

## **Refrigerator and recirculator system for U.S. ITER central solenoid module fabrication program**

The central solenoid magnet forms the heartbeat of the International Thermonuclear Experimental Reactor (ITER). The 12.8 meter high magnet will consist of six solenoid modules, each weighing 110 tonnes. General Atomics is currently fabricating these modules under a contract managed by the US ITER Project Office at Oak Ridge National Laboratory, sponsored by the Department of Energy's Office of Science. Cold testing of the individual modules requires a dedicated cryogenic system providing the required refrigeration capacities at conditions similar to those the modules will experience during operation.

In 2014, Linde Cryogenics was awarded a contract for the engineering, procurement, fabrication and commissioning of this dedicated system. The system is based on the Linde Standard LR-Series which has a capacity of 900W at 4.5K. This is coupled to a secondary supercritical refrigeration loop within the same coldbox. A Linde cold circulator pump recycles 4.7K helium at 5.5 bara through the module under test at up to 320 g/s. One critical item of the testing is the cool-down process of the module within a very narrow temperature band and heat loads of up to 13 kW. The commissioning has been successfully completed by April 2016.

The presentation will highlight the key features of the overall system and show some commissioning results.

### **Summary**

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