

QUALIFICATION ENVIRONMENTS
FOR
ERBS TANK, PROPELLANT/PRESSURANT
ATK P/N 80297-1

No pictures available

Table 1: P/N 80297-1 ERBS Tank Propellantx Assembly Specifications

Parameters	Requirements
Operating Pressure	380 psig
Proof Pressure	622 psig, Actual Proof: 630 psig
Burst Pressure	Not performed
External Pressure	Not tested
Internal Vacuum	Not tested
Material of Construction	6Al-4V titanium alloy pressure vessel. Propellant and Pressurant loading is accomplished through tubes, positioned on the tank's polar axis, at the extreme end of the mounting bosses.
Membrane Thickness	0.047"
Tank Mount(s)	Mounting is accomplished through two (2) polar mounting bosses.
Expulsion Efficiency	99.99 %
Design Fill Fraction	-
Tank Capacity	11389.9 in ³
Internal Dimensions	28" Ø spherical
Tank Weight	Maximum tank weight is 43.0 lbs, Actual tank weight is lbs
Propellant Capacity	-
Shell Leakage	<1x10 ⁻⁶ std cc/sec He max, Actual: 8.89 x 10 ⁻⁸ std cc/sec He max
Failure Mode	Burst
Natural Frequency	-
Temperature Environment	-
On Orbit Life	-

80297-1 was subjected to the following qualification tests:

<u>Test Sequence</u>	<u>Test Description</u>		
1	* Acceptance Tests		
2	Acceleration Test		
3	Internal Leakage Test		
4	External Leakage Test		
5	Slosh Test		
6	Internal Leakage Test		
7	Proof Pressure		
8	Cleanliness		
1	Preliminary Examination of Product	7	External Leakage Test
2	Pre-Proof Volume Determination	8	Internal Leakage Test
3	Proof Pressure Test	9	Radiographic Inspection
4	Post Proof Volume Determination	10	Fluorescent Penetrant Inspection
5	Pressure Drop	11	Final Examination of Product
6	Expulsion Efficiency	12	Cleanliness

Note: The following tests are only listed in this document.

- 1) Acceleration Test
- 2) Slosh Test
- 3) Proof Pressure Test
- 4) Pressure Drop Test

Acceleration Test

The test acceleration of $10.0 \text{ g's} \pm 1.0 \text{ g's}$ shall be applied in both positive and negative directions along each of the 3 orthogonal axes.

The test duration shall be 5 minutes, $+30/-0$ seconds.

Tank is loaded with 313 ± 4 lbs of distilled, deionized water and pressurized to 370, $+10/-0$ psig with nitrogen gas.

DATA SHEET "B"
ACCELERATION TEST

N/C	A	B			
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Date: 7-20-82

Propellant

PSI Part Name: Pressurant Tank Assy

Customer Program: ERBS

PSI Part No. 80297-1

Test Equipment: GAGE, AIRCRAFT

PSI Serial No. 0002 R

NO. L-014 0-400 ASIG CALIB DOE 9-25-82

	Test Values	Requirements
Loaded Water Weight	<u>313 LBS.</u>	<u>313 ± 4</u> "B" +10
Specimen Pressure	<u>370 PSIG</u>	<u>370 - 0 PSIG</u>

Formula:
$$\text{RPM's} = 187.6 \sqrt{\frac{G}{R}}$$
 ;
$$G = R \left(\frac{\text{RPM}}{187.6} \right)^2$$

Note: G = Gravity Load
R = Accelerator Boom

Accelerator Boom Length 180" - Z ± 2
207" - X - Y

Axis of Rotation	RPM's	Acceleration G's	Test Duration	"A" Requirements
+ X	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
- X	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
+ Y	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
- Y	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
+ Z	<u>44</u>	<u>10.</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
- Z	<u>44.5</u>	<u>10.</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>

Tested By G. PETERSEN Date 7-20-82 Specimen Passed YES

Slosh Test

<u>Test Sequence</u>	<u>Test Axis</u>	<u>Double Amplitude -Inches-</u>	<u>Frequency -HZ-</u>	<u>Impulses</u>
1	X	3.0"	0.5 HZ	1,000
2	X	9.8"	1.0 HZ	500
3	X	9.8"	0.6 HZ	2,000
4	Z	3.0"	0.5 HZ	1,000
5	Z	9.8"	1.0 HZ	500
6	Z	9.8"	0.6 HZ	2,000

- Note: A) Each impulse is defined as a half cycle of the reciprocating drive mechanism.
- B) In the interest of safety it shall be permissible to depressurize and if necessary unload the test specimen for re-orientation. In such instances, the test specimen shall be unloaded, loaded and re-pressurized as detailed in Paragraphs 4.13 and 5.2.0 respectively.

Tank is loaded with 313 ± 4 lbs of distilled, deionized water and pressurized to 370, +10/-0 psig with nitrogen gas.

DATA SHEET "B"
ACCELERATION TEST

N/C	A	B			
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Date: 7-20-82

Propellant

PSI Part Name: Pressurant Tank Assy

Customer Program: ERBS

PSI Part No. 80297-1

Test Equipment: GANCE, AIRCRAFT

PSI Serial No. 0002 R

NO. L-014 0-400 ASIG CALIB DOE 9-25-82

	Test Values	Requirements
Loaded Water Weight	<u>313 LBS.</u>	<u>313 ± 4 "B"</u> <u>+10</u>
Specimen Pressure	<u>370 PSIG</u>	<u>370 - 0 PSIG</u>

Formula:
$$RPM's = 187.6 \sqrt{\frac{G}{R}}$$
 ;
$$G = R \left(\frac{RPM}{187.6} \right)^2$$

Note: G = Gravity Load
R = Accelerator Boom

Accelerator Boom Length 180" - Z ± 2
207" - +X - +Y

Axis of Rotation	RPM's	Acceleration G's	Test Duration	"A" Requirements
+ X	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
- X	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
+ Y	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
- Y	<u>41</u>	<u>10</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
+ Z	<u>44</u>	<u>10.</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>
- Z	<u>44.5</u>	<u>10.</u>	<u>5.0</u>	<u>10.0G's ± 1.0G's</u>

Tested By G. PETERSEN Date 7-20-82 Specimen Passed YES

Proof Pressure Test

Tank is pressurized to 630 psig and held for four seconds. One pressure cycle total.



PSI Test Report No. 56-000096
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DATA SHEET "G"

N/C	A	B			
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PROOF PRESSURE TEST

Date: 7-22-82
Propellant - _____
PSI Part Name Pressurant Tank Assy
Customer Program ERBS PSI Part No. 80297-1
Test Equipment _____ PSI Serial No. 18229 CLASS/0002R
Gauge, Heise No. 0978 0-2000 PSIG CALIB DUE 9-25-82

Test Media: Distilled, Deionized Water		
	<u>Actual</u>	<u>Requirement</u>
A) Test Pressure	<u>630 PSIG</u>	<u>+10 622 - 0 PSIG</u>
B) Hold Period at Pressure	<u>4 sec.</u>	<u>Five (5) seconds Max.</u>
C) No. of pressure cycles	<u>1</u>	<u>1</u>
D) Visual Examination	<u>NONE</u>	<u>No Deformation (dimples)</u>

Tested By JR [Signature] Date 7-22-82 Specimen Passed Yes

Pressure Drop Test

PSI 2017 camfield avenue
los angeles, cal. 90040
RESSURE SYSTEMS, INC.

PSI Test Report No. 56-000096
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N/C	A	B	C			
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(B)

DATA SHEET "D"

PRESSURE DROP TEST

Date: 7-15-82

Propellant -
PSI Part Name: Pressurant Tank Assy

Customer Program: ERBS

PSI Part No. 80297-1

PSI Serial No. 0002 R

Test Equipment: GAUGE, BARTON INSTR. NO. ST. 0364 0-15 PSIA

CALIB. DUE - 9-16-82

	<u>Actual Values</u>	<u>Requirements</u>
A) Differential Gauge Reading (static) - P ₁	<u>0</u>	<u>N/A</u>
B) Water Flow Rate	<u>9.5</u>	<u>9.5 GPM</u>
C) Differential Gauge Reading (under flow) - P ₂	<u>.05</u>	<u>N/A</u>
D) ΔP Actual (Ref: $\Delta P = \Delta P_2 - \Delta P_1$)	<u>.05</u>	<u>0.2 PSID Max.</u>
E) Information Only: ΔP at 1.5 GPM	<u>1.7</u>	
ΔP at 2.6 GPM	<u>5.4</u>	

Tested By: *J. R. [Signature]* Date 7-15-82 Specimen Passed YES