



**Report of the  
MQXFA14  
Structure & Shim Review**

US-HiLumi-doc-  
4792  
Other:  
Date: 02-07-2023  
Page 1 of 5



**US HL-LHC Accelerator Upgrade Project**

**Report of the MQXFA14 Structure & Shim  
Review**

*February 7<sup>th</sup> 2023*

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



# Report of the MQXFA14 Structure & Shim Review

US-HiLumi-doc-4792  
Other:  
Date: 02-07-2023  
Page 2 of 5

## TABLE OF CONTENTS

|                            |   |
|----------------------------|---|
| 1. GOAL AND SCOPE .....    | 3 |
| 2. TECHNICAL DETAILS ..... | 3 |
| 3. COMMENTS .....          | 4 |
| 4. RECOMMENDATION.....     | 4 |



# Report of the MQXFA14 Structure & Shim Review

US-HiLumi-doc-  
4792

Other:

Date: 02-07-2023

Page 3 of 5

## 1. Goal and scope

The HL-LHC AUP project is starting the assembly of MQXFA14 magnet. This is the 7th series magnet of the MQXFA low beta quadrupoles to be used in Q1 and Q3 for the High Luminosity LHC. If MQXFA14 meets MQXFA requirements [1] it will be used in a Q1/Q3 cryo-assembly to be installed in the HL-LHC.

MQXFA14 coils were reviewed on December 16, 2022 [2].

MQXFA14 is going to use the structure used for MQXFA12 before it was disassembled. MQXFA12 structure was reviewed during the *MQXFA12 Structure and Shim review* on August 25, 2022 [3].

MQXFA Series magnet specifications are presented in [4]. Discrepancy or Non-Conformity Reports are generated whenever a component does not meet specifications [5].

The goal of this review is to evaluate MQXFA14 structure and shim plan. Reviewers should also assess that discrepancies and non-conformities of the magnet structure have been adequately processed, and that the shims will allow MQXFA14 to meet MQXFA requirements [1]

## Technical details

### Committee

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

### Date and Time

February 07, 2023. 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/58119/>



# Report of the MQXFA14 Structure & Shim Review

US-HiLumi-doc-  
4792  
Other:  
Date: 02-07-2023  
Page 4 of 5

## 2. Review Charges responses

The committee was requested to answer the following questions:

1. Have all recommendations from previous reviews [6] been adequately addressed?  
Yes, with one exception. A list of the repairs to the PH wires has not yet been made.
2. Have discrepancies and non-conformities been adequately documented and processed? Yes.  
Finding: MQXFA14 has 16 NCR's.
3. If there are major non-conformities [5], have they been adequately documented and processed?  
Finding: There are no major non-conformities or NCRs.
4. Are the proposed shims adequate for allowing MQXFA14 to meet MQXFA requirements [1]? Yes.  
Finding: The coil sizes are within specifications but smaller than average, as has been the case for recent magnets.  
Finding: The formula used for calculation shim sizes is the same one used for previous magnets, which met MQXFA specifications.
5. Do you have any other comment or recommendation to assure MQXFA14 is going to meet requirements? Yes.

## 3. Comments

Comment: As a check for deformation due to assembly or cold test, consider repeating the measurement of the shell i. d. that is performed as part of the incoming acceptance procedure as a check of plastic deformation and comparing to the initial measurement.

## 4. Recommendations

Prepare a list of the repairs to the PH wires.

## 5. References



# Report of the MQXFA14 Structure & Shim Review

US-HiLumi-doc-4792

Other:

Date: 02-07-2023

Page 5 of 5

- 1) *MQXFA Functional Requirements Specification*, US-HiLumi-doc-36.
- 2) *MQXFA14 Coils Acceptance Review*, US-HiLumi-doc-4769.
- 3) *MQXFA12 Structure & Shims Review*, US-HiLumi-doc-4329.
- 4) *MQXFA Series Magnet Production Specification*, US-HiLumi-doc-4009.
- 5) *Handling of Discrepancies and Nonconformances*, US-HiLumi-doc-2484.
- 6) *MQXFA13 Structure & Shims Review*, US-HiLumi-doc-4747.