



Douglas Electrical Components

BEYOND THE CATALOG

HERMETICALLY SEALED FIBER OPTIC FEEDTHROUGH SOLUTION



Douglas Electrical Components is challenged to develop new custom hermetic solutions daily. This includes mechanical, electrical, and optical fiber solutions combined to meet the performance specifications of the customers' requirements. In this brief case study, we review some of the design challenges and solutions presented to a Tier-1 manufacturer in the Aerospace & Defense industry.

MECHANICAL INTERFACE

MIL-SPEC CONNECTOR REQUIRES INTEGRAL FLANGE

The design process started with a non-hermetic D38999 commercial optical fiber connector; Douglas created a plug-and-play solution to hermetically seal the connector directly to optical fibers and housing, forming a single feedthrough assembly.

Using a high-strength, chemically inert and low-outgassing epoxy, Douglas Electrical Components combines commercially available components such as the 38999 connector to increase availability and design flexibility. Often, commercially available hermetic connectors are limited in their options and configurations.

For this hermetic design, the customer required a customized integral flange. Standard material options include stainless steel, aluminum, brass, and specialty nickel-alloys. In this application, the customer needed the assembly to be hermetic and lightweight.

Using anodized aluminum, the mechanical interface weight was reduced by approximately half while meeting other environmental challenges. The hermetic epoxy seals to the connector, flange, and low-outgassing jacketed fibers, creating a single hermetic assembly. A mating connector was also sealed using a simple backpotting process.



VIRTUALLY ANY HOUSING MATERIAL CAN BE USED INCLUDING:

- Molded plastics/polymers
- Common metals (brass, copper, aluminum & stainless steel)
- Exotic metals (titanium, AlBeMet)
- Custom geometries and customer furnished housings

OPTICAL FIBER INTERFACE

EXPERTISE IN SEALING OPTICAL FIBER

Challenge 1 – Optical Fiber Sealing

Douglas' hermetic epoxy can be applied to virtually any connector and combined with various integral electrical connections to create a complete hermetic penetration. Douglas employs moisture-tight, hermetic epoxy to hermetically seal and encapsulate optical fibers. Our IPC-620 technicians carefully seal and test the assembly for its hermetic seal through mass spectrometer as well as optical continuity (white light) testing. Insertion Loss (IL) and Return Loss (RL), measured as a ratio relative to the input power, are optional tests that can be conducted on hermetic fiber assemblies. In this application, testing was performed for both the feedthrough assembly as well as the mating connector harness assembly.

Challenge 2 – Integral Armor

The mating D38999 connector harness featured its own unique challenges. While it did not feature a customized housing, there were other unique design features to meet environmental challenges. Douglas designed

the mating harness with breakouts from a MIL-spec mating connector to individual armored fiber channels with FC/APC terminations. Given the fragility of optical fiber compared to copper conductors, the addition of armor and pre-wired connections ensured the highest level of protection of the fiber. Again, having the assembly pre-wired and tested with the terminations adds value to the customer to ensure the optical continuity of the assembly to make it plug-and-play.

Challenge 3 – Grounding

Within the epoxy, Douglas grounded the armored jackets to the connector shell and backpotted the MIL-spec plug connector, encapsulating and protecting the transition between the feedthrough and assembly. Proper grounding of MIL-spec connectors can protect against static electricity, creating signal noise, or electrical surges. In the case of aerospace applications, electrical systems benefit from proper grounding during lightning strike occurrences.

VALUE-ADDED SERVICES

- Connectorized wire and cable feedthrough assemblies
- Full cable harnessing with integral braided or spiral shielding
- Armored cable integration with hermetic protection at feedthrough interface
- Directly integrate existing connectors, wires, cables, and terminations
- Labeling and marking wires and cables
- Fully connectorized harnesses
- Bundle mating cables, assemblies, and harnesses to reduce suppliers
- Hermetically seal existing hardware and housings



FEATURED PRODUCT

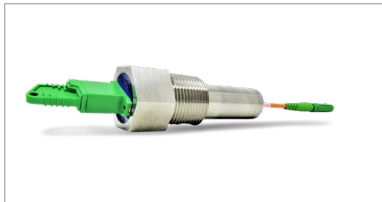
OPTISEAL™ SERIES

Our certified IPC-620 technicians can handle optical fibers carefully to effectively seal the feedthrough assembly. Designs are available for both vacuum and positive pressure applications. With OptiSeal, you can create a hybrid feedthrough harness that can combine

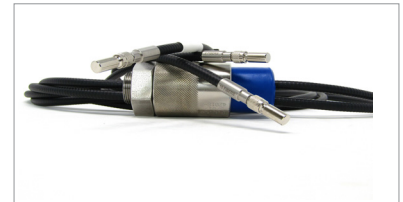
a mixture of copper wires, fiber optic cables, thermocouples, power cables, shielded pairs, triplets, and quads; this can reduce cost and weight, while increasing reliability within your equipment or assembly.



Hermetic Bulkhead feedthrough with MTP terminations



Optical fiber hermetic feedthrough with NPT threads



Custom vacuum face seal optical fiber feedthrough



RFW/PFW assemblies can include MIL-spec optical fiber connectors with integral optical fibers.



Hermetic Optical Fiber Feedthroughs



Simple hermetic fiber optic feedthrough with vacuum face seal

ISO CERTIFIED

ISO9001:2015
ISO 14001: 2015

ITAR REGISTERED

ITAR, DDTC, and DFARS compliant assemblies

RoHS

Conflict Materials- and ROHS-compliant assemblies

IPC-620

IPC/WHMA-A-620 Certified Trainers and Application Specialists

**AS9102 First Article Inspections available on upon request; contact factory.*

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