

APPENDIX B

STS

Structural Loads - Structural loads are determined on a case-by-case basis. Initial design loads shall be provided by the project. Final loads are determined by coupled loads analysis.

Acoustics - The qualification (protoflight) and acceptance test levels for payloads that measure up to 2.75 m (9 feet) in diameter and that will be exposed directly to the cargo bay environment are given in Table B-1. The levels are based on the environment in the empty cargo bay as defined in the STS ICD (1.7.1.2). For larger payloads, a fill-factor (see Appendix A), or computer programs such as PACES or VAPEPS shall be used to estimate the effects of the payload on the acoustic environment and the results shall be used as a basis for modifying the levels of Table B-1. In addition, payload elements in proximity to the cargo bay vent doors may experience a higher noise level in the one-third octave band centered at 315 Hz because of an acoustic tone generated by the vents during transonic flight. When applicable, consideration shall be given to modifying the acoustic specification to account for this effect. Finally, if protective acoustic devices are employed in the payload design, their attenuation characteristics shall be used to adjust the levels of Table B-1.

Component Random Vibration - Generalized component qualification, and acceptance, random vibration test levels are given in Table B-2.

Mechanical Shock - The mechanical shock environment produced by the orbiter is considered negligible. The hardware must be qualified for self-induced shocks or for shocks produced by propulsion assist upper stages and separation.

Table B-1
Acoustic Test Levels
STS Cargo Bay
Payloads up to 2.75 meters (9 feet) in diameter

One-Third Octave Center Frequency (Hz)	Noise Level (dB) re: .00002 Pa	
	Qualification	Acceptance
25	122.0	119.0
32	125.0	122.0
40	128.0	125.0
50	130.5	127.5
63	131.5	128.5
80	132.0	129.0
100	132.0	129.0
125	132.0	129.0
160	131.5	128.5
200	130.5	127.5
250	130.0	127.0
315	129.0	126.0
400	128.0	125.0
500	127.0	124.0
630	126.0	123.0
800	124.5	121.5
1000	123.0	120.0
1250	121.5	118.5
1600	119.5	116.5
2000	118.5	115.5
2500	116.0	113.0
3150	114.5	111.5
4000	112.5	109.5
5000	111.0	108.0
6300	109.0	106.0
8000	107.5	104.5
10000	106.0	103.0
Overall	142	139

Table B-2
Generalized Random Vibration Test Levels
STS Components
22.7-kg (50 lb) or less

Frequency (Hz)	ASD Level (G^2/Hz)	
	Qualification	Acceptance
20	.025	.0125
20-50	+6 dB/oct	+6 dB/oct
50-600	.15	.075
600-2000	-4.5 dB/oct	-4.5 dB/oct
2000	.025	.0125
Overall	12.9 G_{rms}	9.1 G_{rms}

The acceleration spectral density level may be reduced for components weighing more than 22.7-kg (50 lb) according to:

	<u>Weight in kg</u>	<u>Weight in lb</u>	
dB reduction	= $10 \text{ LOG}(W/22.7)$	$10 \text{ LOG}(W/50)$	
ASD(50-800 Hz)	= $.15 \cdot (22.7/W)$	$.15 \cdot (50/W)$	for protoflight
ASD(50-800 Hz)	= $.075 \cdot (22.7/W)$	$.075 \cdot (50/W)$	for acceptance

Where W = component weight.

The slopes shall be maintained at +6 and -4.5 for components weighing up to 57-kg (125-lb). Above that weight, the slopes shall be adjusted to maintain an ASD level of $0.01 G^2/Hz$ at 20 and 2000 Hz.

For components weighing over 182-kg (400-lb), the test specification will be maintained at the level for 182-kg (400 pounds).

