section 11 5311.16

glovebox feedthroughs, hermetically-sealed

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LANL MASTER SPECIFICATION

This template must be edited for each project.  In doing so, specifier must add job-specific requirements.  Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.  Once the choice is made or text supplied, remove the brackets.  The specifications must also be edited to delete specification requirements for processes, items, or designs that are not included in the project -- and specifier’s notes such as these.  To seek a variance from requirements in the specifications that are applicable, contact the Engineering Standards Manual Glovebox[POC](http://engstandards.lanl.gov/POCs.shtml). Please contact POC with suggestions for improvement as well.  
  
When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General requirements.  
  
This specification was prepared by an organization operating under a quality assurance program that meets the requirements of 10 CFR 830 (suitable for ML-1 through ML-4 projects). Implementation of this specification requires modification to the specification to meet project-specific requirements. Responsibility for application of this specification to meet project-specific requirements lies with the organization modifying or implementing the specification. The organization modifying the specification shall apply a graded approach to quality assurance based on the management level designation of the project. When this specification is used with nuclear facilities subject to 10 CFR 830, modification to this specification must be performed by an individual or organization operating under a quality assurance program that meets the requirements of that CFR.

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This specification is a general specification covering a range of bulkhead feedthrough hermetically-sealed wire and cable assemblies as well as military-style circular hermetically-sealed electrical connectors for glovebox applications. It is intended to be used for procurements of bulkhead electrical feedthroughs with extremely low leakage rates.

The technical requirements of this specification are applicable to feedthroughs with relatively low pressure differentials across them—on the order of +/- 7 in. maximum water column pressure with glovebox applications. However, because of the hazardous nature of some substances contained in gloveboxes, a very low helium leakage rate is required of these feedthroughs.

This master specification requires project specific editing to add special requirements to the general electrical feedthrough requirements listed. It requires deletion of requirements that are not pertinent to the specific design being addressed, and addition of requirements that may not be directly addressed in this master specification. To seek a variance from applicable requirements, contact the Glovebox POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements. Employ design verification personnel to review and approve the finished specification after editing, verifying that applicable sections of the specification have been maintained. Ultimate responsibility for defining applicable requirements associated with procuring the correct glovebox hermetic feedthroughs lies with the author of the project-specific specification.

**TA-55 NOTE**: Currently, only Douglas Electrical Components custom-designed sealed wiring harnesses and connectors are authorized for TA-55 use. Refer to Attachment 1 of this Section. Although O-ring type feedthroughs are not the TA-55 standard, allowances/exceptions may be approved by facility management with sufficient technical justification, procurement documentation, and installation procedure documentation. Management approval is required before any use.

Feedthroughs which are currently not approved for use in TA-55 may still be acceptable in other LANL facilities. Refer to facility-specific specifications and regulations.

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1. general
   1. Section Includes
      1. Sealed wire & cable assemblies with wiring potted into threaded pipe nipples using epoxy or other suitable potting compound to form a leak-proof seal around the wiring or cabling. Wiring extends a specified distance from either side of the pipe nipple to allow for connections to be made. The unit is intended to pass electrical signals and power through a bulkhead wall by being screwed into a suitably-sized pipe coupling which is welded into a service panel or the bulkhead wall.

These units will be referred to as “sealed wiring harness(es)”

* + 1. Military-style circular connectors (MIL-STD or MIL-SPEC) with pipe threads sealed to a bulkhead pipe coupling connector types are intended to accept a mating cable connector on each end. These units also provide a leak-proof seal to pass electrical signals or power through a bulkhead wall.

These units will be referred to as “sealed connector(s)”

* + 1. Alternate or substitute products to the glovebox hermetically sealed electrical feedthroughs described in this Section are not allowed without specific approval by LANL.
  1. Related Sections
     1. Section 01 3300, Submittal Procedures
     2. Section 11 5311.12, Glovebox Installation
  2. system description
     1. Hermetically sealed electrical bulkhead feedthrough devices are used to feed electrical power and instrumentation signals through a bulkhead wall of a glovebox, or a service panel. They provide a leak-tight seal for the wiring pass-through that preserves glovebox integrity and maintains isolation of the potentially hazardous materials that a glovebox may contain.
     2. Design Requirements, Performance Requirements
        1. General
           1. Design and fabricate hermetically sealed bulkhead electrical feedthroughs in accordance with this Section, specifications listed in Paragraph 1.2.
           2. Bring any conflicts or exceptions between the above documents to LANL’s attention for resolution.
        2. Electrical
           1. Provide adequate wiring insulation and potting compound with adequate electrical insulating properties. No voltage leakage, breakdown, or flashover is allowed between conductors or between conductors and the outer body of the feedthrough at operating conditions.
        3. Mechanical

Sealed connectors and sealed wiring harnesses are to be manufactured to be dimensionally accurate, uniform in quality, and free from defects that would affect serviceability, reliability, and appearance.

1. Leakage: The maximum allowable helium leakage through and around a sealed connector with O-ring sealing is 1 x 10-6 cc/sec when tested at 4 in. wc or as specified on the drawing.
2. Vacuum rating: The rated operating vacuum for both sealed connectors and sealed wiring harnesses is 90% of full vacuum.
3. Temperature rating: The minimum rated operating temperature range for both sealed connectors and sealed wiring harnesses is 20 oF to +150 oF.
4. Sealed connectors are to be configured with an “N” insert position (normal).
5. Mating Connectors: Supply compatible mating male and female contact wire cable plugs for the ends of each sealed connector in the shipment. Supply male and female contact wire cable plugs for the wiring on each end of each sealed wiring harness in the shipment. Supply standard solder pot-type contact terminations for connector plugs, where required.
6. Do not supply shielded contacts with sealed connectors, or shielded wiring with sealed wiring harnesses.
7. Sealed connectors are to have pins on one side and sockets on the other side. Do not furnish connectors with “pin-pin” or “socket-socket” configuration.
   * + 1. Important: Referencing or including a vendor drawing(s) or quote that specifies configuration and/or QC testing requirements in the purchase requisition indicates that the requestor accepts the configuration and the required tests of the hermetically-sealed feedthrough device. Any inspection should be in accordance with the requirements established on the vendor drawings as modified in the procurement documentation.
   1. submittals
      1. Provide submittals in accordance with Section 01 3300, Submittal Procedures. Refer to LANL Subcontract Number on correspondence.
      2. Product Data
         1. Field Engineering/Procurement: Submit catalog data and/or drawings for each type of hermetically-sealed feedthrough device. If the procurement documentation includes detailed catalog data or drawings as part of the purchase order, no other product data is required unless a substitution is requested or required. (Note to procurement: Any drawing(s) or detailed date sheets should be uploaded in the e-procurement system to aid any inspection).
         2. Vendor: Provide Certified Material Test Reports (CMTR’s) for the stainless steel used in fabrication of sealed connectors and sealed wiring harnesses. Certificates of Conformance may be substituted for CMTR’s with LANL approval.
         3. Vendor: Submit a CoC that the product provided conforms to the drawings and conditions (testing, housing specification, and lead wire/connector data) listed on the drawing.
         4. Vendor: Submit any test reports (results) that demonstrate that the hermetically-sealed feedthrough device has met the requirements of the tests established on the drawings or quote.
   2. Quality Assurance

Control the design, materials, preparation, fabrication, inspection, testing, cleaning, packaging, and shipping of sealed connectors and sealed wiring harnesses to insure the production of an acceptable finished product. Maintain a QA program in accordance with the basic requirements of DOE Order 414.1D and 10 CFR 830 Subpart A.

* 1. delivery, storage, and handling
     1. Protect, store, pack, and ship feedthroughs to prevent damage.
     2. Protect from corrosion and contamination.
     3. Protect installation threads and wiring/connector ends from mechanical damage.
     4. Install a plastic cap on each end of sealed bulkhead feedthrough connectors before shipping.
  2. Nonconformances
     1. Notify LANL of any conflicts or exception to this specification, manufacturer’s recommended processes/instructions, and subcontract documents. Provide notification of a conflict immediately.
  3. Project/Site Conditions
     1. Feedthrough use location is at 7,500 feet elevation above sea level. Provide any service de-rating factor that applies due to use at high altitude to LANL. This requirement is in addition to the standard design requirements for temperature and pressure service.

1. products
   1. Manufacturers

Douglas Electrical Components

(formerly Douglas Engineering)

5 Middlebury Blvd.

Rockaway, NJ 07869

973-627-8230

General Inquiries:

contactus@douglaselectrical.com

Technical Information:

applications@douglaselectrical.com

Website:

[www.douglaselectrical.com](http://www.douglaselectrical.com)

Esterline Connection Technologies-

Souriau S. A. S.

ZAC3, reu de Valion

94440 Marolles-en-Brie

France

USA Contact representative:

Chris Eason, 864 354-8067

* 1. Manufactured units requirements--sealed WIRING HARNESSES and sealed connectors
     1. Fabrication
        1. Use methods, materials, and tolerances in accordance with referenced specifications and standards or as specify on appropriate vendor drawings or quote.
        2. For sealed wiring harnesses, provide wiring length extension of [insert length requirement] on threaded side of feedthrough, and [insert length requirement] on the unthreaded side of the feedthrough.
     2. Materials
        1. Hermetically sealed connector and wiring harness components: High-strength, vacuum-degassed, molded epoxy dielectric or other suitable material, so that any significant gas leakage through electrical connections is eliminated.
        2. Housings and any associated hardware: 300 series stainless steel.
        3. Sealed connectors, connector pin and socket material: Copper [some applications may require gold plating, if specified]. Pin and socket material maybe specified on vendor drawings or data sheets.
        4. Sealed wiring harnesses insulation: [insert proper wiring insulation material to fit project conditions]. Wire harness material maybe specified on vendor drawings or data sheets.

1. Execution
   1. tolerances

The dimensional tolerances for feedthroughs are typically specified on vendor drawings or data sheets. Specified or referenced Mil-Spec for connectors shall meet the requirements of the applicable MIL-Spec.

* 1. Acceptance Tests
     1. Test completed sealed connector and sealed wiring harness assemblies in accordance with the QC test requirements (acceptance requirements) standards specified on the vendor’s drawings and/or quote or EIA-364 and/or MIL-STD-202.

The Manufacturer is responsible for the performance of all specified inspection requirements, unless otherwise stated in the subcontract or purchase order.

* + - 1. Vacuum Leak Test

Test sealed connectors and sealed wiring harnesses for evidence of openings between conductors, or between conductors and outer body in accordance with the general requirements and processes described in MIL-STD-202H with the acceptance criteria established on the vendor drawings or quote (maximum acceptable leak rate 1 x 10-6 cc/sec when tested at 4 in. wc)

* + - 1. High Potential Test

Test sealed connectors and sealed wiring harnesses for evidence of breakdown or flashover between conductors, or between conductors and outer body in accordance with EIA-364, Electrical Connectors Test Procedures, MIL-STD-202H, Test Method 301 based upon the required rated operating voltage of the feedthrough.

* 1. Labeling and identification
     1. Identify and mark connectors. It is recognized that there is limited room on the connector for marking. The connector and/or packaging should be marked with at least the Manufacturer (example: D.E. Co.), and drawing number (or the set number) of the connector. The manufacturer shall serialize parts, components, assemblies, and subassemblies as required by drawings or data sheets. Connectors shall be individually wrapped (identical connector may be wrapped in a single package) with each package marked with the vendor name and set number. The intent is to be able to identify the connector and the associated drawing number or Set number.
  2. Installation
     1. Install sealed wiring harnesses and sealed connectors with NPT threads into glovebox service panel NPT pipe couplings using teflon tape and a suitable pipe thread sealant (example: “TruBlu”) applied to feedthrough threads. Torque feedthrough “snug tight”.
     2. Post-installation Helium leak check completed service panel and glovebox in accordance with the requirements of Section 11 5311.10 and Section 11 5311.12.

END OF SECTION

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Do not delete the following reference information:

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THE FOLLOWING REFERENCE IS FOR LANL USE ONLY

This project specification is based on LANL Master Specification 11 5311.16 Rev. 2, dated January 31, 2017.

Section 11 5311.16- Attachment 1

TA-55 Special requirements FOR GLOVEBOX FEEDTHROUGHS

Because of past performance issues with glovebox electrical feedthroughs, only certain types of feedthroughs are currently approved for use in TA-55. The Douglas Electrical Components custom designed sealed wiring harnesses and connectors, as listed below, are authorized for TA-55 use.

Although O-ring type feedthroughs are not the TA-55 standard, allowances/Exceptions may be approved by facility management with sufficient technical justification, procurement documentation, and installation procedure documentation. Management approval is required before any use.

TA-55 Power Wiring Feedthroughs: The chart below lists specific sealed wiring harness feedthroughs of the NPT nipple type which have been jointly developed by LANL and Douglas Electrical Components (formerly Douglas Engineering) of Rockaway, NJ. These feedthroughs are for power wiring use in TA-55.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **DE p/n** | **DE Quote #** | **SS Housing** | **Wires** | **Lengths** | Color | Rating |
| 42462 | 13246-1 | ½” nipple | 3 #12awg | 1’ x 1’ | Bl / Wh / Grn | 120v, 20a |
| 42463 | 13246-2 | ½” nipple | 3 #10awg | 1’ x 1’ | Bl / Wh / Grn | 120v, 30a |
| 42464 | 13246-3 | ½” nipple | 4 #12awg | 1’ x 1’ | Bl / Red / Wh / Grn | 208v, 20a |
| 42465 | 13246-4 | ½” nipple | 4 #10awg | 1’ x 1’ | Bl / Red / Wh / Grn | 208v, 30a |
| 42466 | 13246-5 | 1” nipple | 1 #10awg 3 #8awg | 1’ x 1’ | Grn  Bl / Red / Wh | 208v, 50a |
| 42467 | 13246-6 | ¾” nipple | 5 #12awg | 1’ x 1’ | Bl / Red / Grn / Blu / Wh | 208v, 20a, 3ph |
| 42468 | 13246-7 | ¾” nipple | 5 #10awg | 1’ x 1’ | Bl / Red / Grn / Blu / Wh | 208v, 30a, 3ph |
| 42469 | 13246-8 | 1” nipple | 1 #10awg 4 #8awg | 1’ x 1’ | Grn  Bl / Red / Blu / Wh | 208v, 50a, 3ph |
| 42679 | 13246-9 | ¾” nipple | 5 #12awg | 1’ x 1’ | Brn / Org / Yel / Wh / Grn | 480v, 20a, 3ph |
| 42680 | 13246-10 | ¾” nipple | 5 #10awg | 1’ x 1’ | Brn / Org / Yel / Wh / Grn | 480v, 30a, 3ph |
| 42681 | 13246-11 | 1” nipple | 1 #10awg 4 #8awg | 1’ x 1’ | Grn  Brn / Org / Yel / Wh | 480v, 50a, 3ph |

TA-55 Signal Wiring Feedthroughs: Listed on the attached drawing 55Y-002446 (see Attachment 1-3) are TA-55 sealed connector feedthroughs of the NPT nipple type which are suitable for signal wiring applications. These feedthroughs were also jointly developed by LANL and Douglas Electrical Components.

