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Test Report

Niobium Furnace Benchmarking

Test Summary:

The Niobium furnace was received November 2007. The sample environment team performed “As Received” tests that mimicked the “As Delivered” tests. An equipment software interface was designed and tested using LabView, and some hardware upgrades were made to optimize the furnace capabilities. The final modification made before the benchmarking tests was to enable the ramp mode of operation. This change was vendor suggested and encouraged by sample environment staff at other neutron scattering facilities.

Device Description:

The niobium furnace has an aluminum body which is water cooled. Within the furnace body is a series of eight niobium and stainless steel (thermal) shields. The heating element is niobium as well. The system is designed to accept samples up to 40mm in diameter to be mounted in vacuum and can be increased in temperature up to 1800 degrees C. The furnace controller offers the options of manual, temperature or exterior driven control, primary and secondary vacuum measurements, and primary and secondary temperature control.

Data:

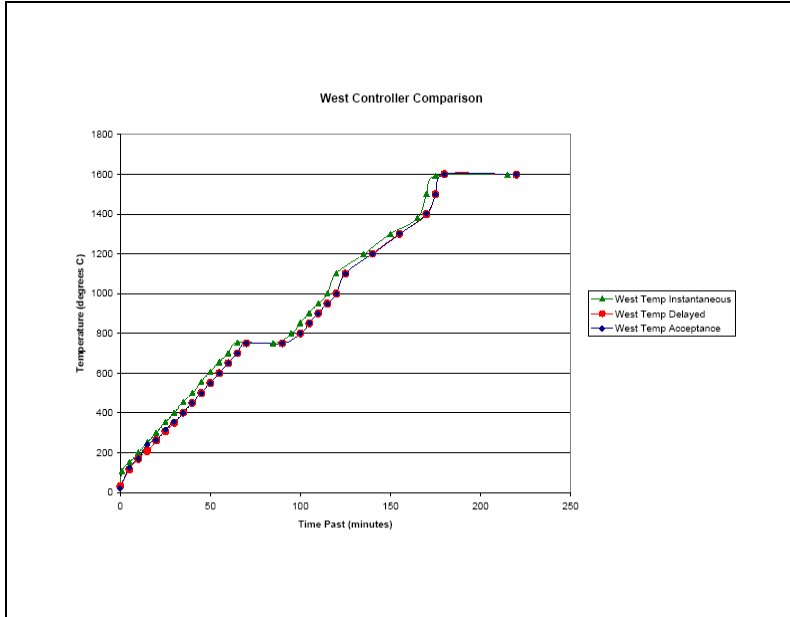


Figure 1. Comparison of “as delivered” or acceptance data vs. “as received” data. Data from the, setpoint driven, West controller was recorded in two modes. Mode 1 records the controller’s immediate response to a setpoint change and Mode 2 records the controller’s response after 5 minutes. Mode 2 mimics the vendors testing criteria.

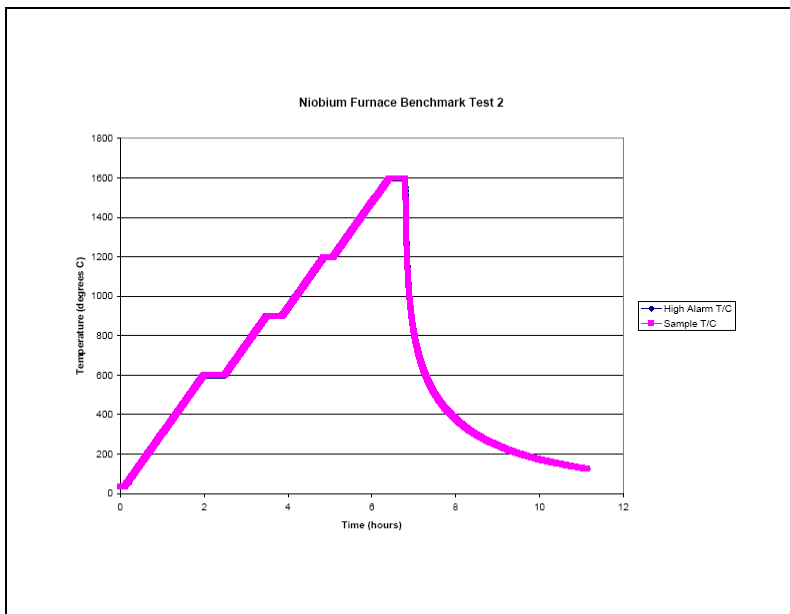


Figure 2. Benchmark Test 2 demonstrates the temperature control capabilities of the niobium furnace.