

MICRO-D HERMETIC CONNECTORS

Hermeticity is defined as "the state or condition of being airtight". Sophisticated military electronics enclosures can experience electrical failure from ingress of moisture. System engineers can design the enclosure to withstand exposure to moisture and condensation by using "moisture-hardened" components and conformal coatings, but often the most practical approach is to install hermetically sealed electrical I/O connectors. Glass-to-metal seals provide assurance that, over the life of the enclosure, the accumulated amount of water vapor inside the box will not exceed the amount necessary to form condensation. Other applications for Micro-D hermetic connectors include vacuum chambers, cryogenics, and enclosures filled with inert gas.

Kovar® Alloy

Glenair's hermetic Micro-D shells and contacts are made from a special alloy called Kovar®, an iron-nickel-cobalt alloy consisting of 54% Fe, 29% Ni, and 17% Co. This alloy is covered by SAE specification AMS-I-23011. Kovar has a relatively low coefficient of thermal expansion.

Matched Glass-To-Metal Seals

Matched seals rely on a chemical bond between the metal and the glass. Kovar contacts and shells are first exposed to high temperatures in order to develop an oxide coating. Then, the borosilicate glass and metal components are assembled with fixtures and are fused in a firing furnace at 900° C. A strong chemical bond is created between the metal and glass. Unlike compression seals which rely on different thermal coefficients of expansion between the glass and metal, a matched seal offers better resistance to stress from thermal extremes.

Hermetic Testing

All Micro-D hermetic connectors are 100% tested prior to shipment. A helium leak test is performed to certify the hermetic seal. This test is conducted by inducing a 1 ATM vacuum on one side of the connector. Helium gas is released on the other side, and a mass spectrometer "counts" the number of helium molecules that penetrate the connector seal. Helium leak testing takes advantage of the small size of a helium molecule compared to air or water vapor. Helium is inert, rare in our atmosphere, and is easy to detect with a mass spectrometer.

Micro-D Hermetic Plating Options

Unlike regular connectors which are plated as components prior to assembly, hermetic connectors are electroplated after the parts are fired and cleaned of oxides. Typically the contacts are gold-plated and the connector shell is nickel-plated.

Connector Installation

Hermetic connectors are typically soldered or welded into panels or bulkheads. Laser welding is a good option if the connector is mounted onto a Kovar or stainless steel panel. If the panel is aluminum alloy, then soldering is recommended. Micro-D's with o-ring seals offer another alternative. O-rings, when installed properly, will provide a very low permeability seal. The seating surface must be free from scratches or imperfections. A 32 finish is acceptable, but a 16 finish is preferred. The o-ring can be coated with a light coat of vacuum grease.



MICRO-D HERMETIC CONNECTOR DESIGN NOTES

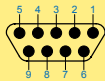
“Why can't I get a hermetic Micro-D with pin contacts instead of sockets?”

The Micro-D TwistPin contact cannot be made from the materials that are required for hermetic contacts. Hermetic contacts are made from ferrous alloys such as Kovar® or Alloy 52. These alloys do not have spring properties. The Micro-D TwistPin contact is made from spring-temper beryllium copper. The Micro-D socket

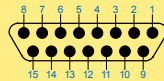
contact is a cylinder and does not provide any spring force, so Micro-D hermetic connectors are always receptacle connectors with socket contacts. “What about high pressure?” “What is the maximum recommended pressure rating for a hermetic Micro-D?”

Glenair hermetic Micro-D's are built to safely withstand 1000 PSI of hydrostatic pressure in an open face (unmated) condition.

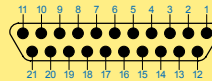
MICRO-D CONTACT ARRANGEMENTS (FACE VIEW SOCKET CONNECTOR)



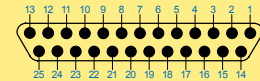
9 Socket



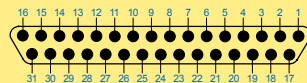
15 Socket



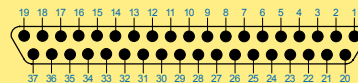
21 Socket



25 Socket



31 Socket



37 Socket



Micro-D Hermetic Connectors General Information

MATERIALS AND FINISHES

Connector Shell	Kovar® Alloy in Accordance With SAE AMS-I-23011 Class 1, Plated with Electrodeposited Nickel In Accordance With SAE-AMS-QQ-N-290 Class 2, 0.0002-0.0003 Inches Thick.
Insulator	Borosilicate Glass
Interfacial Seal	Fluorosilicone Rubber, Blue
Socket Contact	Kovar® Alloy in Accordance With SAE AMS-I-23011 Class 1, Gold Plated In Accordance With ASTM B 488 Type II, Class 1.27 (50 microinches minimum) over Nickel Underplate in Accordance With SAE-AMS-QQ-N-290 Class 2.
Hardware	300 Series Stainless Steel
O-Ring	Fluorosilicone Rubber, Blue
Encapsulant	Epoxy

PERFORMANCE SPECIFICATIONS

Current Rating	3 AMP
Dielectric Withstanding Voltage	150 VAC
Working Voltage	100 VDC
Insulation Resistance	5000 Megohms Minimum
Contact Resistance	30 Milliohms Maximum
Hermeticity	Maximum Helium Leak Rate 1 X 10 ⁻⁸ cc's per Second at One Atmosphere
Operating Temperature	-55° C. to +125° C.
Shock	50 g.
Vibration	20 g.
Outgassing	Meets NASA Outgassing Requirements
Mating Force	(10 Ounces) X (# of Contacts)
For additional performance requirements, please refer to MIL-DTL-83513	

CONNECTOR WEIGHTS FOR 177-140H HERMETIC SOLDER MOUNT

Maximum Weight In Grams

Layout	Solder Cup	PCB
9	4.7	4.5
15	7.1	6.8
21	8.2	8.0
25	8.7	8.4
31	9.5	9.2
37	10.8	10.4