

SPECIFICATION

Project: LHC IR FEEDBOX
CRYOGENICS

Department
Mechanical Engineering

Orig. Issue
8 Nov 2002

DFBX Bus Duct Installation

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REVISION LOG

SPECIFICATIONProject: LHC IR FEEDBOX
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The purpose of this document is to identify the steps that must be followed by the DFBX Subcontractor to properly install the LBNL-supplied DFBX bus ducts that also contain the lambda plug.

2. SCOPE

This document applies to the bus duct assemblies designated as MQX1 and MBX1. The MQX1 assemblies are used in all 8 DFBX, whereas the MBX1 are used in DFBX models C,D, G, and H.

3. REFERENCE DOCUMENTS

- 3.1 LBNL Drawings
 - 24C352 – DFBXG Feed Box Assembly
 - 25I891 – Pipe LD3 and Bus Duct
 - 25M857 – Pipe Weldment, MQX1
 - 25M859 – Pipe Weldment, MBX1
 - 25H400 – Lambda Plug Assembly
 - 25I447 – Lambda Plug, Tie-down Ring
- 3.2 LBNL Documents
 - M982 – 600 A Current Lead Splice Procedure
 - M983 – 120 A Current Lead Splice Procedure
 - M985 – HTS Current Lead Splice Procedure

4. SUBCONTRACTOR ACTIVITIES

The following list of tasks shall be performed by the DFBX Subcontractor.

4.1 Incoming Inspection and Acceptance Testing

- 4.1.1. Uncrate and make sure traveler is completely filled out.
- 4.1.2. Check for obvious damage to the piping and conductors that will be inserted into the liquid helium vessel. If there is no apparent damage, proceed to step 4.1.6.
- 4.1.3. Perform vacuum leak check of magnet side piping.
- 4.1.4. Perform rate of rise test on lambda plug, both directions
- 4.1.5. Perform hipot test of main conductors in air and after pumping and purging with helium gas on magnet side.
- 4.1.6. Repack and place in secure storage.

4.2 Installation

- 4.2.1. Remove required assembly from storage, lifting by a choker sling around the horizontal run containing the tooling ball.

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- 4.2.2. Enter serial number of bus assembly in DFBX traveler.
 - 4.2.3. Remove the protective pipe cover from the DFBX conductors. Remove the protective Teflon tube from the conductors.
 - 4.2.4. Release the Helicoflex clamp and remove the ISO 50KF blank flange and seal. Clean flange with Acetone and Isopropyl alcohol for welding.
 - 4.2.5. Place a protective teflon tube in the 3.875-inch-diameter hole in the liquid helium vessel endplate.
 - 4.2.6. Carefully insert the conductors through the hole in the end plate of the helium vessel, feeding the corrector busses (if present) through their respective hole in the G-10 guides, and making sure the main busses are located in their G-10 support blocks.
 - 4.2.7. Secure the G-10 brackets to the liquid helium vessel and make sure the conductors are all long enough to reach their respective current lead.
 - 4.2.8. Align the bus duct to the proper position. Use 4 individual clamps in the tapped holes on the liquid helium vessel end plate to lock the assembly to the liquid helium vessel while the alignment is finalized.
 - 4.2.9. Remove the teflon guide tube.
 - 4.2.10. From the inside of the liquid helium vessel, attach Omegalabel[®] BU-100/38 temperature monitors on the lambda plate housing at 4 equally spaced locations.
 - 4.2.11. Tack weld the assembly at 4 equally spaced places, each weld no more than 1 inch long. Use a GTAW torch, and a fusion process. Fillet leg to be 0.06 inch. Important factor is to minimize heating of the lambda plug and keep temperature below 40C. Allow the 4 tacks to cool to room temperature before proceeding. Check alignment.
 - 4.2.12. Repeat step 8 for 4 more fillet tacks. Move the clamps as needed. Check alignment.
 - 4.2.13. Repeat step 8 for 4 more fillet tacks. Move the clamps as needed. Check alignment.
 - 4.2.14. Remove the clamps and check that the retaining ring can be applied.
 - 4.2.15. Complete the welding by repeating step 8 as needed. Check alignment.
 - 4.2.16. Fasten retaining ring in position, tightening the 12 bolts in a star pattern to 25 ft-lb torque.
 - 4.2.17. Tack weld the bolt heads to the retaining ring to prevent bolt loosening.
 - 4.2.18. Remove the temperature monitors and place in the traveler, and note their condition in the traveler.
 - 4.2.19. Check rate of pressure rise through lambda plate, from helium vessel into bus duct.
 - 4.2.20. Connect busses inside helium vessel, using LBL procedures. Use M985 for the main busses, M982 for the busses that connect to 600 A leads, and M983 for the busses that connect to 120 A leads.

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- 4.2.21. Remove the 3.38 inch CF and verify continuity and proper connection of the busses.
- 4.2.22. Replace the copper gasket and reseal the 3.38 inch CF. Torque in a star pattern to 26 ft-lbs.