

Author

Department

Mechanical Engineering

Date

18 Oct, 2002

Checked By: _____

Program - Project - Job: _____

Title: Fabrication of DFBX Beam Tube Assemblies at LBNL

1. PURPOSE

The purpose of this document is to identify the steps that will be necessary to fabricate the DFBX Beam Tube Assemblies at LBNL. These assemblies will be shipped to the DFBX Subcontractor for integration into the completed DFBX.

2. SCOPE

This document is limited to the fabrication and test of the Beam Tube Assemblies at LBNL.

3. REFERENCE DOCUMENTS

4. ACTIVITIES

- 4.1. Inspect CERN-supplied 316L bore tube and cut to desired length
- 4.2. Clean bore tube using LBNL UHV cleaning procedure.
- 4.3. Attach jacket weld caps, 25I534, to jacket, using GTAW process.
- 4.4. Weld the jacket assembly to the bore tube. Use GTAW process with shielding gas. Do not create porosity in weld region.
- 4.5. Check that inner diameter has not collapsed due to welding. Ball size to proper diameter if necessary
- 4.6. Weld end fittings per 25I855. Use shielding gas. The end fittings contain 1 inch Swagelock hardware.
- 4.7. Weld guide rings to od of jacket by welding instructions on 25I855.
- 4.8. Leak check the bore tube and jacket. Bore tube leak rate to be less than 1×10^{-10} atm cc/sec, and leak rate of jacket to be less than 1×10^{-9} atm cc/sec.
- 4.9. Verify that the dimensions are within tolerance.
- 4.10. Thermally cycle the weldment 5 times between room and LN temperature. Use GHe inside the jacket and sealed, dry nitrogen inside the tube. Do not dunk the assembly into LN, but rather introduce LN into a box containing the assembly to avoid excessive thermal stresses.
- 4.11. Warm to room temperature. Pressurize the bore tube to 5 bar gauge (75 psig) using dry nitrogen gas. Hold for 10 minutes at pressure.
- 4.12. Leak check the bore tube by pumping on the tube and applying helium gas to the outside. Use a directed spray of helium gas as well as a general application using a bag filled with helium gas. The leak rate of the tube shall be less than 10^{-10} atm cc/sec (helium). This is equivalent to 10^{-11} Pa m³/sec.
- 4.13. Leak check the jacket by pumping on it and applying helium with a directed spray and then with a general bagging. Leak rate to be less than 1×10^{-9} atm cc/sec

- 4.14. Pressure the jacket to 25 bar gauge (370 psig) with GHe. Hold for 10 minutes at pressure. Drop the pressure to 20 bar and perform a dimensional check of the jacket welds and jacket od.
- 4.15. Leak check the bore tube by pumping on it and pressurizing the jacket to 25 bar gauge (370 psig). The leak rate shall be less than 10^{-10} atm cc/sec (helium). This is equivalent to 10^{-11} Pa m³/sec.
- 4.16. Bring the jacket and bore tube up to 3 psig pressure with dry nitrogen gas. Need a ¼ inch Hoke valves on the Swagelock fittings.
- 4.17. Attach “pressure-tested” labels to the assembly. Complete the traveler, apply serial number, and put in shipping container for delivery to the DFBX Vendor.