

**U.S. HL-LHC Accelerator Upgrade Project**

**Production Readiness Review of the HL-LHC AUP Series Cold Mass and Cryo-Assembly Fabrication at FNAL: 302.4.02/03**

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# Goal and Scope

The HL-LHC [1] AUP project is starting the fabrication of LMQXFA and LQXFA/B Series Cold Mass and Cryo-Assembly fabrication using two MQXFA Series Magnets. LMQXFA04 Cold Mass will be used in LQXFA/B04 Cryo-Assembly. Production Readiness Review (PRR) is a review step in the HL-LHC Accelerator Upgrade Project (AUP). It is held at the start of the series production, and it is intended to be a final technical review before production starts.

Scope of this PRR are the following items for Series Cold Masses and Cryo-Assemblies (CM&CA): - Parts and materials for fabrication - Drawings - Manufacturing and test procedures - Interfaces.

Goal of this PRR for Series CM&CA: - Approval of plans and procedures for LMQXFA and LQXFA/B Series CM&CA manufacturing at FNAL.

# Charges

The committee is requested to answer the following questions:

1. Are the Cold mass and Cryo-assembly design and the planned fabrication process sound and it can be expected that the fabricated series Cryo-assemblies will meet LMQXFA and LQXFA/B Functional Requirement Specifications?
2. Scope and interfaces: is the L3 task scope for 302.4.02 and 302.4.03 clearly defined? Are interfaces among these tasks, and with other tasks sufficiently well-defined for executing the series production?
3. Drawings: are all the assembly and component drawings released?
4. Manufacturing: are the manufacturing work-flow documents and travelers — including scheduling, personnel needs, floor space, and facilities requirement — appropriate to execute the series production?
5. QA/QC: are the QA/QC plans adequate? Is there appropriate documentation for quality control procedures, manufacturing and inspection plan, and data reporting (including part and material traceability)? Are the fabrication MIPs complete and approved?
6. ES&H: Have all hazards been identified and addressed? Are ES&H policy and documentation sufficient for the series production?
7. Risk: Are risks understood and appropriately managed for the series production?
8. Reviews: are all recommendations for these L3 tasks from previous reviews addressed?
9. Are these L3 tasks ready for series production?

# Technical Information

**Committee**

Michael Anerella (BNL), chairperson

Dan Cheng (LBNL)

Thomas Nicol (FNAL)

Attilio Milanese (CERN)

**Date and Time**

August 23rd, 2023 starting at 8/10/11/17 (LBNL/FNAL/BNL/CERN)

**Location/Connection**

Video-link by Zoom, info by email.

**Link to agenda with talks and other documents:**

[CA Series Production Readiness Review (23-August 25, 2023) · INDICO-FNAL (Indico)](https://indico.fnal.gov/event/60117/)

# References

1. High-Luminosity Large Hadron Collider (HL-LHC). Technical Design Report, edited by G. Apollinari, I. Béjar Alonso, O. Brüning, M. Lamont, L. Rossi [DOI: 10.23731/CYRM-2017-004](http://dx.doi.org/10.23731/CYRM-2017-004%20)