
Outer Cylinder	Center of bottom surface	10	Z	
Support Ring	Center of vertical cross section	11	Radial	

4.4. Configure gages per Figures 4.4-1 - 4.4-3. Relocation of some gages might be necessary due to the distance between the edge of the test article and the sensors. STL and AMS personnel will need to agree upon the placement of the relocated sensors for practicality of the location and usefulness of the data that will be collected.

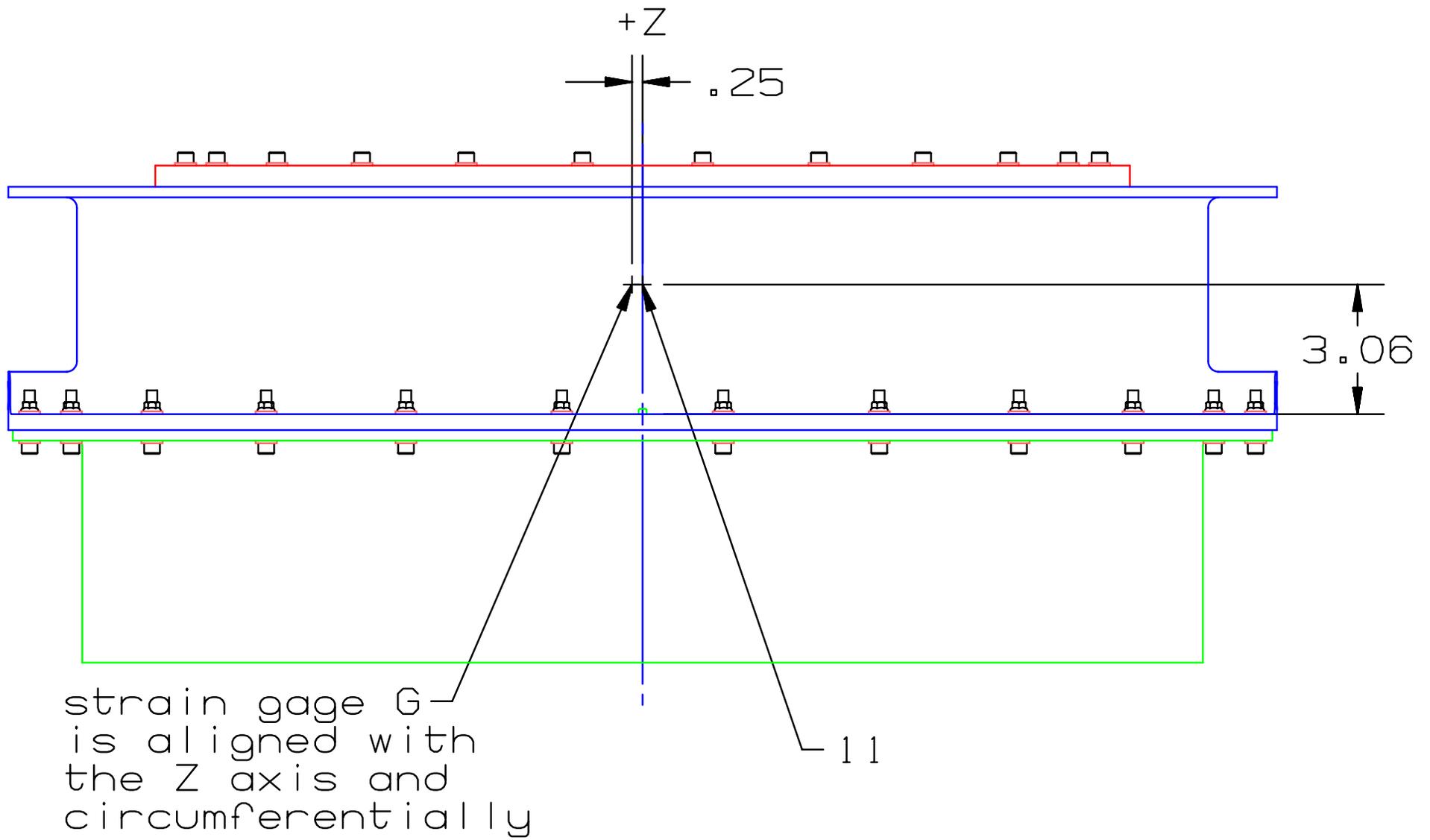


Figure 4.4-1 Gage Setup, Front View

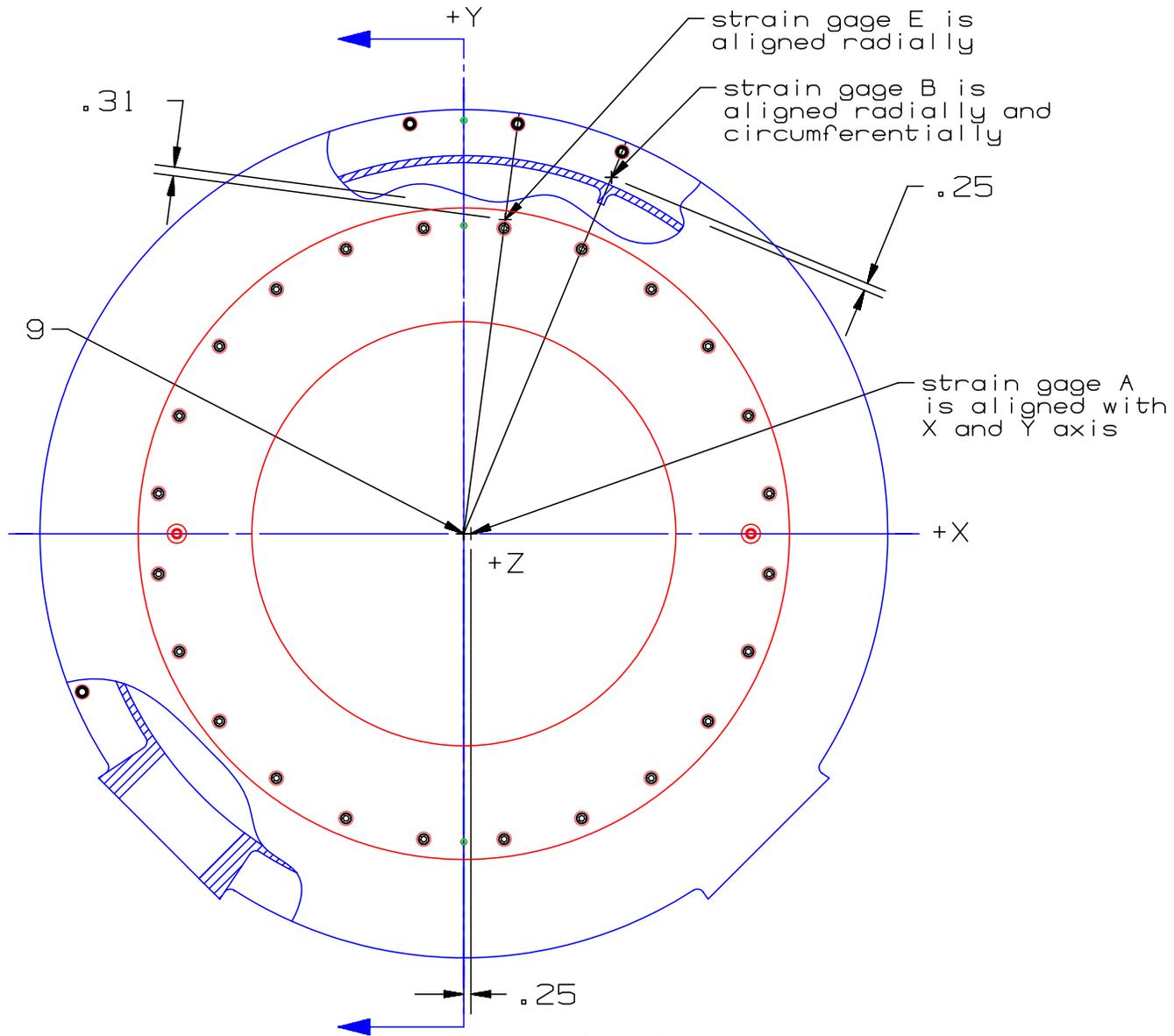


Figure 4.4-2 Gage Setup, Top View

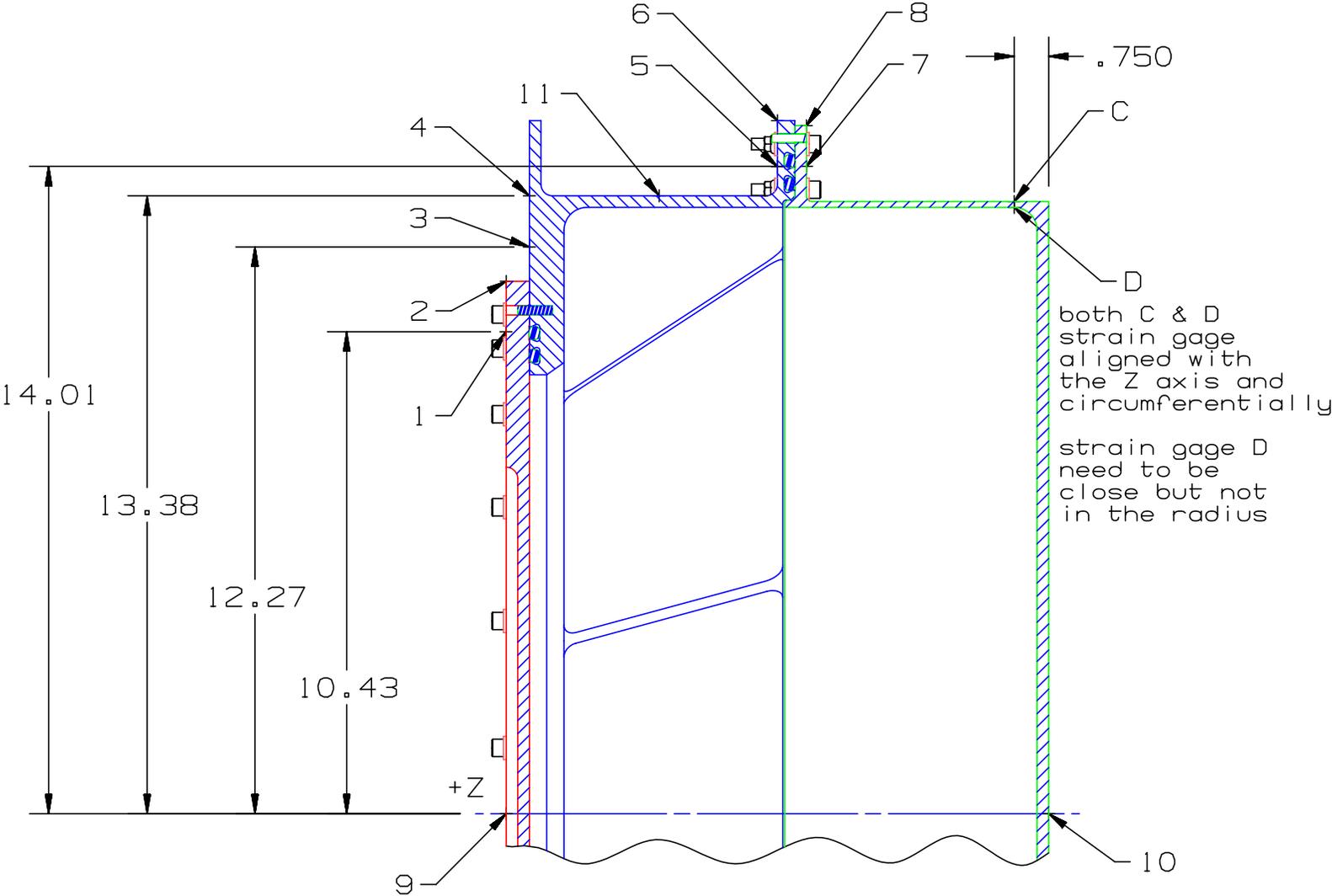


Figure 4.4-3 Gage Setup, Section View

5. Data Requirements

This test requires support of the JSC Building 13 STL. The STL personnel need to coordinate and deliver the following output. Numerical data should be delivered in hard copy and in electronic (ASCII or EXCEL file) format.

- 5.1. Photographic documentation (digital and conventional still camera) of the test set-up and gage location is required. These photos should show the gages with the gage number labels.
- 5.2. Strain versus percent load for each strain gage. Load versus time for each load case.
- 5.3. Real time readouts of all data channel on a display monitor for the Test Engineer and Stress Analyst.
- 5.4. Real time graphical plots of the data on a separate display monitor for the Test Engineer and Stress Analyst.
- 5.5. Test Data Package including test notes, control documentation, instrumentation, test data and other applicable data.

6. Test Procedures

- 6.1. The test area must be cleared of unnecessary personnel.
- 6.2. Zero strain and deflection gages.
- 6.3. Begin recording strain and deflection data.
- 6.4. Start positive pressure flow of dry nitrogen gas/air to the OTF.
- 6.5. Stop positive pressure flow of dry nitrogen gas/air into chambers when the pressure reaches 1.8 atm (26.5 psia) or 0.8 atm (11.75 psig) delta.
- 6.6. Record and print data
- 6.7. Slowly vent OTF SEG36144341-301 to atmospheric pressure after data collection is complete by opening the Plug Valve, P/N 22-4P4T4, on the Positive Pressure Port Interface Flange, P/N SDG36144345-001.

- 6.8. Remove the calibrated pressure gauge from the Vacuum Port Blanking Flange, P/N SDG36144345-005 and return to B13, STL.
- 6.9. Remove the data connector and return to B13, STL.

7. Pass/Fail criteria

The test shall be considered a success if the hardware experiences no permanent deformation or failure.

8. Test Support, OTF

This test will be used for FEM verification and strength determination. Full Quality Assurance (Q.A.) coverage is required. The OTF review board will determine test readiness. The test review board will approve continuation of the test/procedures. Table 8-1 defines the members of the review board. Other board members may be added as necessary.

Table 8-1. OTF Review Board

Responsibility	Representative	Contact
OTF Test Engineer	Hsing Ju / LMSO	281-333-7494
AMS-02 Test Lead Engineer	Phil Mott / LMSO	281-333-6451
Project Manager	Kenneth Bollweg / LMSO	281-335-2714
Structural Lead	Trent Martin / LMSO	281-335-2139
Stress Lead	Chittur Balasubramanian / LMSO	281-333-7518
Stress Analyst	Howard Carter / LMSO	281-333-7339
Safety	Claude Wood / SAIC / B13	281-483-6354
Q.E.	David Fretz / WGI / B13	281-483-6375
Facility Personnel	Don Wilbanks / LMSO / B13	281-483-8819
Chairperson	James Lester/ES5	281-483-8949

Appendix A: Leak Before Burst Analysis

Prepared By	Name/Date C. Balasubramanian 8/30/01	LOCKHEED MARTIN  Science, Engineering, Analysis, & Test <i>Mechanical Systems Analysis Department.</i>	Page/Section No. A1	File Name Oring_lbb.doc
	Checked By Howard Carter 9/06/01		Drawing No.	
Title O Ring Test Fixture.				

The O-Ring test fixture is shown as Leak-Before Burst as per NASA-STD-5003 sect. 4.2.2.4.2.3. The maximum stress is on the outer cylinder.

Material for Outer cylinder: 7050-T7451 Plate

Crack Case type: TC07

Section Properties: Plate thickness $t = 0.125$ in.
Outer diameter $D = 26.5$ in.

Crack Properties: Crack length (half) $c = 0.625$ in.

Max. Stress in outer cylinder analysis) $S_0 = 32.2$ ksi (Ref. O-ring test fixture)

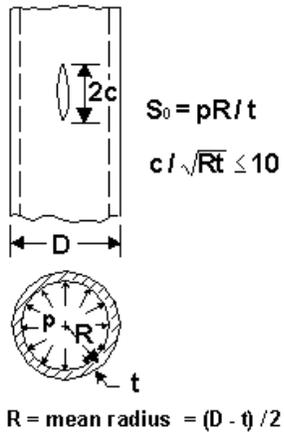
Notes: NASA/FLAGRO analysis (see following pages) is performed to show that a critical length of a through crack is at least 10 times the wall thickness. Analysis is done to show that the stress intensity factor $K < K_t$ (fracture toughness of the material).

$$K = 56.14 \text{ ksi}\sqrt{\text{in.}}$$

$$K_t = 70.7 \text{ ksi}\sqrt{\text{in.}}$$

So the O-ring test fixture is classified as Leak-Before- Burst.

Prepared By	Name/Date C. Balasubramanian 8/30/01	LOCKHEED MARTIN  Science, Engineering, Analysis, & Test <i>Mechanical Systems Analysis Department.</i>	Page/Section No. A2	File Name Oring_lbb.doc
	Checked By Howard Carter 9/06/01		Drawing No.	
Title O Ring Test Fixture.				

TC07

Material: 7050/7451 Plate

NASA/FLAGRO Crack case type: TC07

Section Properties:
 $t = 0.125$ in.
 $D = 26.5$ in.

Crack Properties:
 $c = 0.625$ in.

Stress: $S_0 = 32.2$ ksi

Prepared By	Name/Date C. Balasubramanian 8/28/01	LOCKHEED MARTIN  Science, Engineering, Analysis, & Test <i>Mechanical Systems Analysis Department.</i>	Page/Section No. A3	File Name Oring_Kt.doc
	Checked By		Howard Carter 9/06/01	Drawing No.
Title				

FATIGUE CRACK GROWTH ANALYSIS

DATE: 08/28/01 TIME: 12:40:52
 (computed: NASGRO Version 3.0.4, Jan 2000.)
 U.S. customary units [inches, ksi, ksi sqrt(in)]

PROBLEM TITLE

O Ring Test Fixture

Crack Growth Model: Non Interaction
 Equation/Table : NASGRO Equation

GEOMETRY

MODEL: TC07-Through crack in cyl. in longitudinal direction.

Thickness, t = 0.1250
 Outer Diameter, D = 26.5000

FLAW SIZE: (User specified)

c (init.) = 0.6250

MATERIAL

MATL 1: 7050-T74511
 Extr; L-T; LA & DW

Material Properties:

Keac :	:Matl:	UTS :	YS :	K1e :	K1c :	Ak :	Bk :	Thk :	Kc :	
:	: No.:	:	:	:	:	:	:	:	:	
:	:	:	:	:	:	:	:	:	:	
-----:	:	1 :	79.0:	70.0:	50.0:	36.0:	1.00:	1.00:	0.125:	70.7:

-----:	:Matl:-----	Crack Growth Eqn Constants	-----							
Rcl:Alpha:	Smax/:	: No.:	C :	n :	p :	q :	DKo :	Cth+ :	Cth- :	
:SIGo :	:	:	:	:	:	:	:	:	:	
-----:	:	1 :	0.279D-07:	2.682:	0.50:	1.00:	2.20:	0.40:	0.10:	0.70:

1.90: 0.30: **Kt = 70.7 ksi•in**

Prepared By	Name/Date C. Balasubramanian 8/28/01	LOCKHEED MARTIN  Science, Engineering, Analysis, & Test <i>Mechanical Systems Analysis Department.</i>	Page/Section No. A4	File Name Oring_Kt.doc
	Checked By		Howard Carter 9/06/01	Drawing No.
Title				

STRESS INTENSITY SOLUTION CHECK FOR TC07

 DATE: 08/30/01 TIME: 09:01:38
 (computed: NASGRO Version 3.0.4, Jan. 2000.)
 U.S. customary units [inches, ksi, ksi sqrt(in)]

Thickness, t = 0.1250
 Outer Diameter, D = 26.5000

Material Yield Stress = 60.00

S0: Tens. Hoop Stress
 S0 = 32.20

c	:	K	:	Snet	:	Sn/Sy
0.6250	:	56.1434	:	32.200	:	0.537

K = 56.1434 ksi•in

K < Kt. So the O-ring test fixture is classified as Leak -Before-Burst

Appendix B: Pretest Analysis of Positive Pressure & Vacuum Test

This analysis is located in file "OTF Analysis.pdf".

Appendix C: Procedure for OTF Assembly

1. CONICAL FLANGE TO SUPPORT RING

- 1.1. Remove the Conical Flange Simulator, SDG36144342-001, from the Support Ring Simulator Assembly, SEG36144343-301.
- 1.2. Place the Conical Flange Simulator, SDG36144342-001, to the side with the O-Ring grooves facing up.
- 1.3. Remove the existing O-Rings from the O-Ring grooves. Do not damage the surface of the O-Ring grooves. Store the existing O-Ring in a plastic bag to prevent contamination.
- 1.4. Remove all grease from the mating surface and O-ring grooves of the Conical Flange Simulator, SDG36144342-001, and Support Ring Simulator Assembly, SDG36144343-301, using Isopropyl Alcohol, Reagent Grade, along with lint free cloth. Wipe the surface clean with lint free cloth and clean up any spills that are inside the OTF.
- 1.5. Wearing lint free gloves, remove 1 O-ring, P/N SLG144346-001, from the pouch and apply a thin coat of high vacuum grease, P/N 1597418, to the O-ring by squeezing some of the grease from the tube into the palm of the glove and pull the O-ring through the grease. The grease should evenly coat the O-ring. After the application of the high vacuum grease, place O-ring into the smaller O-ring groove on the Support Ring Simulator Assembly, SDG36144343-301.
- 1.6. Repeat the previous step except remove 1 O-ring, P/N SLG144346-003, from the pouch and install in the larger O-ring groove of the Support Ring Simulator Assembly, SDG36144343-301.
- 1.7. Dispose of excess grease and soiled gloves per the Material Safety Data Sheet (MSDS).
- 1.8. Carefully wipe off any grease from the surfaces outside of the O-rings using Isopropyl Alcohol, Reagent Grade, along with lint free cloths. The area between the O-rings should be left alone unless there is a glob of grease on the surface (This will be determined by the test engineer). Do not touch any part of the O-rings during the cleaning procedure. Clean as close as possible to the O-rings with touching them.
- 1.9. Install the Conical Flange Simulator, SDG36144342-001, to the Support Ring Simulator Assembly, SDG36144343-301, using 24 .250-28UNRF-

3A 1-inch long fasteners, P/N NAS1351N4H16. During the installation process, do not slide the Conical Flange Simulator across the mating surface of the Support Ring Simulator. Install the screws in a crisscross pattern to insure even O-ring compression. Measure and record the running torque for each fastener. Final torque will be 65-75 in-lbs above the running torque.

2. OUTER CYLINDER TO SUPPORT RING

- 2.1. Remove the Support Ring Simulator Assembly, SEG36144343-301, from the Outer Cylinder Simulator Assembly, SEG36144344-301.
- 2.2. Place the Support Ring Simulator Assembly, SEG36144343-301, with the O-Ring grooves facing up. It will be sitting on the Conical Flange Simulator at this step.
- 2.3. Remove the existing O-Rings from the O-Ring grooves. Do not damage the surface of the O-Ring grooves. Store the existing O-Ring in a plastic bag to prevent contamination.
- 2.4. Remove all grease from the mating surface and O-ring grooves of the Support Ring Simulator Assembly, SDG36144343-301, and Outer Cylinder Simulator Assembly, SEG3614344-301, using Isopropyl Alcohol, Reagent Grade, along with lint free cloth. Wipe the surface clean with lint free cloth and clean up any spills that are inside the OTF.
- 2.5. Wearing lint free gloves, remove 1 O-ring, P/N SLG144346-005, from the pouch and apply a thin coat of high vacuum grease, P/N 1597418, to the O-ring. Squeeze some of the grease from the tube into the palm of the glove and pull the O-ring through the grease. The grease should evenly coat the O-ring. After the application of the high vacuum grease, place O-ring into the smaller O-ring groove on the Support Ring Simulator Assembly, P/N SDG36144343-301.
- 2.6. Repeat the previous step except remove 1 O-ring, P/N SLG144346-007, from the pouch and install in the larger O-ring groove of the Support Ring Simulator Assembly, SDG36144343-301.
- 2.7. Dispose of excess grease and soiled gloves per the MSDS.
- 2.8. Carefully wipe off any grease from the surfaces outside of the O-rings using Isopropyl Alcohol, Reagent Grade, along with lint free cloths. The area between the O-rings should be left alone unless there is a glob of grease on the surface (This will be determined by the test engineer).

Do not touch any part of the O-rings during the cleaning procedure.
Clean as close as possible to the O-rings with touching them.

- 2.9. Install the Support Ring Simulator Assembly, SEG36144343-301, to the Outer Cylinder Simulator Assembly, SEG3614344-301, using 24 .250-28UNRF-3A 1.25-inch long fasteners, P/N NAS1351N4H20 and .250-28UJF-3B nuts, P/N NAS1291C4M. During the installation process, do not slide the O-ring groove surface on the Support Ring Simulator Assembly, SEG36144343-301, across the mating surface of the Outer Cylinder Simulator Assembly, SEG36144344-301. Install the nuts and the screws in a crisscross pattern to insure even O-ring compression. Measure and record the running torque for each fastener. Final torque is 65-75 in-lbs above running torque.