HL-LHC: Quality
Manufacturing and Inspection Plan – MQXFA Magnet Fabrication (LBNL)

Prepared by: K. Ray, D. Cheng **Date:** 20/11/2018	**Project:** HL-LHC	**Executing Entity:** LBNL **Supplier:** AUP	**Item Eq. Code:** LHCMQXFAS	**Asset Code (LHC Part Identifier):** HCMQXFAS001-LBNNNNNN
Verified by: J. Blowers, P. Ferracin, F. Savary **Date:** 21/11/2018				
Approved by: G. Apollinari, I. Bejar Alonso, A. Devred, E. Todesco **Date:** 26/11/2018	**Work Package:** WP3	**Client:** CERN **3rd Party**:	**Item description:** MQXFA Magnet	**EDMS Report No:**

No	ACTIVITY / OPÉRATION	APPL. STANDARDS / NORMES APPL.	APPLICABLE DOCUMENTS / DOCUMENTS APPLICABLES	REV. DOC.	INSPECTION / CONTRÔLE								NOTES
					EXECUTING ENTITY		SUPPLIER		CLIENT		3RD PARTY		
					Code	Signature/Date	Code	Signature/Date	Code	Signature/Date	Code	Signature/Date	
1.0	**Coil Receiving Inspection**												
1.1	Coil Selection and Shimming Plan Review		Coil Acceptance and CMM (drafting)		IH		IH		H				
2.0	**Shell Yoke Assembly**												
2.1	Incoming Shells and Yokes & inspection				R								
2.2	Assemble Yoke Half-Stacks		Yoke Pre-Stack Work Instructions SU-1008-8072; Yoke Half Stack Work Instruction SU-1009-7829		R								
2.3	Put strain gauges on shells		Shell Instrumentation Work Instruction SU-1009-3745		R								
2.4	Complete Shell-Yoke Assembly		Shell-Yoke Assembly Work Instructions SU-1008-2169		R		N						

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					Code	Signature/Date	Code	Signature/Date	Code	Signature/Date	Code	Signature/Date	
3.0	**Coil Pack Assembly**												
3.1	Incoming coil pack assembly parts inspection (collars, pads, etc.)		Load Pad Pre-Stack Work Instructions SU-1008-8075 Procurement Specifications		R								
3.2	Dressed Coil		Dressed Coil Work Instructions SU-1008-8073		R								
3.3	Pad Collar Assembly		Pad-Collar Assembly Work Instructions SU-1010-1610		R								
3.4	Coil Pack Assembly and Dimensional Measurements		Coil Pack Subassembly Work Instructions SU-1008-8074		R								
3.5	Coil Pack Electrical Tests		MQXF Magnet Electrical QA at LBNL SU-1010-1903		R		N						
3.6	Coil Pack Magnetic Measurements, and definition of magnetic shimming		Magnetic Measurements SU-1010-2018		IH		IH		H				
4.0	**Magnet Integration**												
4.1	Incoming parts inspection (Master Keys, load keys, etc.)				R								
4.2	Coil pack insertion and azimuthal loading		MQXFA Magnet Fiducial Structure Work Instructions SU-1008-8070		R		N		N				"N" is for strain gauge data, i.e. pre-loads

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					Code	Signature/Date	Code	Signature/Date	Code	Signature/Date	Code	Signature/Date	
4.3	Intermediate Post-azimuthal Electrical QC		MQXF Magnet Electrical QA at LBNL SU-1010-1903		R								
4.4	Strain Gauges on Axial Rods		Axial Rods Instrumented Work Instructions SU-1008-8069		R								
4.5	Axial Loading		Axial End Load Structure Work Instructions SU-1008-8068		R		N		N				"N" is for strain gauge data, i.e. pre-loads
4.6	Post-Axial Electrical QC		MQXF Magnet Electrical QA at LBNL SU-1010-1903		R								
4.7	Magnetic Measurements, Fiducial Structure; insertion of magnetic shims		Magnetic Measurements SU-1010-2018		IH		IH		N				
4.8	Assemble Splice Box		Splice Box Work Instructions SU-1008-8067		R								
4.9	Post-Splice Electrical QC		MQXF Magnet Electrical QA at LBNL SU-1010-1903		R								
4.10	Finish Wiring				R								
4.11	Final Electrical QC		MQXF Magnet Electrical QA at LBNL SU-1010-1903		R		IH						
4.12	Strain Gauge Reading				R								
4.13	Prepare for Shipment				IH		N		N				

*Add as many rows as required

NOTE:	**EXECUTING ENTITY: LBNL**	**SUPPLIER:AUP**	**CLIENT: CERN**	**3rd PARTY (if any):**
H = HOLD POINT N = NOTIFICATION POINT R = REVIEW AND APPROVAL OF REPORT W = WITNESS POINT	**Approved by:** N. Surname **Signature:** **Date:** DD/MM/20YY	**Approved by:** N. Surname **Signature:** **Date:** DD/MM/20YY	**Approved by:** N. Surname **Signature:** **Date:** DD/MM/20YY	**Approved by:** N. Surname **Signature:** **Date:** DD/MM/20YY

1- **N (Notification Point)**: CERN, or its authorized representative, is informed 5 working days in advance that a specific step has been completed and that the following step in the approved work-flow will be performed. A Notification Point does not affect the work-flow. Work can continue without CERN, or its authorized representative, reply.
2- **IN (Internal Notification Point)**: the executing entity (or the supplier) is informed that a specific step has been completed and that the following step in the approved work-flow will be performed. A Notification Point does not affect the work-flow. Work can continue without reply.
3- **H (Hold Point)**: CERN, or its authorized representative, is informed that a specific step has been completed. The work-flow is stopped until CERN, or its authorized representative, provides a Hold Point Clearance. The clearance is provided within 5 working days upon submission of the quality control documentation relative to the performed step. In case of clearance the work-flow can continue. In case of rejection, a recovery plan shall be discussed with CERN and submitted to CERN for final approval within 10 working days.
4- **IH (Internal Hold Point)**: the executing entity (or the supplier) is informed that a specific step has been completed. The work-flow is stopped until the executing entity (or the supplier) provides a Hold Point Clearance.
5- **R (Review)**: The quality records will be reviewed.
6- **W (Witness Point)**: CERN, or its authorized representative, intends to attend any specific step of the production. The supplier will notify the client with 10 working days in advance that the activity will be performed.
7- **IW (Internal Witness Point)**: the executing entity (or supplier) intends to attend any specific step of the production. The executing entity will notify the supplier with 10 working days in advance that the activity will be performed.