

MicroBooNE Interface Agreement Form

Cryostat nozzle and flange for PMT system cabling

Description of Interface:

All of the cables for the PMT system (signals, high voltage, and any monitoring or controls) will enter the cryostat through a nozzle that is welded to the cryostat and terminated with a Conflat® flange at the other end. The location, diameter length, and perhaps orientation of the nozzle and the size and characteristics of the mating flange must be agreed upon and specified. The blank flange closing the nozzle will be procured by WBS 1.10 and all engineering, design and machining required for the cables and equipment mounted on this flange will be also be done in coordination by WBS 1.3 and 1.10.

The PMT system will be assembled and mounted on a support structure outside the cryostat. This assembly will then be moved into the cryostat on a set of rails, or tracks, attached to the inside of the cylindrical section of the cryostat. WBS 1.3 will provide brackets welded to the cryostat to support the rails for the PMT structure. WBS 1.10 will provide the rails that attach to these brackets and all other components that mount on the rails. The motion of the system into the cryostat must not interfere with other components of the experiment that are installed before the PMT system is inserted. The rails will then support the PMT system for the duration of the experiment. The rails should be designed to allow smooth motion of the system, to provide adequate mechanical strength for support, and to provide adequate precision and constraint for the location of the system to prevent interference with other components inside the cryostat during transport and installation of the completed experimental system.

Requestor: WBS 1.8 PMTs

Supplier: WBS 1.3 Cryostat, WBS 1.10 Assembly

Technical Details of Interface:

The nozzle allocated for the PMT system is the nozzle labeled “Nozzle 16” (see TDR chapter 7, table 7-2 in Docdb #1503). Details of the design will exist in the latest version of Drawing LArTPC-112. All information in the drawing package is definitive. The following is a summary of some of that information. The nozzle is a 6” OD x 0.083” wall SS tube, opening to a section of 12” OD x 0.165” wall tube and terminated with a 14” Conflat® flange.

(Drawings of a typical Conflat® flange are available at <http://www.mdcvacuum.com/displayproductcontent.aspx?d=MDC&p=m.1.1.d.1>.) The total distance inside the nozzle from the inside wall of the cryostat to the parting plane of the flange is 25.0”. The PMT nozzle axis is displaced 7.6” from the parting plane of the removable end along the cylinder axis toward the center plane of the cylinder and rotated 16 degrees from the vertical axis. *Acquisition, design and machining of the blank flange, mating with the corresponding flange welded to the nozzle, will be done by WBS 1.10. A valve must be mounted on the blank flange by WBS 1.10 to allow flow of argon gas out of the nozzle. A drawing specifying this valve will be provided by WBS 1.2, Cryogenics.*

At present, the PMT rail system support brackets are two SS angles welded along one side of most of the length of the cylindrical section of the cryostat (see drawing sheet #2 of the file lartpc-112.pdf in Docdb #1399, and especially Section C-C and Detail G). The brackets are specified there, and all information in the drawing package is definitive. The following is a summary of some of that information. The brackets are constructed of a right angle section of 0.25” thick SS with legs 5.8” x 9.0” (H x V) 420” long. These angle sections are welded to the side of the cryostat, one with the horizontal face 36” inches below the horizontal center plane and the other 36” above the plane. *Any mounting holes or other attachments for rails are at present not indicated on the brackets and must be supplied by WBS 1.10.*

The PMT system will be assembled and mounted on a support structure outside the cryostat. This assembly will then be moved into the cryostat on a set of rails, or tracks, mounted on the brackets attached to the inside of the cylindrical section of the cryostat (brackets described above). The PMT system will be the last major system to be installed, after the TPC and cryogenic instrumentation. There must be sufficient space inside the cryostat, with all other systems installed, for this motion and for the final location of the PMT system. *WBS 1.8 will supply WBS 1.3 and WBS 1.10 with drawings and specifications of the PMT assembly, so that any possible interferences with other equipment inside the cryostat can be determined. An agreement will be reached by WBS 1.3, WBS 1.8 and WBS 1.10 that eliminates any interference found.*

Summary:

1. WBS 1.10 provides a blank 14-inch diameter Conflat® flange to be fitted in Nozzle 16, located closest to the open end of the vessel.
2. WBS 1.10 machines the flange to the requirements of WBS 1.8, including the required addition of an argon gas bleed valve to be specified by WBS 1.2.
3. WBS 1.8 provides the cables and connectors that are to be fitted to the feed-through, both internally as well as external to the cryostat.
4. WBS 1.10 provides all other feed-through components to be fitted into the Conflat® flange, mounts all components on the flange, and supplies a complete cable feed-through system to WBS 1.7 for installation.
5. WBS 1.8 supplies WBS 1.3 with their requirements for space for the PMT system to be installed into the vessel after all other elements are already installed. WBS 1.8 will inform WBS 1.3 of any conflicts and suggest changes as necessary. Process iterates, if required, to find a satisfactory solution.
6. WBS 1.10 provides support rails for the Cryostat, to be mounted onto the brackets installed in the vessel by WBS 1.3, for installation and housing of the support rack.
7. WBS 1.10 executes the final design and manufacturing of the support rack for the PMT system, using conceptual design and specifications provided by WBS 1.8. WBS 1.8 provides 30 PMTs and corresponding components for mounting on this rack at the time of installation. (See PMT-Installation Interface, DocDB #1198.)

Attachments: