Glenair®

Series 28 HiPer-D
General information and Reference
HiPer-D Connectors for Space Flight

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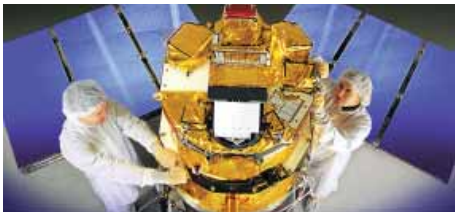

HiPer-D connectors feature space-grade materials, finishes and performance. The one-piece aluminum shell provides low residual magnetism. The rear grommet eliminates the need to backpot wires. High strength stainless steel locking hardware replaces gold-plated M24308-type brass hardware. The EMI spring provides shielding protection. The resilient interfacial seal protects mated connectors from dust, moisture and corrosion.

HOW TO ORDER SPACE GRADE HIPER-D CONNECTORS

Step 1: Find a Standard Part Number

Space-grade HiPer-D connectors are available with electroless nickel (code ME) or with optional gold plated connector shells (code Z2). Other shell platings are not recommended for space applications. NASA prohibits the use of cadmium in space applications.

Step 2: Select a NASA Screening Level

The term “Screening Level” refers to the final inspection procedure.
Level 1 for mission-critical highest reliability
Level 2 for high reliability
Level 3 for standard reliability

Step 3: Choose Outgassing Processing

Standard HiPer-D connectors do not meet NASA outgassing requirements unless the connectors are specially processed. Testing has shown an oven bakeout for 8 hours at +400°F is sufficient to meet NASA requirements; however, a more expensive thermal vacuum outgassing process is also available. To specify outgassing processing, select the desired modification code from the table below.

Step 4: Select the Mod 429 Code that Matches the Desired Level of Screening and Outgassing

Use the following table to choose the right modification code. Add the mod code to the connector part number. Example: 280-018P4S37MEGP-***429C***

NASA SCREENING LEVELS AND MODIFICATION CODES

NASA Screening Level	Special Screening Only		Special Screening Plus Outgassing Processing	
	Grommet and Face Seal installed	Grommet and Face Seal Deleted	8 Hour Oven Bake 400° F.	Thermal Vacuum Outgassing 24 hrs. 125° C.
Level 1 Highest Reliability	Mod 429B(1)	Mod 429F(1)	Mod 429J	Mod 429C
Level 2 High Reliability	Mod 429(1)	Mod 429D(1)	Mod 429K	Mod 429A
Level 3 Standard Reliability	(Use standard part number)	Mod 432(1)	Mod 186	Mod 186M

EEE-INST-002 requires outgassing for M24308.
(1) Indicates no outgassing performed

NASA screening

NASA specification EEE-INST-002 provides instructions on selecting, screening and qualifying parts for use on NASA GSFC space flight projects. Table 2B in the NASA specification contains inspection instructions for MIL-DTL-24308 D-type connectors. Table 2B applies by similarity to HiPer-D connectors, except for residual magnetism screening. This table calls for 100% residual magnetism screening, but the HiPer-D connector will not be 100% screened unless special arrangements are made. EEE-INST-002 requires outgassing for M24308.
(1) Indicates no outgassing performed

NASA screening levels

NASA defines three levels of screening: level 1 for highest reliability, level 2 for high reliability, and level 3 for standard reliability. Level 3 equates to standard lot acceptance inspection. Levels 1 and 2 call for additional testing.

Qualification requirements

Projects using connectors covered by military specifications are typically able to waive qualification testing. The Series 28 HiPer-D connector is not covered by a military specification. Projects considering using this connector for space flight should obtain guidance from the overseeing space agency regarding the suitability of this connector and any testing that might be recommended.

ASTM E595

The space industry has adopted a standardized test procedure, ***ASTM E 595***, to evaluate out-gassing properties of polymers. Small samples of material are heated to 125° C. at a vacuum of 5 X 10^{-5} torr for 24 hours. Then the sample is weighed to calculate the ***Total Mass Loss*** (TML). The TML cannot exceed 1.00% of the total initial mass. The quantity of outgassed matter is calculated to determine the ***Collected Volatile Condensable Material***

Dimensions in inches (millimeters) and are subject to change without notice.

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(CVCM). The CVCM cannot exceed 0.10% of the original specimen mass.

Materials Approved for Space

Metal materials such as aluminum alloy connector shells, copper retention clips, gold-plated pin and socket contacts, stainless steel contact hoods and so on, are approved for space. Rigid non-metallic materials, such as LCP or epoxy insulators, and epoxy potting compounds are also approved for space flight. Resilient non-metallic materials, such as fluorosilicone grommets and interfacial seals, typically require outgassing processing, as do all adhesives.

Residual Magnetism

Standard aluminum shell HiPer-D connectors are nonmagnetic. Spacecraft designers generally avoid the use of ferromagnetic materials, which can become magnetized and can interfere with sensitive instruments. Although D type connectors typically are 100% screened for residual magnetism, the aluminum shell HiPer-D connector has adopted the magnetic permeability requirements for space-grade MIL-DTL-83513 and MIL-DTL-38999 connectors. These specifications require 2μ maximum magnetic permeability. This requirement is considered to be a qualification test and is not invoked as a screening test unless specifically requested.

Cryogenic Exposure

Series 28 HiPer-D connectors are rated to -65° C. Glenair does not yet have data to validate these connectors for cryogenic applications. EEE-INST-002 states "...experience has proven it is possible for (non-certified) connector types to be used successfully at cryogenic temperatures. It is recommended that connector samples should be subjected to five cycles of cryogenic temperature...(followed by examination for cracks and DWV)".

TML and CVML

Glenair has conducted testing on all connector materials to establish typical percentage material loss (TML) and collected volatile material loss (CVML). Please consult factory for test reports.

Outgassing

Plastic and rubber materials give off gaseous molecules. For example, the smell inside a new car is caused by polymer outgassing. Heat and vacuum increase the rate of diffusion. In a spacecraft the gases coming off polymers can contaminate optical surfaces and instruments. The result is degraded performance.

Glenair recommends that HiPer-D connectors for space flight should be oven baked or thermal vacuum outgassed. The table below shows HiPer-D connector materials that must be postcured or baked to meet outgassing limits. Components such as insulators and seals are routinely postcured prior to connector assembly. However, some materials such as RTV can only be outgassed once the connector is assembled. NASA states "A bakeout for outgassing control is driven by the application and may be required where tight contamination control must be maintained." This processing can be performed by Glenair; however, some customers prefer to fabricate higher level subassemblies before outgassing processing is performed.

OUTGASSING PROPERTIES OF HIPER-D MATERIALS

Component	Material	Outgassing Property
Insulator, PCB Trays	Thermoset epoxy	Meets ASTM E595
Grommet and Face Seal	Flourosilicone	Postcure is required
Adhesive	Eccobond 104 A/B	Meets ASTM E595
Sealant	DC3145 and DC3140 RTV	Postcure is required
Epoxy ink	Markem 7224	Meets ASTM E595
O-ring	Fluorosilicone	Postcure is required

NASA EEE-INST-002 SCREENING REQUIREMENTS

Inspection/ Test	NASA Level 1	NASA Level 2
Visual inspection	100%	100%
Mechanical	2 pcs.	2 pcs.
Voltage (DWV)	2 pcs.	2 pcs.
Insulation Resistance	2 pcs.	2 pcs.
Mating and Unmating Force	2 pcs.	N/A
Contact Engagement and Separation Force	2 pcs.	N/A
Solderability/Resistance to Soldering Heat	2 pcs.	N/A

1. NASA screening requirements from Table 2B of EEE-INST-002 Screening Requirements.

OUTGASSING AT-A-GLANCE

- Fluorosilicone rubber components used in HiPer-D connectors, such as o-rings, grommets and seals do not comply with NASA outgassing requirements.
- NASA nevertheless recommends additional processing to reduce outgassing of all materials to minimal levels.
- An inexpensive oven bakeout delivers excellent results compared to thermal vacuum outgassing. The high temperature of the oven bakeout effectively removes volatile materials.
- Glenair 429 mod codes provide easy ordering, whichever outgassing option is required.

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