**MQXFS1b Test Plan**

**Rev. 1, 3/29/2017**

**OUTLINE**

**Test Cycle I**

* Verify that all configuration files are uploaded to the production area and DAQ computers are rebooted
* **Room Temperature preparation**
	+ Electrical checkouts and Hi-pot
	+ Check the quench and slow scan data logging
	+ Verify that the VMTF Overview Display is up and running
	+ Initial RRR measurements: check CVT, FVT and Lead signals
	+ Verify that all warm checkouts are completed in the Test Readiness Verification Procedure document (TID-N-769)
	+ Magnetic measurements (z-scan) at room temperature
* **Cool down**
	+ Restricted cool down: temperature difference between the magnet top and bottom should not exceed 100 K
	+ Periodically check the SG data logging
	+ Perform preliminary measurements of coil/segment RRR down to 70 K (see Quench Protection Test plan)
* **System checks at 4.5 K with 120 mΩ dump resistor:**
	+ Cold Electrical Checkout and Hi-pot, Quench Detection Checkout
	+ Verify that all cold verification steps are completed in the Test Readiness Verification Procedure (TID-N-769)
	+ Connect the CPS3 power leads and proceed with the AQD/DQD balancing
	+ Ramp to 1000 A, adjust Cu-I AQD balance and perform manual trip
	+ Heater induced quenches at 20% and 30% of **INOM=16480 A**
	+ Splice resistance measurement to 6 kA
	+ Magnetic measurements before training, Imax=6 kA at 4.5 K or 1.9 K
* **At 1.9 K operation with 30 mΩ dump resistor:**
	+ Install the quench antenna and acquire quench antenna signals
	+ Acquire voltage spike data for each ramp
	+ Quench Training at 20 A/s in first few ramps, then continue with mixed ramp rates: start at 50 A/s and then continue at 20 A/s
	+ Ramp rate dependence study
		- Ramp up at dI/dt = 10 A/s, 50 A/s, 100 A/s, 150 A/s, 200 A/s, 300 A/s, 350 A/s
		- Ramp down at dI/dt = 300-10 A/s starting from INOM (16.48 kA or 95% of Imax achieved during the training)
	+ Magnetic measurements to maximum stable current (see Magnetic measurements plan)
	+ Splice resistance measurements (could be at 4.5 K)
	+ Inductance measurements
	+ Quench Temperature Dependence Study at 1.9-4.5 K
* **Quench Protection study at 1.9 K**
	+ See detailed **Quench Protection Test Plan**
	+ Protection heater study
	+ Quench Integral and Fast extraction studies
	+ Energy loss measurements (could be at 4.5 K)
* **Warm up to 300 K**
	+ Cold RRR Measurements. Additional RRR measurements at different temperatures from 20 K to 300 K
	+ Magnetic measurements during warm up
	+ Periodically check the SG data logging
* **At 300 K after the test**
	+ Repeat RRR measurements at room temperature
	+ Magnetic measurements

**Test Cycle II**

* Only if the ultimate quench current (17.9 kA) was reached in Test Cycle I
	+ Confirm key findings and investigate open questions from the previous cycle