

GT-25-021

Summary Test Report ThermaRex™ Cryo 806 Hermetic Connectors

Rev	Description of Change	Originator	Date
A	Initial Release	S. Farhat	1/31/2025



1.0 Purpose

This report summarizes the results of testing on Glenair ThermaRex™ Cryo 806 Hermetic connectors in dynamic cryogenic conditions. The connectors were fully immersed in liquid nitrogen at -196°C while experiencing random vibration, 300G mechanical shock, and thermal cycling. The electrical and mechanical performance of each hermetic connector was characterized before and after each major test. Reference Glenair test report GT-24-300 for the complete test results.

2.0 Test Samples

Table I – Test Samples

Test Group	Part Number	Description	Total Quantity	Wire
Group 1	806-060-ME8-3PMA	ThermaRex™ Cryo 806 Plug, Electroless Nickel over Aluminum, Accessory Threads, 3 x 20HD pin contacts	3	961-047-N-B-9
	806-088-T07Z18-3SA	ThermaRex™ Cryo 806 Hermetic, Jam Nut, Stainless Steel, Accessory Threads, 3x 20HD Socket Contacts	3	M22759/11-20-9
Group 2	806-060-ME8-4SMA	ThermaRex™ Cryo 806 Plug, Electroless Nickel over Aluminum, Accessory Threads, 4x 22HD Socket Contacts	3	961-047-N-B-9
	806-088-T07Z18-4PA	ThermaRex™ Cryo 806 Hermetic, Jam Nut, Stainless Steel, Accessory Threads, 4x 22HD Pin Contacts	3	M22759/11-22-9
Backshell	620VS080ME08	Strain relief clamp backshell, Electroless Nickel over Aluminum, used on all connectors	12	--

All 806-060 plug connectors were terminated with 22 AWG ThermaRex nickel-plated wire 961-047-N-B-9 to both 20HD and 22HD crimp contacts. Hermetic 22HD contacts in 806-088 connectors were terminated with M22759/11-22-9 wire. Hermetic 20HD contacts in 806-088 connectors were terminated with M22759/11-20-9 wire. Straight strain relief backshells 620VS080ME08 were used on all connectors. Reference Glenair 8071-7407-T07Z18-4PA221-60SME and 8071-7407-T07Z18-3SA201-60SME for details of the terminated hermetic receptacle assemblies.

Every hermetic connector in each test group was subjected to all tests in that group in the order listed below.



3.0 Test Results

Table II – Group I Test Order and Results 8-3 Arrangement Connectors, 3x 20HD hermetic socket contacts			
Test	Requirement	Test Procedure	Pass/Fail, Average Result
Visual and Mechanical Examination	Pass	MIL-DTL-38999 4.5.1	Pass
Air Leakage	$< 1 \times 10^{-7} \text{ cm}^3 \text{ He/sec}$	MIL-DTL-38999 4.5.6	Pass $5.4 \times 10^{-10} \text{ cm}^3 \text{ He/sec}$
Insulation Resistance at Room Temperature	5000 megaohms, minimum, at 500 VDC, unmated	MIL-DTL-38999 4.5.10.1	Pass, >10 GΩ
Dielectric Withstand Voltage at Room Temperature and Sea Level	Size 20: 1800 VAC 2 mA maximum leakage current Mated connector pairs	MIL-DTL-38999 4.5.11.1	Pass
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 20 tested at 5A	MIL-DTL-38999 4.5.14.2	Record 781 mV including wire 39 mV without wire
Shell-to-Shell Conductivity	10 millivolts max	MIL-DTL-38999 4.5.25	Pass 2.1 mV
Thermal Shock, Liquid nitrogen immersion at -196°C to 125°C, dwell 60 minutes minimum at each extreme, 5 cycles	Maximum 15-minute transfer time including chamber temperature stabilization	EIA-364-32, Method B, Test Condition III	Pass
Air Leakage	$1 \times 10^{-7} \text{ cm}^3/\text{s}$ max	MIL-DTL-38999 4.5.6	Pass $1.4 \times 10^{-10} \text{ cm}^3 \text{ He/sec}$
Insulation Resistance at Room Temperature	1000 megaohms, minimum, at 500 VDC, mated	MIL-DTL-38999 4.5.10.1	Pass, >10 GΩ
Dielectric Withstand Voltage at Room Temperature	Size 20: 1800 VAC 2 mA maximum leakage current Mated connector pairs	MIL-DTL-38999 4.5.11.1	Pass

Table II – Group I Test Order and Results
8-3 Arrangement Connectors, 3x 20HD hermetic socket contacts

Test	Requirement	Test Procedure	Pass/Fail, Average Result
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 20 tested at 5A	MIL-DTL-38999 4.5.14.2	Record 786 mV including wire 44 mV without wire
Random Vibration while fully immersed in liquid nitrogen at -196°C, 43 G _{rms} , 2 hours per axis, 4 hours total	No discontinuities greater than 1 microsecond	EIA-364-28 Test Condition VI Letter J	Pass
Air Leakage	< 1 x 10 ⁻⁷ cm ³ He/second	MIL-DTL-38999 4.5.6	Pass 1.2 x 10 ⁻¹⁰ cm ³ He/sec
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 20 tested at 5A	MIL-DTL-38999 4.5.14.2	Record 782 mV including wire 40 mV without wire
300G Shock while fully immersed in liquid nitrogen at -196°C	No discontinuities greater than 1 microsecond	MIL-DTL-38999 3.28 and 4.5.24.1	Pass
Air Leakage	< 1 x 10 ⁻⁷ cm ³ He/second	MIL-DTL-38999 4.5.6	Pass <1.0 x 10 ⁻¹⁰ cm ³ He/sec
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 20 tested at 5A	MIL-DTL-38999 4.5.14.2	Record 786 mV including wire 44 mV without wire
Insert Retention	100 ± 5 pounds per square inch with a 25 pounds minimum force	MIL-DTL-38999 4.5.12	Pass
Insulation Resistance at Room Temperature	1000 megaohms, minimum, at 500 VDC, mated connectors	MIL-DTL-38999 4.5.10.1	Pass, >10 GΩ
Dielectric Withstand Voltage at Room Temperature	Size 20: 1800 VAC 2 mA maximum leakage current Mated connector pairs	MIL-DTL-38999 4.5.11.1	Pass
Shell-to-Shell Conductivity	20 millivolts, max	MIL-DTL-38999 4.5.25	Pass 1.5 mV
Post Test Visual Examination	MIL-DTL-38999 3.52 and 3.53	MIL-DTL-38999 4.5.49	Pass



Table III – Group II Test Order and Results
8-4 Arrangement Connector, 4x 22HD hermetic pin contacts

Test	Requirement	Test Procedure	Pass/Fail, Average Result
Visual and Mechanical Examination	Pass	MIL-DTL-38999 4.5.1	Pass
Air Leakage	$< 1 \times 10^{-7} \text{ cm}^3 \text{ He/second}$	MIL-DTL-38999 4.5.6	Pass $4.4 \times 10^{-10} \text{ cm}^3 \text{ He/second}$
Insulation Resistance at Room Temperature	5000 megaohms, minimum, at 500 VDC, unmated	MIL-DTL-38999 4.5.10.1	Pass, >10 GΩ
Dielectric Withstand Voltage at Room Temperature and Sea Level	Size 22: 1300 VAC 2 mA maximum leakage current Mated connector pairs	MIL-DTL-38999 4.5.11.1	Pass
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 22 tested at 3A	MIL-DTL-38999 4.5.14.2	Record 580 mV including wire 52 mV without wire
Shell-to-Shell Conductivity	10 millivolts max	MIL-DTL-38999 4.5.25	Pass 1.7 mV
Thermal Shock, Liquid nitrogen immersion at -196°C to 125°C, dwell 60 minutes minimum at each extreme, 5 cycles	Maximum 15-minute transfer time including chamber temperature stabilization	EIA-364-32, Method B, Test Condition III	Pass
Air Leakage	$< 1 \times 10^{-7} \text{ cm}^3/\text{s max}$	MIL-DTL-38999 4.5.6	Pass $1.8 \times 10^{-10} \text{ cm}^3 \text{ He/second}$
Insulation Resistance at Room Temperature	1000 megaohms, minimum, at 500 VDC, mated	MIL-DTL-38999 4.5.10.1	Pass, >9.8 GΩ
Dielectric Withstand Voltage at Room Temperature	Size 22: 1300 VAC 2 mA maximum leakage current Mated connector pairs	MIL-DTL-38999 4.5.11.1	Pass
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 22 tested at 3A	MIL-DTL-38999 4.5.14.2	Record 579 mV including wire 46 mV without wire



Table III – Group II Test Order and Results
8-4 Arrangement Connector, 4x 22HD hermetic pin contacts

Test	Requirement	Test Procedure	Pass/Fail, Average Result
Random Vibration while fully immersed in liquid nitrogen at -196°C, 43 G _{rms} , 2 hours per axis, 4 hours total	No discontinuities greater than 1 microsecond	EIA-364-28 Test Condition VI Letter J	Pass
Air Leakage	< 1 x 10 ⁻⁷ cm ³ He/second	MIL-DTL-38999 4.5.6	Pass <1.0 x 10 ⁻¹⁰ cm ³ He/second
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 22 tested at 3A	MIL-DTL-38999 4.5.14.2	Record 582 mV including wire 49 mV without wire
300G Shock while fully immersed in liquid nitrogen at -196°C	No discontinuities greater than 1 microsecond	MIL-DTL-38999 3.28 and 4.5.24.1	Pass
Air Leakage	< 1 x 10 ⁻⁷ cm ³ He/second	MIL-DTL-38999 4.5.6	Pass <1.0 x 10 ⁻¹⁰ cm ³ He/second
Contact Resistance	MIL-DTL-38999 3.18.2 Read and record value including wire Size 22 tested at 3A	MIL-DTL-38999 4.5.14.2	Record 578 mV including wire 45 mV without wire
Insert Retention	100 ± 5 pounds per square inch with a 25 pounds minimum force	MIL-DTL-38999 4.5.12	Pass
Insulation Resistance at Room Temperature	1000 megaohms, minimum, at 500 VDC, mated connectors	MIL-DTL-38999 4.5.10.1	Pass
Dielectric Withstand Voltage at Room Temperature	Size 22: 1300 VAC 2 mA maximum leakage current Mated connector pairs	MIL-DTL-38999 4.5.11.1	Pass
Shell-to-Shell Conductivity	20 millivolts, max	MIL-DTL-38999 4.5.25	Pass 1.4 mV
Post Test Visual Examination	MIL-DTL-38999 3.52 and 3.53	MIL-DTL-38999 4.5.49	Pass

4.0 Discussion of Results

The ThermaRex™ Cryo 806 Hermetic connectors showed outstanding durability and performance after exposure to extreme cryogenic thermal cycling, cryogenic vibration, and cryogenic 300G mechanical shock. The connectors maintained ultralow 10^{-10} cm³/second helium leak rates and showed consistent electrical performance throughout testing.