

QUALIFICATION ENVIRONMENTS

FOR

PMD TANK

ATK P/N 80506-7



<u>ATK P/N</u>	<u>CAPACITY</u>	<u>MASS PROP. (Max.)</u>
80506-1	277.26L (16,920 in ³)	16.37 Kg (36.10 lbs.)
80506-2	333.31L (20,340 in ³)	18.86 Kg (41.60 lbs.)
80506-3	389.35L (23,760 in ³)	20.91 Kg (46.10 lbs.)
80506-4	445.40L (27,180 in ³)	22.43 Kg (49.45 lbs.)
80506-5	501.44L (30,600 in ³)	24.19 Kg (53.35 lbs.)
80506-6	548.14L (33,450 in ³)	25.58 Kg (56.40 lbs.)
80506-7	594.85L (36,300 in ³)	26.96 Kg (59.45 lbs.)

Family of 80506 Tanks

Note: 80506-7 was qualified by test. Smaller tanks were qualified by similarity.

Table 1: P/N 80506-7 PMD Tank Specification Requirements

Parameters	Requirements
Operating Pressure	256 psig
Proof Pressure	338 psig, Actual Proof: 340 psig
Burst Pressure	410 psig, Actual Burst: 510 psig
Collapse Pressure	1.0 – 1.2 psig, Actual Tested: 1.2 psig
Reverse Pressure	Yes
Material of Construction	Shell: Solution Treated and Aged (STA) 6AL-4V Titanium Heads Inlet/Outlet Ports: 6AL-4V titanium to 304L Stainless transition tubes PMD: 6AL-4V and CP Titanium
Membrane Thickness	0.023 inch
Tank Mount(s)	Mounting is provided via a trunion located on lower center section cylinder and with struts on the upper and lower boss.
Expulsion Efficiency	99.97 %
Design Fill Fraction	
Tank Capacity	36,300 in ³
Internal Dimensions	25.25" ID x - 1 37.00" - 2 43.00" - 3 49.00" - 4 55.00" - 5 61.00" - 6 66.00" - 7 71.00"
Tank Weight	Varying according to size from 36.10 lbs to 59.45 lbs 59.45 lbs maximum tank weight for 80506-7 Actual weight lbs 57.81 lbs
Propellant Capacity	
Shell Leakage	<1x10 ⁻⁶ std cc/sec He @ 260 psig
Failure Mode	Burst
Natural Frequency	
Temperature Environment	+50°F to +113°F (10°C to 45°C)
On Orbit Life	N/A

80506-1 was subjected to the following qualification tests:

<u>Test Sequence</u>	<u>Test Description</u>
1	Preliminary Examination of Product
2	Pre-Proof Volumetric Capacity Test
3	Proof Pressure Test
4	Post-Proof Volumetric Capacity Test
5	Proof Pressure Cycling Test
6	MEOP Pressure Cycling Test
7	Propellant Outflow Test
8	Bubble Point Test
9	Radiograph Inspection of Welds
10	External Leak Test
11	Vibration Test
12	Bubble Point Test
13	External Leak Test
14	Collapse Pressure test
15	External Leak Test
16	Radiograph and Penetrant Inspection
17	Final Examination of Product
18	Burst Test
19	Data Review

Note: The following tests are only included

1. Cycle Log
2. Proof Pressure Test
3. Proof Pressure Cycling Test
4. MEOP Pressure Cycling Test
5. Vibration Test
6. Collapse Pressure Test
7. Burst Test


Proof Pressure Test


The proof pressure was held at 340 psig @ 61°F for five (5) minutes

Test Paragraph No. 4.2.2 PSI Serial No. 0001RTest Equipment: PRES. GALGE ST-1054 PSI Part Name: Outer tankCAL 8-14-07 DUE 2-14-08, THERMOMETER ST-1432 CAL 11-8-07 DUE 5-8-08,
SCALE S/N 2421843 CAL 6-8-07 DUE 6-9-08Test Media: Distilled/Deionized Water

	<u>ACTUAL</u>	<u>REQUIRED</u>
(1) Weight of Test Assy, including Line, Prior to Test	<u>1421.0</u> lb	<u>Record</u>
(2) Record growth at every 1000 psig	<u>See sheet 4</u>	<u>Record</u>
(3) Proof Pressure at start	<u>340</u> psig	<u>338 +5/-0 psig</u>
(3) Proof Pressure at 5-minute	<u>340</u> psig	<u>338 +5/-0 psig</u>
(4) Weight of Test Assy at 5 minute-mark	<u>1938.4</u> lb	<u>Record</u>
(5) Test Specimen Liner Growth at 5-minute mark	<u>.251</u> inch	<u>Record (info only)</u>
(6) Pressure Hold Period	<u>5</u> minutes sec	<u>5 minutes minimum</u>
(7) Post Proof Test Linear Growth (after 5 minutes)	<u>0.008</u> inch	<u>Record</u>
(8) Water Weight Increase At Proof (4) - (1)	<u>17.4</u> lb	<u>Calculate</u>
(9) Water Temperature	<u>61</u> °F	<u>Record</u>
(10) Water Specific Volume at Temperature	<u>27.7096</u> in ³ /lb	<u>Record</u>
(11) Volume increase At Proof Pressure (8) x (10)	<u>482.1</u> in ³	<u>Calculate</u>
(12) Visual Inspection for damage	<u>ACCEPT</u> / REJECT	<u>None allowed</u>
(13) Record on Data Sheet - Pressure Log	<u>YES</u> / NO	<u>Record each cycle</u>

Inspected By: B. Johnson  Date 2-12-08 Test result Pass / Fail

Test Paragraph No. 4.2.2PSI Serial No. 00018 Test Equipment: N/APSI Part Name: Outer tank**Proof Pressure Test:**

	Linear Growth	 LOWER / UPPER Radial Growth	
(1) Growth at 100 psig	<u>.091</u> inch	<u>.001</u>	<u>-.028</u> inch
(2) Growth at 200 psig	<u>.160</u> inch	<u>.012</u>	<u>-.035</u> inch
(3) Growth at 300 psig	<u>.224</u> inch	<u>.028</u>	<u>-.056</u> inch
(4) Growth at 338 psig	<u>.251</u> inch	<u>.036</u>	<u>-.062</u> inch
(5) Growth at 0 psig	<u>.008</u> inch	<u>.004</u>	<u>-.001</u> inch

Inspected By: G. Johnson  Date 2-12-06 Test result Pass / Fail

Proof Pressure Cycle Test

The proof pressure cycling test cycled the tank between ambient and proof pressure of 338 psig @ 61°F. The tank was held at proof pressure for a minimum of thirty (30) seconds. Total proof cycle is fifteen (15) cycles.


Test Paragraph No. 4.2.4 PSI Serial No. 0001Q

Test Equipment: PRES GAUGE ST-1054 PSI Part Name: Outer tank
CAL 9-14-07 DUE 2-14-08

Test Media: Distilled/Deionized Water

Proof Cycle number	PRESSURE GAUGE READING (338, +5/-0 psig)	PRESSURE HOLD PERIOD (30 sec. Minimum)	TANK LINEAR/RADIAL GROWTH (information only)
1	340 psig	30 sec	.241 .032 -.070 in
2	339 psig	30 sec	.240 .032 -.070 in
3	339 psig	30 sec	.239 .032 -.071 in
4	339 psig	30 sec	.239 .032 -.071 in
5	338 psig	30 sec	.238 .032 -.071 in
6	339 psig	30 sec	.238 .032 -.072 in
7	338 psig	30 sec	.238 .032 -.072 in
8	338 psig	30 sec	.237 .032 -.073 in
9	338 psig	30 sec	.236 .032 -.073 in
10	338 psig	30 sec	.236 .032 -.073 in
11	339 psig	30 sec	.237 .032 -.073 in
12	339 psig	30 sec	.235 .032 -.073 in
13	338 psig	30 sec	.235 .032 -.074 in
14	338 psig	30 sec	.233 .032 -.074 in
15	338 psig	30 sec	.231 .032 -.074 in

	ACTUAL	REQUIRED
Visual Inspection for damage	<u>ACCEPT</u> REJECT	No damage allowed
Record on Data Sheet - Pressure Log	<u>YES</u> NO	Record # of cycles

Inspected By: [Signature]  Date 2-12-08 Test result Pass Fail

MEOP Pressure


The MEOP pressure cycling test cycled the tank between ambient and MEOP pressure of 271 psig @ 61°F. The tank was held at MEOP pressure for a minimum of thirty (30) seconds. Total MEOP cycle is fifty (50) cycles.

Test Paragraph No. 4.2.5 PSI Serial No. 0001 g
 Test Equipment: PRES GAUGE ST-1054 PSI Part Name: Outer tank
CAL 8-14-07 DUE 2-14-08

Test Media: Distilled/Deionized Water

	ACTUAL	REQUIRED
(1) Water resistivity	<u>16 MEG ohm</u>	500,000 ohm min.
(2) Water pH	<u>7.0</u>	5.5 - 8.0
(3) Water temperature	<u>61 °F</u>	Record

MEOP Cycle number	PRESSURE GAUGE READING (271, +5/-0 psig)	PRESSURE HOLD PERIOD (30 sec. Minimum)	TANK LINEAR/RADIAL GROWTH (Information only)
1	<u>271 psig</u>	<u>30 sec</u>	<u>.184 .022 -.079 in</u>
2	<u>271 psig</u>	<u>30 sec</u>	<u>.184 .022 -.079 in</u>
3	<u>271 psig</u>	<u>30 sec</u>	<u>.182 .022 -.079 in</u>
4	<u>271 psig</u>	<u>30 sec</u>	<u>.193 .021 -.080 in</u>
5	<u>271 psig</u>	<u>30 sec</u>	<u>.183 .021 -.080 in</u>
6	<u>271 psig</u>	<u>30 sec</u>	<u>.182 .021 -.079 in</u>
7	<u>271 psig</u>	<u>30 sec</u>	<u>.184 .021 -.079 in</u>
8	<u>271 psig</u>	<u>30 sec</u>	<u>.184 .021 -.079 in</u>
9	<u>271 psig</u>	<u>30 sec</u>	<u>.195 .021 -.080 in</u>
10	<u>274 psig</u>	<u>30 sec</u>	<u>.190 .020 -.077 in</u>
11	<u>272 psig</u>	<u>30 sec</u>	<u>.186 .020 -.077 in</u>
12	<u>271 psig</u>	<u>30 sec</u>	<u>.180 .020 .077 in</u>
13	<u>271 psig</u>	<u>30 sec</u>	<u>.177 .019 -.076 in</u>
14	<u>274 psig</u>	<u>30 sec</u>	<u>.177 .020 -.076 in</u>

Inspected By: [Signature]  Date 2-13-08 Test result Pass Fail

Test Paragraph No. 4.2.5 PSI Serial No. 0001 G
 Test Equipment: SAME AS SHEET 1 OF 3 PSI Part Name: Outer tank

MEOP Cycle number	PRESSURE GAUGE READING (271, +5/-0 psig)	PRESSURE HOLD PERIOD (30 sec. Minimum)	TANK LINEAR/RADIAL GROWTH (information only)
15	273 psig	30 sec	.180 .020 -.076 in
16	272 psig	30 sec	.177 .020 -.076 in
17	272 psig	30 sec	.170 .020 -.075 in
18	271 psig	30 sec	.178 .020 -.075 in
19	271 psig	30 sec	.176 .020 -.075 in
20	272 psig	30 sec	.179 .020 -.075 in
- 21	271 psig	30 sec	.177 .020 -.075 in
22	271 psig	30 sec	.178 .020 -.076 in
23	272 psig	30 sec	.177 .020 -.076 in
24	272 psig	30 sec	.196 .020 -.075 in
25	272 psig	30 sec	.179 .020 -.075 in
26	272 psig	30 sec	.178 .020 -.075 in
27	272 psig	30 sec	.180 .020 -.075 in
28	273 psig	30 sec	.185 .020 -.074 in
29	273 psig	30 sec	.184 .020 -.074 in
30	271 psig	30 sec	.181 .020 -.075 in
31	273 psig	30 sec	.185 .020 -.075 in
32	273 psig	30 sec	.179 .020 -.075 in
- 33	272 psig	30 sec	.176 .020 -.075 in
34	272 psig	30 sec	.178 .020 -.075 in

Inspected By: Bryan Nadel  Date 2-13-08 Test result Pass Fail

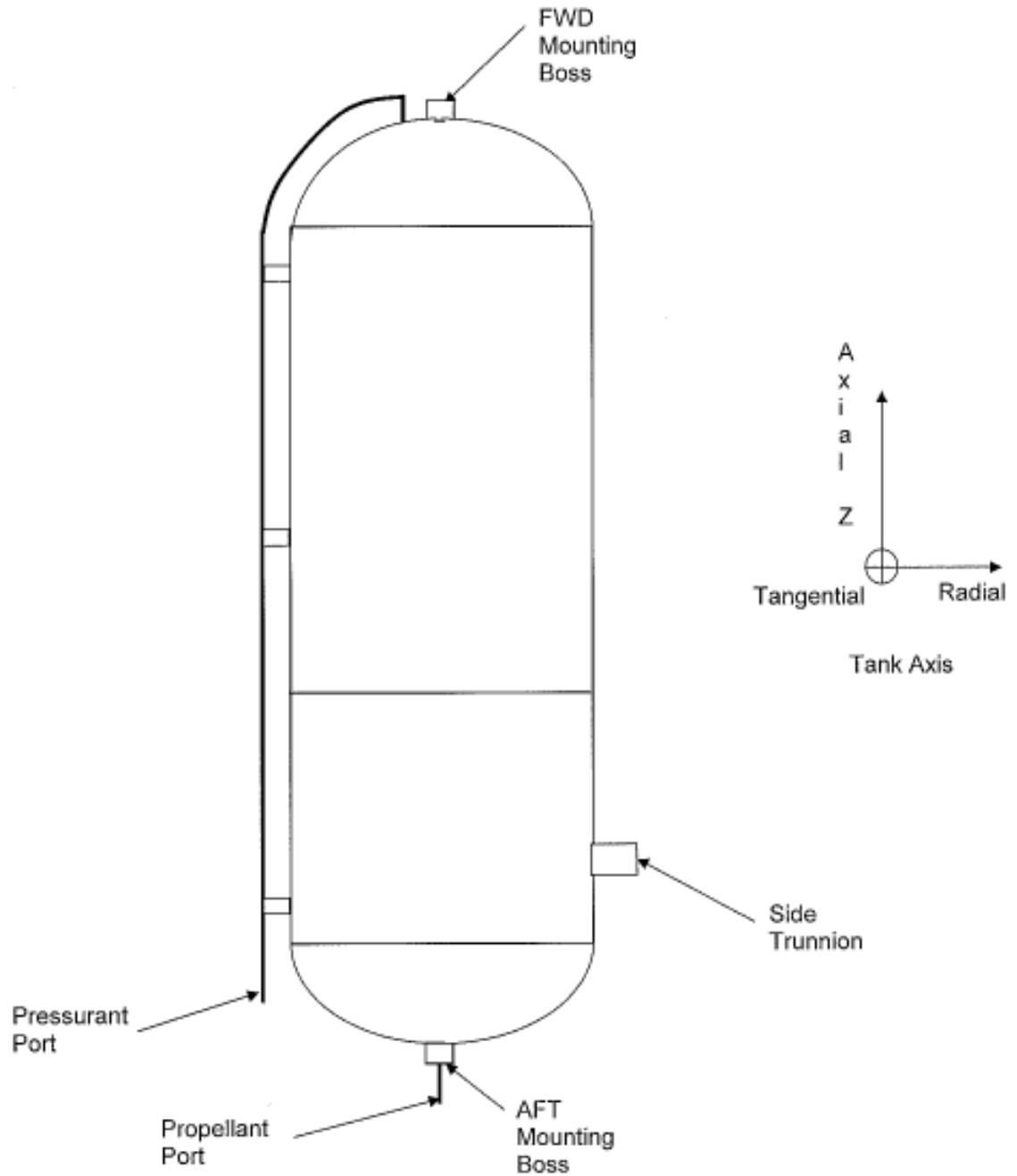
Test Paragraph No. 4.2.5 PSI Serial No. 00019Test Equipment: SAME AS SHEET 1 OF 3, PSI Part Name: Outer tank

MEOP Cycle number	PRESSURE GAUGE READING (271, +5/-0 psig)	PRESSURE HOLD PERIOD (30 sec. Minimum)	TANK LINEAR/RADIAL GROWTH (Information only)
35	273 psig	30 sec	.176.020-.074 in
36	273 psig	30 sec	.180.020-.074 in
37	273 psig	30 sec	.179.020-.074 in
38	274 psig	30 sec	.183.020-.075 in
39	272 psig	30 sec	.179.020-.075 in
40	273 psig	30 sec	.177.020-.075 in
41	273 psig	30 sec	.182.020-.075 in
42	272 psig	30 sec	.180.020-.075 in
43	273 psig	30 sec	.181.020-.075 in
44	272 psig	30 sec	.181.020-.075 in
45	273 psig	30 sec	.191.020-.075 in
46	271 psig	30 sec	.178.019-.072 in
47	271 psig	30 sec	.177.019-.072 in
48	271 psig	30 sec	.179.019-.072 in
49	272 psig	30 sec	.180.019-.073 in
50	272 psig	30 sec	.178.019-.072 in

	<u>ACTUAL</u>	<u>REQUIRED</u>
Record on Data Sheet - Pressure Log	<input checked="" type="checkbox"/> YES / NO	Record # of cycles

Inspected By: *Angela Vardell*  Date 2-13-07 Test result Pass Fail

Qualification Vibration Orientation



Wet Vibration Testing

All wet vibration testing was conducted with the tank filled to 100% fill fraction with deionized water and pressurized to launch pressure of 176 psig, +10, -0 psig in the tank, using nitrogen per paragraph 3.4. Response limiting or notching of 8.5g peak Tangential, 8.5g peak Radial and 12.75g peak axial was allowed in wet vibration testing, use Q=10 for initial random vibration input notching.

Qualification Wet Sinusoidal Vibration Test Environment, Full Level

Sinusoidal Log sweep at 2 Oct./Min.

Note: Acceleration was increased by 1.455 to account for the test fluid density

AXES	FREQUENCY (HZ)	ACCELERATION (g 0-peak)	DISPLACEMENT (in. DA)
R,T (lateral)	5 – 9.9 9.9 - 120	3.64	0.5
Z (axial)	5 – 11.9 11.9 - 120	5.24	0.5

Qualification Dry Random Vibration Test Environment, Full Level

3 minutes per axis

AXES	FREQUENCY (Hz)	PSD (G ² /Hz)	PSD (DB/oct)	GRMS
Z,R,T	20 20 - 118 118 - 560 560 - 2000 2000	0.0029 0.1 0.008	 +6 -6	9.42

Dry Vibration Testing

All dry vibration testing was conducted with a pad pressure of 20-30 psig in the tank, using nitrogen per paragraph 3.4. There was no response limiting or notching allowed in dry vibration testing.

Qualification Dry Sinusoidal Vibration Test Environment, Full Level

Sinusoidal Log sweep at 2 Oct./Min.

AXES	FREQUENCY (HZ)	ACCELERATION (g 0-peak)	DISPLACEMENT (in. DA)
Z,R,T	5 - 7 7 - 100	1.4	0.5

Qualification Dry Random Vibration Test Environment, Full Level

3 minutes per axis

AXES	FREQUENCY (Hz)	PSD (G ² /Hz)	PSD (DB/oct)	GRMS
Z,R,T	20 20 - 118 118 - 800 800 - 2000 2000	0.0029 0.1 0.008	+6 -6	10.62

Test Paragraph No. 4.3.1-3 PSI Serial No. 0001R

Test Equipment: TORQUE WRENCH ST-0758 PSI Part Name: Outer tank
CAL DATE 5-15-07 CAL DUE 5-15-09, GAGE ASH CRAFT ST-0270 CAL DATE 2-26-08
CAL DUE 8-26-08

Tangential-Axis Dry Vibration

	Actual
1. Tank Bolt Torque (25 in-lbs above running torque)	<u>Yes/No</u>
2. Fixture Bolt Torque (75 ft-lbs above running torque)	<u>Yes/No</u>
3. Actual tank pressure (20 +10/-0 psig)	<u>20 psig</u>
4. Pre-to-post survey fundamental frequency within 5%	<u>Yes/No</u>
5. Record pressurization on Data Sheet - Pressure Log	<u>Yes/No NA</u>
6. Engineering modification to test procedure during testing?	<u>Yes/No</u>

Tangential -Axis Wet Vibration

	Actual
1. Tank Bolt Torque (25 in-lbs above running torque)	<u>Yes/No</u>
2. Fixture Bolt Torque (75 ft-lbs above running torque)	<u>Yes/No</u>
3. Dry Tank Weight (from Data Sheet "B")	<u>57.8 lbs</u>
4. Weight of water	<u>1311 lbs</u>
5. Total Tank + Water Weight (line 3 + line 4)	<u>1368.8 lbs</u>
6. Correction factor (1426/line 5, should be 1.062 minimum)	<u>N/A</u>
7. Actual tank pressure (176 +10/-0 psig)	<u>178 psig</u>
8. Pre-to-post survey fundamental frequency within 5%	<u>Yes/No</u>
9. Full level sine test minimum 8.5	<u>Yes/No</u>
10. Record pressurization on Data Sheet - Pressure Log	<u>Yes/No</u>
11. Engineering modification to test procedure during testing?	<u>Yes/No</u>

Inspected By: [Signature] ⁽¹⁵⁾ Date 3-4-08 Test result: Pass/Fail

Test Paragraph No. 4.3.1-3

PSI Serial No. 00010

Test Equipment: TORQUE WRENCH ST-09B
CAL DATE 5-15-07 CAL DW 5-15-08, GAUGE BENNET ST-020

PSI Part Name: Outer tank
CAL DATE 2-26-08
CAL DW 8-26-08

Radial-Axis Dry Vibration


1. Tank Bolt Torque (25 in-lbs above running torque)
2. Fixture Bolt Torque (75 ft-lbs above running torque)
3. Actual tank pressure (20 +10/-0 psig)
4. Pre-to-post survey fundamental frequency within 5%
5. Record pressurization on Data Sheet – Pressure Log
6. Engineering modification to test procedure during testing?

Actual
<u>Yes/No</u>
<u>Yes/No</u>
<u>23</u> psig
<u>Yes/No</u>
Yes/No <u>NA</u>
Yes/No <u>Yes</u>

Radial -Axis Wet Vibration

1. Tank Bolt Torque (25 in-lbs above running torque)
2. Fixture Bolt Torque (75 ft-lbs above running torque)
3. Dry Tank Weight (from Data Sheet "B")
4. Weight of water
5. Total Tank + Water Weight (line 3 + line 4)
6. Correction factor (1426/line 5, should be 1.062 minimum)
7. Actual tank pressure (176 +10/-0 psig)
8. Pre-to-post survey fundamental frequency within 5%
9. Full level sine test minimum 8.5
10. Record pressurization on Data Sheet – Pressure Log
11. Engineering modification to test procedure during testing?

Actual
<u>Yes/No</u>
<u>Yes/No</u>
<u>57.8</u> lbs
<u>1311</u> lbs
<u>1368.8</u> lbs
<u>N/A</u>
<u>178</u> psig
<u>Yes/No</u>
<u>Yes/No</u>
<u>Yes/No</u>
Yes/No <u>Yes</u>

Inspected By [Signature]  Date 3-6-08 Test result Pass/Fail

Test Paragraph No. 4.3.1-3 PSI Serial No. 000 157

Test Equipment: TORQUE WRENCH ST-0998 PSI Part Name: Outer tank
CAL DATE 5-15-07 CAL DUE 5-15-08, CAL DATE 2-26-03 CAL DUE 8-26-08
CAL DATE 5-15-07 CAL DUE 5-15-08, CAL DATE ASH CROFT ST-0270 CAL DATE 2-26-03 CAL DUE 8-26-08

Axial Dry Vibration

	Actual
1. Tank Bolt Torque (25 in-lbs above running torque)	<input checked="" type="radio"/> Yes <input type="radio"/> No
2. Fixture Bolt Torque (75 ft-lbs above running torque)	<input checked="" type="radio"/> Yes <input type="radio"/> No
3. Actual tank pressure (20 +10/-0 psig)	<u>22</u> psig
4. Pre-to-post survey fundamental frequency within 5%	<input checked="" type="radio"/> Yes <input type="radio"/> No
5. Record pressurization on Data Sheet - Pressure Log	Yes/No <u>NA</u>
6. Engineering modification to test procedure during testing?	Yes/No <input checked="" type="radio"/> No

Axial Wet Vibration

	Actual
1. Tank Bolt Torque (25 in-lbs above running torque)	<input checked="" type="radio"/> Yes <input type="radio"/> No
2. Fixture Bolt Torque (75 ft-lbs above running torque)	<input checked="" type="radio"/> Yes <input type="radio"/> No
3. Dry Tank Weight (from Data Sheet 'B')	<u>578</u> lbs
4. Weight of water	<u>1311</u> lbs
5. Total Tank + Water Weight (line 3 + line 4)	<u>1368.8</u> lbs
6. Correction factor (1426/line 5, should be 1.062 minimum)	<u>N/A</u>
7. Actual tank pressure (176 +10/-0 psig)	<u>177</u> psig
8. Pre-to-post survey fundamental frequency within 5%	<input checked="" type="radio"/> Yes <input type="radio"/> No
9. Full level sine test minimum 12.75	<input checked="" type="radio"/> Yes <input type="radio"/> No
10. Actual tank pressure (100 +10/-0 psig)	<u>102</u> psig
11. Pre-to-post survey fundamental frequency within 5%	<input checked="" type="radio"/> Yes <input type="radio"/> No
12. Full level sine test minimum 12.75	<input checked="" type="radio"/> Yes <input type="radio"/> No
13. Record pressurization on Data Sheet - Pressure Log	Yes/No <input checked="" type="radio"/> No
14. Engineering modification to test procedure during testing?	Yes/No <input checked="" type="radio"/> No

Inspected By: [Signature] Date: 3-12-08 Test result: Pass/Fail

Test Paragraph No. 4.3.1-3 PSI Serial No. 00010
Test Equipment: NA PSI Part Name: Outer tank

SPECIMEN DRYING PER 3.12 (Record actual or fill in N/A) DATA FOR INFORMATION ONLY


Oven Temperature NA °F For information only
Nitrogen purge pressure NA psig For information only
Nitrogen flow rate NA For information only
Dew point NA °F For information only
Total drying time NA Hrs NA minutes For information only

Visually inspect test specimen and test fixture; no damage allowed

ACCEPT / REJECT

Note: Attach vendor log and response data sheets for all data collected. Vendor may use other data sheets and attach them to this sheet, but the top of this data sheet shall be completed and this data sheet shall be signed and dated.

Notes: _____

Inspected By: [Signature]  Date 3-12-08 Test result Pass / Fail

Test Paragraph No. 4.3.1-3 PSI Serial No. 00019
 Test Equipment: SEE NTS EQUIPMENT LIST PSI Part Name: Outer tank

Test Log: record each test run, acceptable to use NTS vibration test log

1 of 3

Axis	Date Completed	Frequency (Hz)	Level	Test Duration	Accept/Reject	
DRY	R	2-27-08	5-100	.25g	130 sec.	NTS 10
	R	"	5-56	DRY SINE	109 sec.	
	R	"	55-100	" "	21 sec.	
	R	"	5-100	.25g	130 sec.	
	R	"	5-100	DRY SINE	129 sec.	
	R	"	5-100	.25g	130 sec.	
	R	"	20-2000	-9 DB	60 sec.	
	R	"	20-2000	0 DB	180 sec.	
	R	"	20-2000	-9 DB	65 sec.	
	T	2-28-08	5-100	.25g	130 sec.	
	T	"	5-100	DRY SINE	130 sec.	
	T	"	5-100	.25g	130 sec.	
	T	"	20-2000	-9 DB	60 sec.	
T	"	20-2000	0 DB	180 sec.		
T	"	20-2000	-9 DB	60 sec.		
WET	T	2-29-08	5-120	.25g	107 sec.	
	T	3-3-08	5-120	.25g	138 sec.	
	T	"	5-120	1/2 LEVEL	138 sec.	↓
	T	"	5-120	FULL LEVEL	138 sec.	NTS 10

Test Paragraph No. 4.3.1-3 PSI Serial No. 00018
 Test Equipment: NA PSI Part Name: Outer tank

Test Log: record each test run, acceptable to use NTS vibration test log 3 of 3

Axis	Date Completed	Frequency (Hz)	Level	Test Duration	Accept/Reject	
Z	3-10-08	20-2000	-12DB	30 sec.	ⓧ	
Z	"	20-2000	-3DB	30 sec.	↓	
Z	"	20-2000	0DB	180 sec.		
Z	"	20-2000	-9DB	30 sec.		
Z	3-11-08	5-120	.25g	138 sec.		
Z	"	5-120	1/2 Level	138 sec.		
Z	"	5-120	FULL Level	138 sec.		
Z	"	5-120	.25g	138 sec.		
Z	"	5-120	.25g	138 sec.		
Z	3-12-08	5-100	.25g	130 sec.		
Z	"	5-100	FULL Level	130 sec.		
Z	"	5-100	.25g	130 sec.		
Z	"	20-2000	-9DB	30 sec.		
Z	"	20-2000	0DB	180 sec.		
Z	"	20-2000	-9DB	30 sec.		ⓧ
				sec.		
				sec.		
				sec.		
				sec.		

Test Paragraph No. 4.3.1-3

PSI Serial No. 000 10

Test Equipment: NA

PSI Part Name: Outer tank

Test Log: record each test run, acceptable to use NTS vibration test log 2 of 3

Axis	Date Completed	Frequency (Hz)	Level	Test Duration	Accept/Reject	
T	3-3-08	5-120	.25g	138 sec.	Ⓢ	
T	11	20-2000	-12 DB	30 sec.		
T	3-4-08	20-2000	-6 DB	30 sec.		
T	11	20-2000	0 DB	180 sec.		
T	11	20-2000	-9 DB	35 sec.		
R	3-5-08	5-120	.25g	131 sec.		
R	11	5-120	.25g	138 sec.		
R	11	5-120	1/2 LEVEL	138 sec.		
R	11	5-48	FULL LEVEL	99 sec.		
R	11	45-120	FULL LEVEL	42 sec.		
R	11	5-120	.25g	138 sec.		
R	3-6-08	20-2000	-12 DB	30 sec.		
R	11	20-2000	-6 DB	67 sec.		
R	11	20-2000	0 DB	180 sec.		
R	11	20-2000	-9 DB	38 sec.		
Z	3-10-08	5-120	.25g	138 sec.		
Z	11	5-120	1/2 LEVEL	138 sec.		
Z	11	5-120	FULL LEVEL	138 sec.		
Z	11	5-120	.25g	138 sec.		Ⓢ



Burst Pressure


A pressure trace was recorded for the burst test. The tank was pressurized to 415 psig, +5/-0 psig at 64°F. The tank was held at 415 psig pressure for 20 seconds. The tank ruptured at 510 psig.

Burst Pictures:

Test Paragraph No. 4.5.3 PSI Serial No. 0001G
 Test Equipment: PRES. GAUGE ST-1054, PSI Part Name: Outer tank
CAL EXT. 3-14-08 DUE 4-14-08, THERMOMETER ST-1512 CAL 3-7-08 DUE 9-7-08.

Test Media: Distilled/Deionized Water

	TEST VALUE	REQUIRED VALUE
(1) Water Resistivity	<u>16 MEG</u> ohm min. 	500,000 ohm min.
(2) Water pH	<u>7.0</u> pH	5.5 - 8.0
(3) Water Temperature	<u>64</u> °F	Record
(4) Hold at 410 psig ⁺⁵ ₋₀ 	<u>415</u> psig	Record
(5) Burst Pressure	<u>510</u> psig	410 psig minimum
(6) Test Period	<u>3 mins 16 sec</u>	Record

Notes: 20 SECOND HOLD @ 415 PSIG 


Inspected By: B. Johnson  Date 4.9.08 Test result Pass Fail



Figure 4: Burst Tank

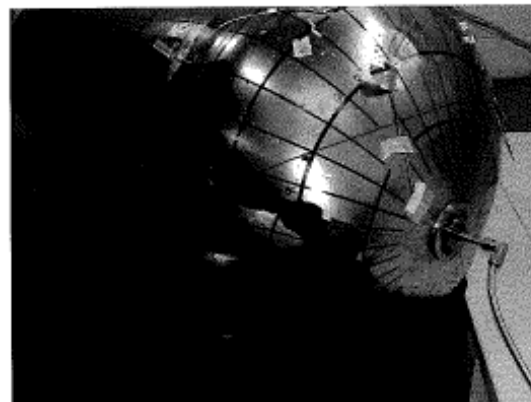


Figure 5: Burst Tank (Lower Dome)

ATK Proprietary information. The information included herein is controlled under the international Traffic in Arms (ITAR) by the U.S. Department of State. Export, release or disclosure to any foreign national requires an export license issued by the U.S. State Department or an ITAR exception to the license requirement prior to the export or transfer.

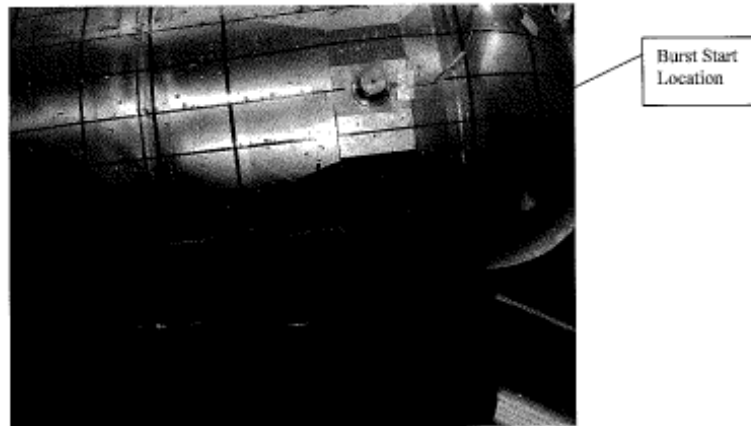


Figure 7: Burst Tank (Lower center Section at Trunnion)

After the burst pressure test, the PMD was cut out of the lower dome and the welds of the sponge panels to the top cover were visually examined for weld quality; PMD welds did not have any defects. The welds on the post burst PMD pictures can be seen in Figures 7 thru 10.

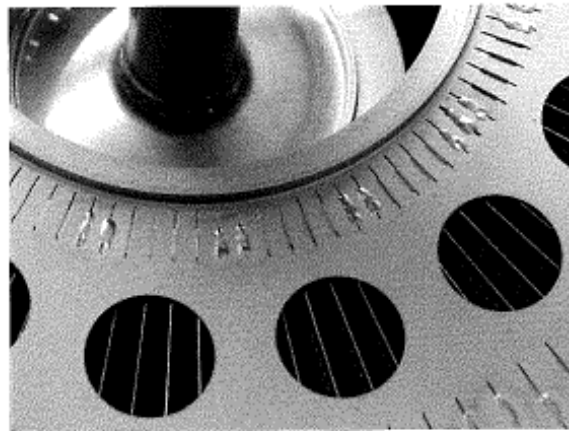


Figure 7: Burn down weld on PMD Top Plate-Sponge Panels