Press Release

FOR IMMEDIATE RELEASE

CS 90 046 13067 Saint Paul Lez Durance Cedex France
+ 33 (0) 4 42 19 98 18 www.iter.org

Contact:
Michel Claessens
michelclaessens@iter.org
Tel.: +33 (0)4.42.17.66.13

Comments:

ITER'S NEW SOLENOID CONDUCTOR PASSES TESTS

CADARACHE, France (28 February 2012) - The performance degradation problem that was found in a conductor for ITER's Central Solenoid last year seems to be solved.

Tests carried out at the SULTAN Test Facility in Switzerland on a newly fabricated Central Solenoid conductor sample showed good results. The new conductor sample was submitted to 10,000 magnetic load cycles and two warm-up / cool-down cycles, conditions which mimic one-sixth of the full operational life of ITER's Central Solenoid.

china
eu
india
japan
korea
russia
usa

"*Compared to the tests performed last year, the conductor now shows a level of degradation much closer to that originally anticipated in the design, and the rate of degradation with magnetic cycling is stabilizing*," explains Neil Mitchell, head of ITER's Magnet Division.

The Central Solenoid, the mighty "backbone" of ITER's magnet system, is a 13.5 metre-high, 4.1 metre-wide stack of six independent coil packs that use niobium-tin (Nb3Sn) Cable-in-Conduit superconductor to produce a magnetic field of 13 Tesla. As part of ITER's quality assurance policy, all magnet conductors have to undergo rigid performance testing at the SULTAN Test Facility.

In November 2010, the testing of a Central Solenoid conductor sample for ITER revealed some serious degradation after only 6,000 cycles (60,000 or so current pulses are anticipated during ITER's 20-year lifetime). The root cause of the problems observed was believed to be the high magnetic loads accumulating on the strands in the cable-in-conduit conductor. A comprehensive R&D program was launched to investigate a viable solution in order to avoid any delay to the project's manufacturing schedule.

The new conductor sample relies on a different strand manufacturing process referred to as "internal tin," which has shown good resistance to mechanical bending loads in individual strand tests. The SULTAN tests also compared two design options. In one, the original cable design is used, with two superconducting strands (copper to non-copper ratio 1:1.0) and one copper strand making up "triplet" cable structure. In the other, three superconducting strands (copper to non-copper ratio 1:1.5) are used, which presents the advantage of reduced loads on individual strands and extra added superconducting material.

To maintain a low level of coupling losses in the pulsed conditions required in a central solenoid designed for a tokamak machine such as ITER, the contact between strands needs to be limited. However, the strands also need to be supported transversally to limit bending under the Lorentz load. If the strands deform too much, it can lead to gradual fracture of the brittle superconducting filaments and degradation in superconducting performance.

BACKGROUND TO THE NEWS RELEASE

ITER will be the world's largest experimental fusion facility and is designed to demonstrate the scientific and technological feasibility of fusion power. ITER is also a first-of-a-kind global collaboration. Fusion is the process which powers the sun and the stars. When light atomic nuclei fuse together to form heavier ones, a large amount of energy is released. Fusion research is aimed at developing a safe, limitless and environmentally responsible energy source. The ITER project is sited at Cadarache in the South of France.

More information on the ITER project can be found at: www.iter.org