



**PRR of the HL-LHC AUP Series
Structure Fabrication & Magnet
Assembly: 302.2.07 & Review of
Series Magnet Specs**

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US HL-LHC Accelerator Upgrade Project

**Production Readiness Review of the HL-LHC AUP
Series Structure Fabrication & Magnet Assembly:
302.2.07 & Review of Series Magnet Specifications**



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1. Goal & scope

The HL-LHC AUP project is starting the fabrication of MQXFA Series Magnets (MQXFA08-23). MQXFA magnets [1] are the low-beta quadrupoles to be used in Q1 and Q3 Inner Triplet elements of the High Luminosity LHC (HL-LHC). If these magnets meet MQXFA requirements [2] they will be used in Q1/Q3 cryo-assemblies to be installed in the HL-LHC.

MQXFA Series magnets are assembled at LBNL (302.2.07) using coils fabricated at BNL (302.2.06) and FNAL (320.2.05), and magnet structures procured by LBNL (302.2.07). Five MQXFA Pre-Series magnets (MQXFA03/4/5/6/7) are to be assembled at LBNL before starting Series production. The first two series magnets (MQXFA03/4) were tested at BNL vertical test facility and met all key requirements.

A Production Readiness Review (PRR) is a major review step in the HL-LHC Accelerator Upgrade Project (AUP). It is held at start of series production, and is intended to be a largely technical review, but it also includes assessment of the planned cost, schedule, and personnel needs to complete the production. The scope of this review includes also the review of the MQXFA Series Magnet Specification [3].

Scope of this review are the following items for Series Magnets:

- MQXFA Series Magnet Drawings
- MQXFA Series Magnet Specification
- Parts and materials for magnet structures
- Structure assembly, magnet assembly and QC test procedures
- Interfaces.



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2. Charges

The committee is requested to answer the following questions:

1. Specifications: Are the specifications for MQXFA Series Magnet [3] complete? Do they (including referenced documents) cover all steps of structure assembly, magnet assembly and QC? Are magnets fabricated according to these specifications going to meet MQXFA Functional Requirement Specifications [2]?
2. Scope and interfaces: Is the L3 task scope for 302.2.07 clearly defined? Are interfaces [4] with other tasks sufficiently well-defined for executing the series magnet production?
3. Drawings: Are all the series magnet structure and series magnet assembly drawings released? Have they been provided to CERN?
4. Manufacturing: Are the manufacturing work-flow documents and travelers — including scheduling, personnel needs, floor space, and facilities requirement — appropriate to execute the series magnet 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)? Is the magnet fabrication MIP complete and approved?
6. Cost and Schedule: Are the cost and schedule estimates sufficiently well-defined and of adequate maturity to support the series production?
7. ES&H: Have all hazards been identified and addressed? Are ES&H policy and documentation sufficient for the series production?
8. Risk: Are risks understood and appropriately managed for the series production?
9. Reviews: Are all recommendations for this L3 task from previous reviews [5] addressed?
10. Is this L3 task ready for series production?



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3. Technical information

Committee

Peter Wanderer, chairperson (BNL)
Mike Anerella (BNL)
Rodger Bossert (FNAL)
Susana Izquierdo Bermudez (CERN)
Diego Perini (CERN)

Date and Time

February 24-25, 2021; starting at 7/9/10/16 (LBNL/FNAL/BNL/CERN)

Location/Connection

Video-link by Zoom, info by email.

Link to agenda with talks and other documents

<https://indico.fnal.gov/event/47193/>

4. References

- 1) *MQXFA Final Design Report*, US-HiLumi-doc-948.
- 2) *MQXFA Functional Requirements Specification*, US-HiLumi-doc-36.
- 3) *MQXFA Series Magnet Production Specification*, US-HiLumi-doc-4009.
- 4) *AUP Interface Control Documents*, US-HiLumi-doc-216/252/273/309/321.
- 5) *Closeout Report on the DOE/SC CD-3 Review of AUP*, US-HiLumi-doc-3963.