**D R A F T rev. 9**

**June 26, 2017**

**Electrical Quality Assurance**

**QXFA (QXFS, QXFP) Coil Fabrication**

Comments:

* **Hipot tests**:
* Power the component listed first, keep not tested components floating.
* Test each Quench Heater separatly.
* Connect the pole segments together (3 in QXFS, 10 in QXFP, 11 in QXFA) to perform Coil to Pole Hipot. Be sure that Inner and Outer pole segments are connected.
* Set the maximum leakage current threshold to **1 μA** (10 μA when 1 μA does not work). The maximum leakage current must not be exceeded neither during Ramp up nor at Plateau.

Test parameters:

* Coil inductance (LQ) measurements at 20 Hz (unless otherwise specified)
* Coil resistance (R) and VT measurements at 1 A. After Impregnation, connect Multimeter Terminals at **7 inches from the Splice Blocks**.
* Impulse tests with direct polarity (High Outer Layer – Ground Inner Layer) at 500 V, 1000 V, 1500 V, 2000 V and then with 100 V steps up to 2500 V, 2 test pulses applied at each step
* Impulse tests with reversed polarity (High Inner Layer – Ground Outer Layer) at 500 V, 1000 V, 1500 V, 2000 V and then with 100 V steps up to 2500 V, 2 test pulses applied at each step

Pre-Fabrication Tests:

1. Trace Hipot after receiving: 3500 V

Coil Fabrication Tests:

1. Coil winding: ∙Real-time monitoring of continuity

 between coil and parts and mandrel

1. After curing, coil on curing mandrel, OD up: ∙Coil RLQ

∙Continuity check:

coil-to-RE saddles,

coil-to-LE saddles,

saddle-to-saddle,

coil-to-end spacers,

coil to pole

1. Before reaction, fixture open, w/o mold

blocks and SS shell, OD up: ∙Coil RLQ

∙Continuity checks:

coil-to-RE saddles,

coil-to-LE saddles,

saddle-to-saddle,

coil-to-end spacers,

coil to pole

1. Before reaction, After close and flip,

fixture open, ID up: ∙Coil RLQ

∙Continuity checks:

coil-to-RE saddles,

coil-to-LE saddles,

saddle-to-saddle,

coil-to-end spacers,

coil to pole

1. After reaction, fixture open, OD up: ∙Coil RLQ

 ∙Continuity checks coil-to-RE saddles,

coil-to-LE saddles,

saddle-to-saddle,

coil-to-end spacers,

coil to pole

1. After splicing, OL trace installed, OD up: ∙Coil RLQ

 ∙OL Voltage tap & OL Heater resistance

1. After fixture bolted closed, OD up: ∙Coil RLQ

 ∙Continuity checks

 coil-to-OL Heaters

1. After flip, fixure open, ID up: ∙Coil RLQ

∙Continuity checks:

coil-to-RE saddles,

coil-to-LE saddles,

saddle-to-saddle,

coil-to-end spacers,

coil to pole

1. After IL trace installed, ID up: ∙Coil RLQ

∙IL Voltage tap & IL Heater resistance

1. After fixture bolted closed, ID up: ∙ Coil RLQ

 ∙Continuity checks

 coil-to-IL Heaters

1. After impregnation, fixture open, OD up: ∙Coil RLQ

∙Continuity checks:

coil-to-RE saddles,

coil-to-LE splice blocks,

coil-to-OL Heaters,

saddle-to-saddle,

OL Heaters-to-saddles,

coil to pole,

pole segment to pole segment

∙OL Voltage tap & OL Heater resistance

1. After flip, ID up: ∙Coil RLQ

∙Continuity checks:

coil-to-RE saddles,

coil-to-LE splice blocks,

coil-to-IL Heaters,

saddle-to-saddle,

IL Heaters-to-saddles,

coil to pole,

pole segment to pole segment

 ∙IL Voltage tap & IL Heater resistance

/\* Steps 12 and 13 can be reverse depending on the process\*/

1. Before shipping, coil in the crate on shipping

Mandrel, OD up: ∙Coil RLQ (20 Hz, 100 Hz, 1000 Hz)

∙Continuity checks:

 coil-to-structure,

 heaters-to-structure,

coil-to-RE saddles,

coil-to-LE splice blocks,

coil-to-heaters,

saddle-to-saddle,

heaters-to-saddles,

coil to pole,

pole segment to pole segment

∙Voltage tap & Heater resistance

**∙Hipots:**

 QH to Coil 3200 V

 Coil to Pole 500 V

 Coil to Endshoes (all) 1000 V

 QH IL to Endshoes IL 2500 V

 QH OL to Endshoes OL 2500 V

 Endshoes IL to Endshoes OL 1000 V

 ∙**Impulse tests** (Direct and Reverse)

1. After receiving, coil in the crate on shipping

 Mandrel, OD up: ∙Coil RLQ (20 Hz, 100 Hz, 1000 Hz)

∙Continuity checks:

 coil-to-structure,

 heaters-to-structure,

coil-to-RE saddles,

coil-to-LE splice blocks,

coil-to-heaters,

saddle-to-sadle,

heaters-to-saddles,

coil to pole,

pole segment to pole segment

∙Voltage tap & Heater resistances.

1. After receiving, coil on Wooden Table ∙**Hipots:**

 QH to Coil 3200 V

 Coil to Pole 500 V

 Coil to Endshoes (all) 1000 V

 QH IL to Endshoes IL 2500 V

 QH OL to Endshoes OL 2500 V

 Endshoes IL to Endshoes OL 1000 V

∙**Impulse tests** (Direct and Reverse)