



MQXFA18 Structure & Shims Review

US-HiLumi-doc-5153

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 MQXFA18 quadrupole magnet. This is the first MQXFA magnet to be assembled after MQXFA17 did not meet requirements during vertical test. Therefore, it will be the first new magnet to use tapered loading shims to prevent MQXFA17 issue.

If MQXFA18 meets MQXFA requirements [1] it will be used in a Q1/Q3 cryo-assembly to be installed in the HL-LHC.

MQXFA18 coils were presented and approved at the MQXFA18 Coil Acceptance Review [2].

The insertion of tapered loading keys was tested during the assembly of MQXFA12b. Comparison between FE simulations and strain gauge measurements can be found at [3]. The Off-normal work procedure used for this test is on the Indico page of this review [4].

Discrepancy or Non-Conformity Reports are generated whenever a component does not meet specifications [5, 6].

The goal of this review is to evaluate MQXFA18 structure, the proposed shim plan, and the use of tapered loading keys to prevent MQXFA17 issue. Reviewers should also assess that discrepancies and non-conformities of the magnet structure have been adequately processed to meet MQXFA requirements [1].

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 MQXFA18 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 MQXFA18 to meet MQXFA requirements [1]?
5. Do you have any comment or recommendation about the plan to use tapered loading keys to prevent MQXFA17 issue?
6. Do you have any other comment or recommendation to assure MQXFA18 is going to meet requirements?



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3. Technical information

Committee

Peter Wanderer, chairperson (BNL)

Mike Anerella (BNL)

Rodger Bossert (FNAL)

Susana Izquierdo Bermudez (CERN)

Date and Time

June 14, 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

[MQXFA18 Structure & Shims Review \(June 14, 2024\) · INDICO-FNAL \(Indico\)](#)

4. References

- 1) *MQXFA Functional Requirements Specification*, US-HiLumi-doc-36.
- 2) *MQXFA18 Coils Acceptance Review*, US-HiLumi-doc-5084.
- 3) *Analysis of test performed on MQXFA12b using tapered loading keys*
<https://indico.fnal.gov/event/64922/>
- 4) *Off-Normal Procedure for Tapered Key Demonstration*, Indico page of this review.
- 5) *MQXFA Series Magnet Production Specification*, US-HiLumi-doc-4009.
- 6) *Handling of Discrepancies and Nonconformances*, US-HiLumi-doc-2484.
- 7) *MQXFA12b Structure and Shims Review*, US-HiLumi-doc-4983.