

QUALIFICATION ENVIRONMENTS
FOR
PROPELLANT TANK ASSEMBLY
ATK P/N 80317-1

Table 1: P/N 80317-1 PROPELLANT TANK Assembly Specifications

Parameters	Requirements
Operating Pressure	70 to 350 psig
Proof Pressure	525 psig, Actual Proof: psig
Burst Pressure	700 psig minimum, Actual Burst: psig
External Pressure	Not Tested
Internal Vacuum	Not Tested
Material of Construction	Cylindrical titanium pressure vessel, with three ports at the polar boss of the ported hemisphere.
Membrane Thickness	"
Tank Mount(s)	Mounted by three radial lugs on the cylinder near the weld to the ported hemisphere and a polar boss on the blind hemisphere.
Expulsion Efficiency	%
Design Fill Fraction	-
Tank Capacity	23,400 in ³ or 383.6 liters
Internal Dimensions	27.5" Ø x 49"
Tank Weight	Maximum tank weight is 60.0 lbs, Actual tank weight is 56.69 lbs
Propellant Capacity	800 pounds or 363.6 kg
Shell Leakage	<1x10 ⁻⁶ std cc/sec He max, Actual: x10 ⁻⁷ scc/sec He @ psig
Failure Mode	Burst
Natural Frequency	-
Temperature Environment	-
On Orbit Life	-

80317-1 was analyzed and designed to the following requirements:

Initial Acceleration, applied in combination through the center of mass:

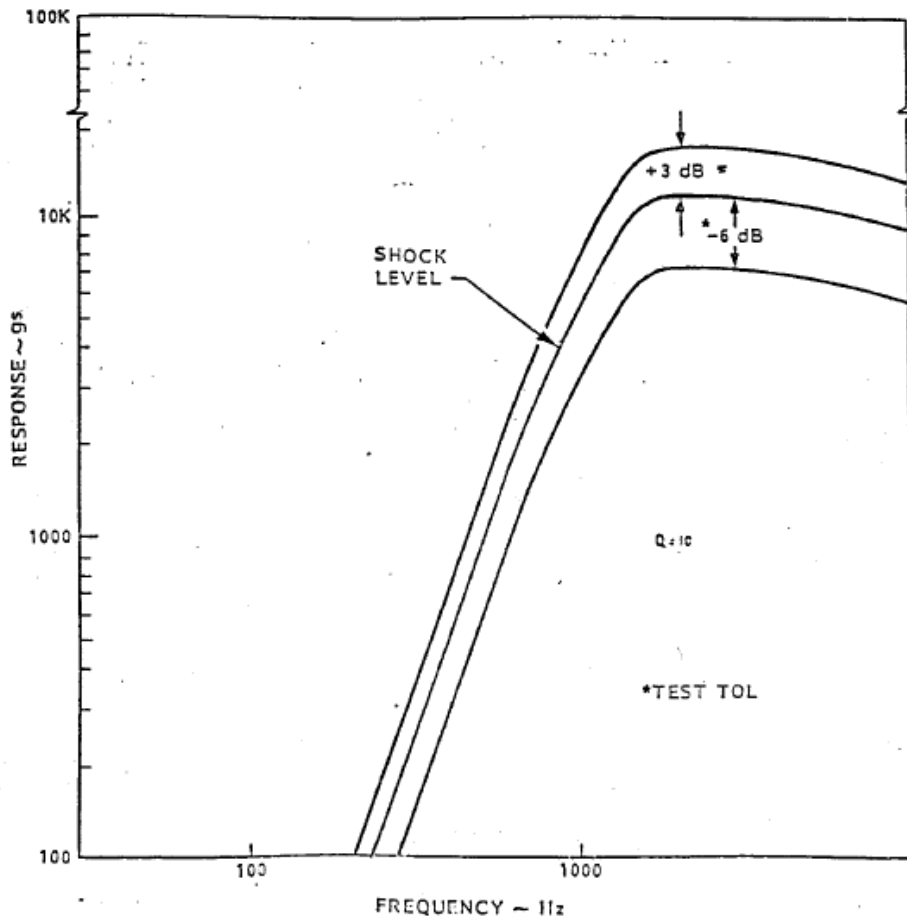
<u>Tank Axis</u>	<u>Load Factor (g)</u>	
	<u>Yield</u>	<u>Ultimate</u>
Any axis in X-Y Plane	2.0 (TBR)	2.5 (TBR)
Z (Longitudinal)	10.5 (TBR)	13.13 (TBR)

Combined Acceleration, with a duration of 1.7 second:

Combined longitudinal acceleration up to 1.0 ft/sec²

Angular acceleration up to 0.50 rads/sec²

Pyroshock Environment:



Acoustic Environment:

ACOUSTIC ENVIRONMENT

<u>1/3 Octave Center Frequency</u>	<u>Sound Pressure Level (dB above 2×10^{-5} n/m²)</u>
31.5	125
40	126.5
50	127.0
63	128.0
80	128.5
100	129.0
125	129.5
160	130.5
200	131.5
250	132.5
315	132.0
400	130.5
500	129.5
630	128.5
800	128.0
1000	127.5
1250	127.0
1600	126.5
2000	126.0
Overall = 141.9 dB	

80317-1 was subjected to the following qualification tests:

<u>Test Sequence</u>	<u>Test Description</u>	<u>Pi Th:</u>	<u>Test Sequence</u>	<u>Test Description</u>	<u>I</u>
1	Acceptance Test				
2	Acoustic Test		10	Pressure Cycles	
3	Modal Survey		11	Pressure Drop	
4	Pyrotechnic Shock		12	PMD Bubble Point	
5	Vacuum Leakage		13	Vacuum Leakage	
6	External Leakage		14	External Leakage	
7	Cleanliness Verification		15	Radiographic Inspection	
8	Radiographic Inspection		16	Penetrant Inspection	
9	Penetrant Inspection		17	Final Examination	
			18	Burst Test	

Acoustic test, modal survey, and pyrotechnic shock are performed by Contractor. The following tests are described in this report.

- 1) Pressure Log
- 2) Proof Pressure test
- 3) Pressure Cycles
- 4) Pressure Drop Test
- 5) Burst Test

Pressure Cycles Tests

Vacuum Cycle

Tank is evacuated to a pressure of 0.2 mm of mercury (200 microns) or less and held for a minimum of 15 seconds. Number of cycles is 8.

Nominal Pressure Cycle

Tank is pressurized to 350, +10/-0 psig and held for 5 seconds maximum. Number of cycles is 27.

Proof Pressure Cycle

Table 4.6, Required Proof Pressure

<u>Temperature</u>	<u>Proof Pressure</u>
60° to 80°F	550 psig
80° to 100°F	535 psig

Pressure held for 5 seconds maximum. Number of cycles is 8.

Burst Test

Table 4.14, Required Burst Pressure

<u>Temperature</u>	<u>Burst Pressure</u>
60° to 80°F	737 psig
80° to 100°F	730 psig

Actual burst pressure was 1091 psig.