US HL-LHC Accelerator Upgrade Project

MQXFA11 Structure & Shims Review

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1. Goal & scope

The HL-LHC AUP project is starting the assembly of MQXFA11 magnet. This is the fourth series magnet of the MQXFA low beta quadrupoles to be used in Q1 and Q3 for the High Luminosity LHC. If MQXFA11 meets MQXFA requirements [1] it will be used in a Q1/Q3 cryo-assembly to be installed in the HL-LHC.

MQXFA11 coils were reviewed on November 12, 2021 [2].

The dis-assembly of MQXFA07 showed a large asymmetry in pole-key gaps. MQXFA Series magnet specifications [3] were changed in order to prevent excessive asymmetry in future magnets.

AUP decided to dis-assemble MQXFA09 because a critical non-conformity was found during final inspection. Therefore, MQXFA11 is going to use the structure that we used to assemble and pre-load MQXFA09. MQXFA09 structure was reviewed on July 22, 2021 [4].

The goal of this review is to evaluate MQXFA11 structure assembly and shim plans. Reviewers are requested to assess that MQXFA11 assembly is going to meet the revised MQXFA Series magnet specifications [3] and that it will prevent the critical NCR that caused MQXFA09 disassembly.

Reviewers should also assess that discrepancies and non-conformities of the magnet structure have been adequately processed, and that the shims will allow MQXFA11 to meet MQXFA requirements [1].

2. Charges

The committee is requested to answer the following questions:

1. Have Work Instructions (travelers) been revised to meet the revised MQXFA Series magnet specifications [3]?
2. Have Work Instructions (travelers) been revised to prevent the critical NCR that caused MQXFA09 disassembly?
3. Have discrepancies and non-conformities been adequately documented and processed?
4. If there are major non-conformities [6], have they been adequately documented and processed?
5. Are the proposed shims adequate for allowing MQXFA11 to meet MQXFA requirements [1]?
6. Have all recommendations from previous reviews [4, 5] been adequately addressed?
7. Do you have any other comment or recommendation to assure MQXFA11 is going to meet requirements?

3. Technical information

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

Date and Time
March 17, 2022. Start time is 7/9/10/15 (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/53560/

4. References

1) *MQXFA Functional Requirements Specification,* US-HiLumi-doc-36.
2) *MQXFA11 Coils Acceptance Review*, US-HiLumi-doc-4224.
3) *MQXFA Series Magnet Production Specification*, US-HiLumi-doc-4009.
4) *MQXFA09 Structure & Shims Review*, US-HiLumi-doc-4183.
5) *MQXFA10 Structure & Shims Review*, US-HiLumi-doc-4202.
6) *Handling of Discrepancies and Nonconformances*, US-HiLumi-doc-2484.