ProtoDUNE II High Voltage System QA/QC Document Review for Final Design Review

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1. Findings

Quality Assurance/Quality Control requirements are described in documents by High Voltage System Subcomponents: Cathode Plane Assembly (CPA), Endwall Field Cage, Top/Bottom Filed Cage, Camera, HV Bus and Interconnect, and Resistor Divider Boards. QA/QC Procedures, Manufacturing and Procurement Plans have been uploaded to EDMS. There is no overall QC Plan for the High Voltage System describing the specifications, drawings, procedures, components being tested, description of QC inspections and tests and the technical justification for these inspections and tests. Although this information is interspersed among the documents provided.

1. Comments

The documents submitted for the HV Bus and Interconnect are good plans but will need to have procedures put in place prior to production.

There are a few DUNE requirements (and some CERN requirements) that could be expanded on. The documentation should be reviewed to ensure the DUNE and CERN requirements are adequately described.

For cabling and wires: It’s not clear from the documentation which material is in compliance with the low smoke zero halogen (LSZH) requirements, and which may have a derogation request. LSZH will be a requirement at SURF as well as at CERN. LSZH requirements should be reviewed and identified in the applicable design documentation.

For ProtoDUNE II material intended to be reused for DUNE at SURF the National Recognized Testing Laboratory (NRTL) requirement will need to be considered, either through NRTL certification or vetting through the safety review/ORC process for non-NRTL equipment. Considering the component manufacturers and suppliers, this should not be a problem, just something to be mindful of.

1. Recommendations

The documentation hierarchy should include a QC Plan describing the information noted above. The procedures should follow with more detailed steps to perform the fabrication, inspections, and tests with detailed acceptance criteria. The travelers and/or checklists will include the completion of key fabrication steps and inspections and tests. A QC Plan needs to be developed prior to the Production Readiness Review. For your reference are: LBNF DUNE QC Plan Template Instruction Sheet, (EDMS 2171775 v.0) and LBNF DUNE Quality Control Plan Template, (EDMS 2171059 v.0).

The procedures in EDMS are in rough draft format. These procedures need to be finalized in a format with page numbering, version control, and approval status. For your reference are: Development of LBNF DUNE Procedures Template, (EDMS 2260870 v.0), and Development of LBNF DUNE Procedures, (EDMS 2258386 v.0).

The acceptance criteria in the procedures needs to be measurable and/or objective. There were several instances in the procedures where the acceptance criteria were not defined, or it was described in a subjective matter such as “small”. Procedures need to be reviewed and revised as necessary to clarify the acceptance criteria so the person performing the task understands what is required.