

Quality is more than a word

ESPEC



AIRCRAFT-RELATED EQUIPMENT

Application Examples

Large-size Altitude (Reduced Pressure/Low Temperature) Tests

Testing can be conducted to simulate the reduced pressure and low-temperature environment at altitudes where aircraft operate.

Altitude **Max. 100,000 ft**

Pressure range (Atmospheric pressure) Max. 0.1 kPa

Temperature range -70°C to +180°C (when the above temperature range exceeds 11.6 kPa)

Interior dimensions **W1.5 m × H1.5 m × D1.5 m**

High-rate Vibration Tests

In addition to a maximum vibration force of 45 kN, a maximum temperature change stress of 5°C/min can be applied.

Temperature range **-70°C to +180°C**

Interior dimensions W1.0 m × H1.0 m × D1.0 m

Maximum vibration force **45 kN**

Frequency range 5 Hz to 2000 Hz

Maximum displacement 76.2 mm (p-p)

Rapid Temperature Change Tests

Capable of linear temperature change testing at up to 20°C/min. Test sample temperatures can also be controlled.

Altitude -70°C to +180°C

Temperature change rate **20°C/min (+155°C to -45°C)**

Interior dimensions W0.8 m × H0.5 m × D0.4 m

Medium-size Temperature Change Tests

Capable of testing capacities up to 1100L at 10°C/min. Humidity control is also possible.

Temperature range -70°C to +180°C

Temperature change rate 10°C/min (-45°C ⇄ +155°C)

Interior dimensions **W1.1 m × H1.0 m × D1.0 m**

HALT/HASS Tests

Products are subjected to “strong stress” (rapid temperature changes and six-degree-of-freedom random vibration) that exceeds their specifications to find their limitations (weaknesses) at an early stage.

Vibration acceleration **5 Grms to 75 Grms**

Temperature range -100°C to +250°C

Temperature change rate **70°C/min (+85°C to -65°C)**

Table dimensions W0.76 m × D0.76 m

List of MIL-STD-810H Test Items

METHOD No.	Test Name		Examples of Compatible Chambers			
			Chamber Model	Test Area Dimensions [mm]		
				W	H	D
500.6	Low Pressure (Altitude)	Procedure I - Storage/Air Transport	MZH Series	1500	1500	1500
		Procedure II - Operation/Air Carriage				
		Procedure III - Rapid Decompression	Temperature chamber + Custom equipment	300	300	300
501.6	High Temperature	Procedure I - Storage	TCC-151	800	500	400
		Procedure II - Operation	ARSF-800	1000	1000	800
			ARS-1100	1000	1000	1000
		Procedure III - Tactical-Standby to Operational	FD Series	1800	1150	1300
502.6	Low Temperature	Procedure I - Storage	PL-4J	1000	1000	800
		Procedure II - Operation	ARSF-800	1000	1000	800
			ARS-1100	1000	1000	1000
		Procedure III - Operation	FD Series	1800	1150	1300
503.6	Temperature Shock	Procedure I-A One-way shock(s) from constant extreme temperature	TSD-101 TSE-12	710 320	345 148	410 230
		Procedure I-B Single cycle shock from constant extreme temperature				
		Procedure I-C Multi-cycle shocks from constant extreme temperature				
		Procedure I-D Shocks to or from controlled ambient temperature (Fig. 503.6-4)				
504.2	Contamination by Fluids	Procedure I				
		Procedure II				
507.6	Humidity		PL-4J	1000	1000	800
			ARSF-800	1000	1000	800
			ARS-1100	1000	1000	1000
			FD Series	1800	1150	1300
516.8	Shock	Procedure I - Functional Shock	Vibration and shock test chamber	1000	1000	1000
		Procedure II - Materiel to be Packaged				
521.4	Icing/Freezing Rain	Procedure I - Freezing Rain	EBE-6	3950	2400	2900

List of RTCA/DO-160G Test Items

* Whether or not these tests can be conducted may vary depending on the size of the test sample and any other conditions.

Section No.	Section Name	Sub. Sec.	Test Name	Examples of Compatible Chambers				
				Chamber Model	Test Area Dimensions [mm]			
					W	H	D	
Section 4	Temperature Tests	4.5.1	Ground Survival Low Temperature Test and Short-time Operating Low Temperature Test					
		4.5.2	Operating Low Temperature Test	TCC-151	800	500	400	
		4.5.3	Ground Survival High Temperature Test and Short-time Operating High Temperature Test	ARSF-800	1000	1000	800	
				ARS-1100	1000	1000	1000	
				FD Series	1800	1150	1300	
		4.5.4	Operating High Temperature Test					
		4.5.5	In-flight Loss of Cooling Test					
		4.6.1	Altitude Test	MZH Series	1500	1500	1500	
4.6.2	Decompression Test							
4.6.3	Overpressure Test							
Section 5	Temperature Variation Tests	5.3.1	If the test is a combined test	TCC-151	800	500	400	
			ARSF-800	1000	1000	800		
		5.3.2	If the test is not a combined test	ARS-1100	1000	1000	1000	
				FD Series	1800	1150	1300	
				Category S1	TSD-101	710	345	410
		TSE-12	320	148	230			
5.3.3		Category S2						
Section 6	Temperature and Humidity Tests	6.3.1	Standard Humidity Environment	Category A	PL-4J	1000	1000	800
					FD Series	1200	1000	1500
		6.3.2	Severe Humidity Environment	Category B	ARS-1100	1000	1000	1000
					ARSF-800	1000	1000	800
6.3.3	External Humidity Environment	Category C						
Section 7	Operation Shocks and Crash Safety Tests	7.2.1	For equipment capable of sustaining vertical shock	Category A	Vibration and shock test chamber	1000	1000	1000
				Category D				

Section No.	Section Name	Sub. Sec.	Test Name		Examples of Compatible Chambers			
					Chamber Model	Test Area Dimensions [mm]		
						W	H	D
Section 8	Vibration	8.5.1	Standard Sinusoidal Vibration Test	S	Vibration and shock test chamber	1000	1000	1000
		8.5.2	Standard Random Vibration Test	S				
		8.6	High-level, Short Duration Test	H, Z				
		8.7.1	Robust Sinusoidal Test	R, U, U2				
		8.7.2	Robust Random Test	R, U, U2				
		8.8.1	Sine-on Random Test - Known Helicopter Frequencies	R, U, U2				
		8.8.2	Sine-on Random Test - Unknown Helicopter Frequencies	U				
		8.8.3	Sine-on Random Test - Known Helicopter Frequencies	U2				
		Section 10	Water proofness	10.3.1				
10.3.3	Spray Proof Test							
10.3.4	Continuous Stream Proof Test							
Section 11	Fluids Susceptibility	11.4.1	Spray Test	F				
		11.4.2	Immersion Test					
Section 24	Icing	24.4.1	Built-up Icing	A				
			In-flight Icing	B	MZH Series	1500	1500	1500
			On-ground Icing	C	EBE-6	3950	2400	2900

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