



MQXFA12b Structure & Shims Review

US-HiLumi-doc-4983

Other:

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US HL-LHC Accelerator Upgrade Project

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1. Goal & scope

The HL-LHC AUP project is starting the assembly of MQXFA12b quadrupole magnet. This is the re-assembly of MQXFA12 with two new coils. MQXFA12 had a critical non-conformity during the final electrical QC tests performed after magnet preload. Some coil and structure strain-gauge pins had been erroneously swapped in a connector bringing those pins close to each other. During a coil-structure Hipot a failure occurred. The Hipot was repeated a few times to understand the issue. Finally, it was found that two coils were no more able to meet the coil-pole 100 V requirement [1]. These coils have been put on hold and are not going to be used in MQXFA12b. Therefore, two new coils were presented and approved at the MQXFA12b Coil Acceptance Review [2].

If MQXFA12b meets MQXFA requirements [3] it will be used in a Q1/Q3 cryo-assembly to be installed in the HL-LHC.

In order to avoid reoccurrence of the MQXFA13 issue, additional locations for CMM measurements and a specification were added to the MQXFA Series Coil Production Specification [4].

In addition, a target for the minimum size of the loading-key shims has been added to the assembly plan of subsequent magnets. The MQXFA team has prepared a draft specification for adding it to the MQXFA Series magnet specifications [5].

Discrepancy or Non-Conformity Reports are generated whenever a component does not meet specifications [6].

The goal of this review is to evaluate MQXFA12b structure, the proposed shim plan, and the proposed change to the MQXFA Series magnet specifications. Reviewers should also assess that discrepancies and non-conformities of the magnet structure have been adequately processed to meet MQXFA requirements [3].

2. Charge questions

The committee is requested to answer the following questions:

1. Have all recommendations from previous reviews [7] been adequately addressed?
2. Have discrepancies and non-conformities of MQXFA12b structure been adequately documented and processed?
3. If there are major/critical non-conformities, have they been adequately documented and processed?
4. Are the proposed shims adequate for allowing MQXFA12b to meet MQXFA requirements [1]?



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5. Do you have any comment or recommendation about the proposed change to the MQXFA Series magnet specifications?
6. Do you have any other comment or recommendation to assure MQXFA12b is going to meet requirements?

3. Technical information

Committee

Rodger Bossert, chairperson (FNAL)

Mike Anerella (BNL)

Helene Felice (CEA)

Susana Izquierdo Bermudez (CERN)

Date and Time

March 6, 2024.

Start time is 7:00/9:00/10:00/16:00 (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/63577/>

4. References

- 1) *LBNL MQXFA-NCR-0429*
- 2) *MQXFA12b Coils Acceptance Review*, US-HiLumi-doc-4972.
- 3) *MQXFA Functional Requirements Specification*, US-HiLumi-doc-36.
- 4) *MQXFA Series Coil Production Specification*, US-HiLumi-doc-2986.
- 5) *MQXFA Series Magnet Production Specification*, US-HiLumi-doc-4009.
- 6) *Handling of Discrepancies and Nonconformances*, US-HiLumi-doc-2484.
- 7) *MQXFA13b Structure and Shims Review*, US-HiLumi-doc-4969.