

# DUNE Electrical Review Guidelines

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# Expectations of review materials for electrical aspects of a project

- Guidance document in DUNE DocDB 11269
- This is a general list to be tailored to each subsystem being reviewed.
- The sooner material is presented in the design process, the easier it will be to spot any issues requiring corrective issues.
- Much of the material may be ready for review at the 60% review, all of relevant material must be ready prior to a pre-production review.

# Electrical Review

- **System Level Diagram and Grounding plan**
  - System Level block diagram including grounding scheme
- **Printed Circuit Boards**
  - Schematic
  - Bill of Material
  - Board Layout Files
  - Specified electrical tests to be done by manufacturer on Printed Circuit Board
  - Specified tolerances given to manufacturers
  - Desirable – native board files

# Electrical Review

- **Mechanical/Electrical**

- Pressfit pins – documentation showing how manufacturer specifications are fulfilled in the design of the printed circuit board
- Verify soldering temperature profiles met
- Plans to verify board assembly process (visual, AOI, x-ray)
- Cable Strain relief
- Any Pressure specifications (i.e, Flange boards)
- Qualifications of board glue joints

- **Electrical Interfaces**

- Connector pinout information of BOTH mating ends of board/cable, cable/cable, or board/board

# Electrical Review

- **Power**

- One Line Drawing(s) – Show Connectors, pinouts, cables, and current ratings – include (specifications and part numbers, manufacturer if known, cable AWG, cable color)
- Validation of power supply – show it will meet load specs

- **Assembled Boards**

- Plans for testing and/or stress testing
- Qualification process for “good” board

- **Component Qualification**

- Voltage ratings correct (i.e., Capacitors)
- Verification procedures for all “cold” components

# Electrical Review

- **ASICs**

- Requirements and specification
- Test and qualification testing
- Qualification procedures for “cold” operation

- **Cables**

- Specifications and manufacturer if known
- Required ampacity for power cables; length of cable
- Materials must be low smoke halogen free OR a waiver must be applied for
- Cable performance at expected lengths

# Electrical Review

- **HV Power**

- Verify connectors are rated for or tested for voltage levels
- Verify no touch potential hazards

- **Firmware**

- Plan for firmware development; file storage, version control and access
- Plan for long term maintenance

- **System Performance and Documentation**

- Verification that all system requirements have been met
- Verification of all interface requirements
- Verification all design documentation is in EDMS

# Electrical Review

- **Safety**

- Verification that commercial equipment meets agreed upon safety standards
- Verification that custom designs meet safety guidelines and have or can pass operational readiness review