US HL-LHC Accelerator Upgrade Project

MQXFA13b Coils Acceptance Review

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1. Goal & scope

The HL-LHC AUP project is planning to start assembly of MQXFA13b. MQXFA13 showed a long training with some detraining after quench 10. It was able to reach acceptance current after 24 quenches. Subsequently, it quenched at every up-ramp after a down-ramp at 100 A/s. All detraining and ramp-dependent quenches were in coil 227 [1]. The other three coils of MQXFA13 did not show any issue and will be re-used if they pass QC tests (electrical and CMM) after disassembly.

If MQXFA13b meets MQXFA requirements [2] it will be used in a Q1/Q3 cryo-assembly to be installed in the HL-LHC.

In MQXFA13b AUP is planning to use one of these new QXFA coils: 150, 234, 241 and 242.

Conductor and series coil specifications are presented in [3-7]. Discrepancy or Non-conformity Reports are generated whenever a component does not meet specifications.

Three coils (150, 234, and 242) have been presented at the MQXFA16 or MQXFA17 Coil Acceptance Review [8, 9]. At that time, it was recommended not using these coils because of small arc length in the ends. Updated analysis of this issue will be presented during this review.

The reviewers are requested to review discrepancies and non-conformities in strands, cable, and coil 241 (cable P43OL1188). In addition, they are requested to comment about the analysis of CMM measurements for all coils.

2. Charge questions

The committee is requested to answer the following questions:

1. Have all recommendations from previous reviews [9] been adequately addressed?
2. Have Discrepancies and Non-conformities been adequately documented and processed (all DR/NCR for coil 241, and new DR/NCR for the other coils)?
3. If there are critical Discrepancies/Non-conformities, have they been adequately documented and processed?
4. Is there any coil that you recommend not to use in MQXFA13b?
5. Do you have any other comment or recommendation regarding these coils and their conductor for allowing MQXFA13b to meet MQXFA requirements [1]?

3. Technical information

Committee

Arup Ghosh (chairperson), BNL retired
Susana Izquierdo Bermudez, CERN
GianLuca Sabbi, LBNL

Date and Time

November 8, 2023. Start time is 7/9/10/16 (LBNL/FNAL/BNL-FSU/CEA-CERN)

Location/Connection

Video-link by Zoom, info by email.

Link to agenda with talks and other documents

MQXFA13b Coils Acceptance Review (8-November 10, 2023) · INDICO-FNAL (Indico)

4. References

1) MQXFA13, MQXFA8b and MQXFA14b Test Results (October 12, 2023) · INDICO-FNAL (Indico)
2) *MQXFA Functional Requirements Specification*, US-HiLumi-doc-36
3) *Specification for Quadrupole Magnet Conductor*, US-HiLumi-doc-40
4) *Cable Specification*, US-HiLumi-doc-74
5) *Quadrupole Magnet Cable Insulation*, US-HiLumi-doc-75
6) *QXFA Series Coil Production Specification*, US-HiLumi-doc-2986
7) *QXFA Series Coil Fabrication Electrical QC plan*, US-HiLumi-doc-521
8) *MQXFA16 Coils Acceptance Review*, US-HiLumi-doc-4900
9) *MQXFA17 Coils Acceptance Review*, US-HiLumi-doc-4937