

FD-HD Plan for Production Readiness Reviews

Eric James
FD-HD Technical Board Meeting
October 16, 2024

PRR Preparations

- Resolve as best possible any open PDR or FDR recommendations (some recommendations are left as “for future” when these reviews are closed out)
- Make sure that all models and drawings are “final” and in the released state in EDMS
 - Any post-PRR changes require approval of Technical Board and FDC Executive Board
- Make sure that all interface documents are up-to-date and in the released state in EDMS

PRR Preparations

- Compliance Office Mechanical and Electrical approvals for the system must be in place prior to start of review
- Approved grounding and shielding plan should be in place prior to start of review (exceptions may be granted in some specific cases)
- Pointers to documents posted in EDMS should be provided (all documents should be in the released state)

Document List

Systems Engineering/Mechanical Engineering	Integrated sub-system (3D) model	2144461	DFD-13-6000_092122.png	HVS 3D model
	Interface Documents	2339392, 3078020	Requirements and Interfaces for Detector Support System (DSS), JT-HV to JT-PD Far Detector 1 Interface Control Document	Contains files of CPA interfaces
	Final fabrication and detailed cable drawings	2633164	DFD_CPA_071123.pdf	CPA Production drawings
	Part Identifier assignments	3078026	CPA_Part_Identifier_Assignments	Part IDs defined for CPA in HWDB
	Schema for component entries in DUNE HWDB	3078037	HVS_CPA_Schema.pdf	HWDB schema for CPA
	Approved installation plan	2233449, 3078054	FD1-HD Installation Plan 9 Aug 2022(v5).docx, Assembly and Installation at SURF	
Electrical Engineering	Approved Grounding & Shielding Plan	2373456	DUNE_FD1_HVS_Grounding_v1.2	Included in CPA drawing package
	System wiring diagrams	2380734 v.5	3 files	
	Detailed cable drawings	2633164	DFD_CPA_071123.pdf	
	Printed circuit board documentation	2144465 v.3	SP CPA FSS Bias Board	
	CPA Electrical Schematic Diagram	3078055	DUNE_SP_FD_CPA_Diagram_2 024-03-25-draft.pdf	Latest version by Glenn
	Layout artwork and Gerber files	2144465 v.3	multiple files	
	Bill of materials			
	Firmware/software validation	NA	NA	NA
Electro-static discharge (ESD) procedures	NA	NA	NA	

Document List

Compliance Office	Documentation of electrical and mechanical safety reviews	2380734 v.5	3 files	Revised original by Glenn - describes both electrical and mechanical connections
	Compliance Office Approvals	3153843 v.1	Electrical Safety Validation	Compliance Office approval
	Plans for component procurement including procurement specifications	3078039	Procurement_Plans_and_Responsibilities	Division of responsibility for part procurement between CPA factories and part suppliers
	Engineering codes and standards to be applied in manufacturing processes			Any? - Not Applicable?
	Plan for documentation of commercial vendor QC requirements	3078040	Plan_for_commercial_vendor_QC_documentation	Plan of QC tests done by vendors
	Certified material test reports	CERN-0000203861, CERN-0000211004	Engineering Notes, Final Design Review Docs (EDMS 2742504 v.1 DUNE FD1 HVS Engineering Analysis)	Files from previous reviews
	Certificates of compliance			Proof of these anywhere?
	General test inspection reports	CERN-0000203861, CERN-0000211004	(see above)	
Process for requesting and approving engineering changes during production	3078041	Process_for_requesting_and_approving_engineering_changes_during_production	Made this up	
Plans for critical handling of components	NA	NA	NA	
Technical Coordination	Production schedule	3078042, 2956778	Production_Schedule, CPA Factory Production.xlsx	Schedule for production at factories
	Shipping plan and schedule	3078043	Material_Shipment_Schedule	Shipping CPA crates to SURF
	Plan for resources (facilities, infrastructure, and workforce)	3078044	Production_Status_and_Manufacturing_Procedures	
	Production risks assessment and proposed mitigation strategies	3078045	Production_Risk_Assessment_and_Proposed_Mitigation	Several scenarios
	Delineation of responsibilities and required signoffs at each stage of shipping process	3078046	ShippingPlanDetails032124	

Document List

Review Office	Responses to previous review recommendations	2774172, 2796146	FD1 HVS PDR Closeout, FD1 HVS FDR Closeout	Closeout reports from PDR and FDR
	Final testing and performance results from prototyping activities	DocDB 28412, 28325, 27382	Cold Tests of SS Hardware for CPA Connections, Summary of NASA evaluation of Helical and Belleville Washers, Cold Test of Insulator for CPA FSS Edge	Docs of testing of hardware components
	Description of design changes occurring after the Final Design Review	NA	NA	Changed 4 typos and omissions on 3 drawings
Project ES&H	Production facility safety plans	3078048	wpc_worker_package.pdf	ANL Work Control Document (WCD)
	Hazard analyses for the production and manufacturing processes	3078048	wpc_worker_package.pdf	ANL WCD - includes recommended PPE
Project Quality Assurance	Detailed manufacturing procedures including inspection and testing steps	3078044	Production_Status_and_Manufacturing_Procedures	Included in iPad app
	Shipping, handling, and storage specifications	3078049	Storage_Requirements_in_the_Warehouse_and_Related_QC	Description of QC procedures and checklists in the iPad app
	QC Plan, traveller docs and HWDB data	3078051	QC_Details	
	Disposition plan for non-conforming items	3078052	Disposition_Plan_for_non	Plan for non-conforming items Assigns parts QC and schedules between ANL and CWM
	Documentation of assigned responsibilities in QC process	2952719	CPA_Parts_QC, Personnel, and Schedule Requirements	
	Drafts of detailed installation procedures including inspection and testing	3078053	CPAiPadappUserGuide020224	Included in iPad app
	CPA Mechanical Connection Configurations	3086538	CPAMechConnConfigs042924	Pictures of all CPA mechanical configurations

Kick-off Meeting

Public US/Central E. James

DUNE PRR: FD1 HVS-CPA Module Production

October 1, 2024
zoom
US/Central timezone

- Overview
- Timetable
- Contribution List
- Participant List

Support

- paolag@fnal.gov

Production Readiness Review (stage-2) of the DUNE FD1 HVS CPA Module Production

[Review Home](#)

[Charge Letter](#)

[Guide to PRR Documentation](#)

[EDMS Location of PRR Documentation](#)

[Final Committee Report](#)

Starts Oct 1, 2024, 9:30 AM
Ends Oct 1, 2024, 11:00 AM
US/Central

zoom

Bo Yu
Eric James
Francesco Pietropaolo
Francesco Pietropaolo
Peter Ratoff
Stephen Magill
Stephen Magill

Introductory to the CPA PRR

Reviewers
Michael Andrews, Linda Bagby, Olga Beltramello, Anselmo Cervera, Kevin Fahey, Jack Fowler, Eric James, Steve Kettell, Jim Mateyack, William Miller, Marzio Nessi, James Niehoff, Jennifer Raaf, Peter Ratoff (RO Coordinator), Filippo Resnati, Terri Shaw, James Stewart, and Kyle Zeug

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Kick-off Presentation

[Sample Presentation Link](#)

Question and Answer

Mechanical:

Regarding EDMS 3086538, the connection configuration schematics are helpful to show detail which is difficult to see on the 2D drawings (nice work). Do you think there is enough detail on this document for the assemblers? It took me a bit of time to sort out where each connection config appears on an assembly drawing. Have you considered if the connection schematic is an appropriate place to list the torque specs for each type and size of fastener? Or is that covered elsewhere?

>> Torque can be added. Each type of connection is labeled which indicates its location. This doc is meant to be a reference and is posted on the wall of the clean room. The detailed instructions for the connections are contained in the iPad app step-by-step. Each procedure includes the order of screw, washers, nuts etc. and the torque requirement. These pictures are just meant to illustrate the connections in case a worker wants to confirm what the procedure says.

Do you want to add a similar detail for the Z shape brackets that go between the cathode frame and FC profiles?

>> No, we are replacing all Z brackets with clip brackets.

Project Quality Assurance:

Are the acceptance criteria documented in the checklists and/or in the component incoming inspection procedures?

>> The instructions for the QC tests and acceptance evaluation are in the checklists on the iPad app.

In EDMS 3078040 (Plan for Commercial Vendor QC Documentation) QC requirements such as “Check of tongue and groove” seem to lack the details needed to perform the QC check? Are the specific QC inspection criteria shown in the iPad?

>> The inspection criteria are the same at the vendor and at the factories when we receive the parts. For example, we supplied Atlas Fibre with an aluminum template block for them to check the size of the frame tongues and the hole locations – the same template we use when we receive the parts.

Answers should note when documentation has been updated to avoid review recommendations that will require follow-up

End Game

- Once questions have been answered, committee will finalize report
- Recommendations will be uploaded into SharePoint for tracking.
- Recommendations must be addressed prior to review closeout, which is used to authorize start of procurement and/or construction activities

FD-HD Production Readiness Reviews

FD-HD Review	Start Date
TPC Electronics LArASIC PRR*	March 2022
APA Daresbury Production PRR	March 2022
PDS Rails & Cables PRR	October 2022
PDS SiPM PRR	November 2022
TPC Electronics COLDADC/COLDDATA PRR*	May 2023
PDS DAPHNE Components PRR*	November 2023
HVS CPA Resistive Panels PRR	January 2024
TPC Electronics PTC Components PRR*	March 2024
CALCI Temperature Sensors PRR (Site Visit)	March 2024
PDS SiPM Testing PRR (Site Visit)	March 2024
DAQ Timing System Carrier Board PRR*	April 2024
HVS CPA Module PRR	September 2024

Past/Ongoing

FD-HD Review	Start Date
APA External Boards and Cables PRR	October 2024
TPC Electronics FEMB PRR*	November 2024
PDS Cold Electronics PRR	December 2024
TPC Electronics Cold Cables PRR*	December 2024
HVS Voltage-Divider Board PRR	December 2024
HVS Field Cage PRR	February 2025
DAQ Timing System PRR*	February 2025
DAQ Readout Network PRR*	February 2025
DAQ Server PRR*	March 2025
HVS Field Cage Profiles PRR*	March 2025
TPC Electronics Mechanical PRR*	March 2025
PDS Module PRR	April 2025
PDS Warm Readout Electronics PRR*	April 2025
TPC Electronics Warm Readout PRR*	April 2025
APA Installation Hardware PRR	May 2025
HVS Delivery System PRR*	May 2025
CI Purity Monitor PRR*	June 2025

Future

* Shared with FD-VD