the way to new energy

china eu india japan korea russia usa

SUMMARY

Call For Nomination IO/13/CFN/9284/TME

Contract for the Execution of Mechanical Tests on Intercoil Structures

Purpose

Purpose of this work is the qualification of the design of the Outside Intercoil Structures (OIS) and of the Intermediate Outer Intercoil Structures (IOIS) of the ITER Toroidal Field Coils (TFCs), by means of mechanical tests on their prototypes.

Background

The Toroidal Field Coils (TFCs) of the ITER tokamak reactor are connected together by means of Intercoil Structures (IS). The Contract will cover the mechanical testing of the prototype assemblies of both the Outer Intercoil Structures (OIS) and the Intermediate Outer Intercoil Structures (IOIS) by means of load tests to be performed at Room Temperature (RT) and at 77K (in liquid nitrogen).

During the ITER service operation, large interface forces will be generated between the helium cooled TFCs at 4K. These forces will be resisted in part by the OIS components connecting two adjacent TFCs and by the IOIS components which link the wings of two adjacent TFCs.

The OIS assemblies are installed on both sides of the TFC outer curved section as shown in Figure 1a. Each OIS assembly is made up of a large bracket welded to the TFC, plus six shear bolts and six clamping bolts that link the bracket to the bracket on the adjacent TFC, as shown in Figure 2a.

The radial and poloidal cyclic forces on the OIS assemblies are reacted in combined shear by the shear bolts: the maximum cyclic shear load per OIS shear bolt during the plasma burn sequence is ~2MN (range between 0 and 2MN).

The IOIS assemblies are installed on both sides of the TFC outer curved section as shown in Figure 1b. Each IOIS assembly is made up of a front and back plate plus six shear pins, as shown in Figure 2b.

Misalignments between the holes in adjacent OIS brackets and between the TFC wings due to TFC manufacture and assembly will be compensated by the use of sleeves which will be customised and inserted before the installation of the OIS shear bolts and in the IOIS shear pin respectively.

When the components are installed, they will be required to resist very large toroidal forces and cyclic poloidal forces between them. These forces are reacted in double shear by the pin connections between the IOIS plates and the TFC wings. During the plasma burn sequence, the most severe operational cycle induces a combined shear load on a single pin in the range between ~2 to ~9.7MN.

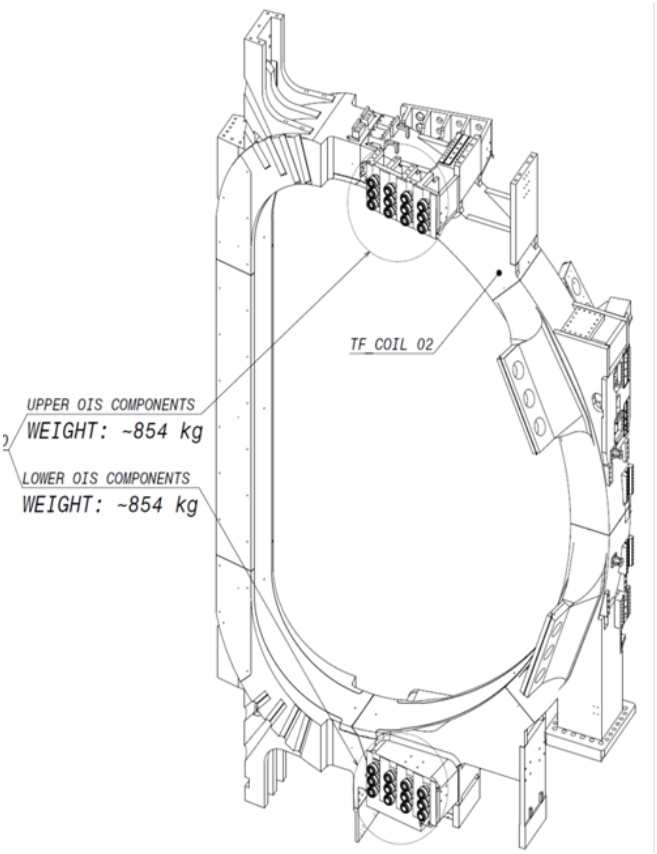


Figure 1a: Location of OIS system on the upper and lower outer curved sections of the TF coil case

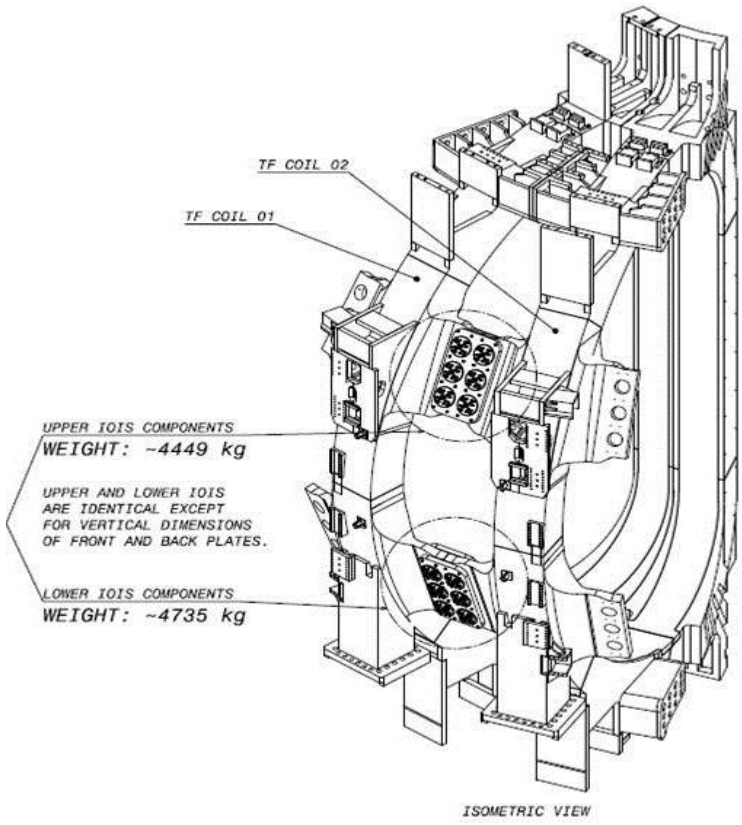
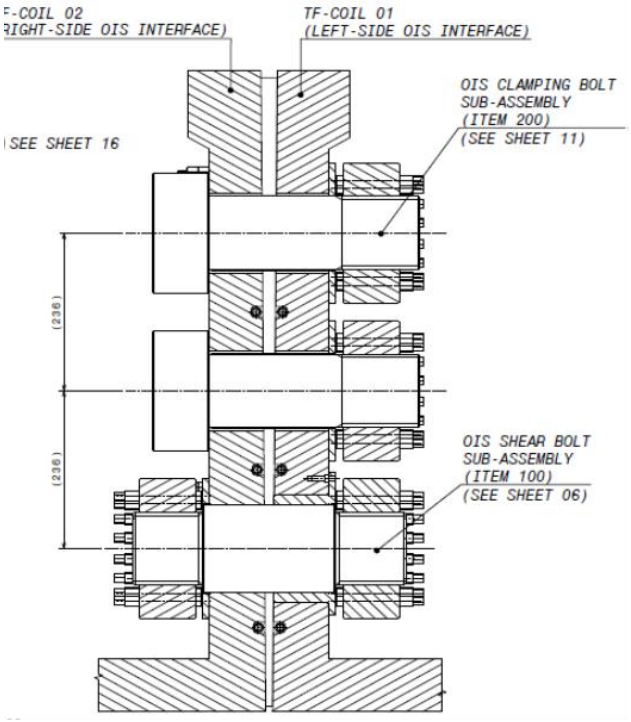


Figure 1b: Location of IOIS system on the upper and lower outer curved sections of the TF coil case



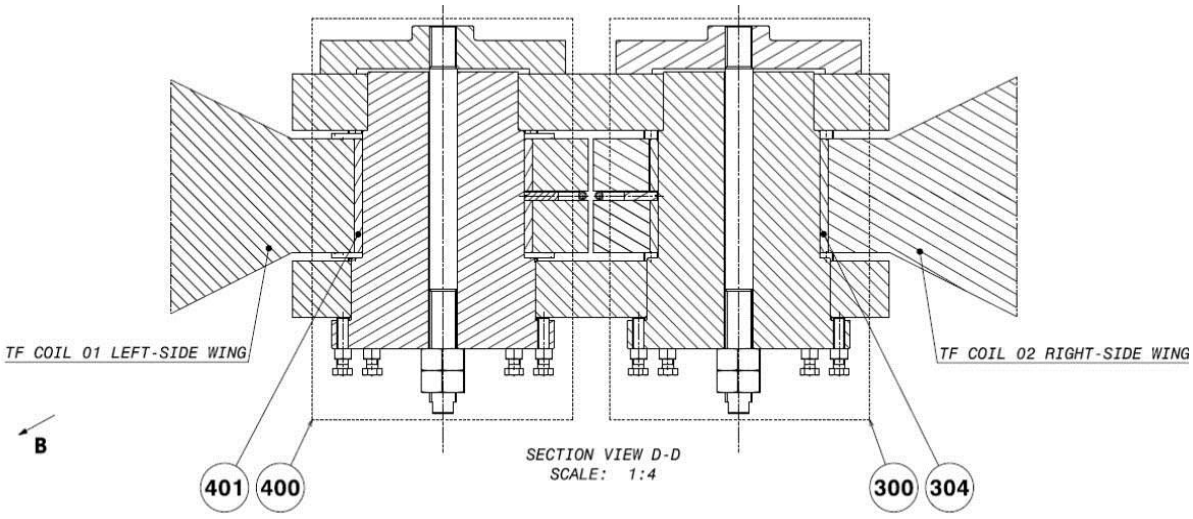


Figure 1b: Cross section through an IOIS assembly

Scope of work

The scope of supply covers:

1. Detailed design of the interface tooling to locate the IOIS prototype in the test machine based on the relevant drawings and preparation of a test plan based on the test load specifications;
2. Manufacture of the interface tooling and commissioning of the test facility with the IOIS prototype in the custom test frame or testing machine;
3. Execution of the test programme;
4. Analysis of test results and reporting.

The contract will be focused on the functions required for Assembly phase 1 and that will be concluded by the first Plasma end 2020. Options will consider the further assembly phases.

Duration of services

For the tests on the OIS prototype the duration is envisaged to be 28 weeks inclusive of the final reporting phase. The proposed duration of the individual contract phases is as follows:

Phase 1: detailed design and preparation of the test plan - 6 weeks.

Phase 2: manufacture and commissioning - 8 weeks.

Phase 3: execution of the test programme - 9 weeks.

Phase 4: analysis of the test results and reporting - 5 weeks.

For the tests on the IOIS prototype the duration is envisaged to be 28 weeks inclusive of the final reporting phase. The proposed duration of the individual contract phases is as follows:

Phase 1: detailed design and preparation of the test plan - 5 weeks.

Phase 2: manufacture and commissioning - 6 weeks.

Phase 3: execution of the test programme - 8 weeks.

Phase 4: analysis of the test results and reporting - 5 weeks.

If the Contractor will perform the two tests in sequence the overall duration of the Contract is envisaged to be 52 weeks. Phase 1 and Phase 2 of the tests of the second prototype could be executed before the end of the test programme on the first prototype: in this case the overall duration of the Contract is envisage to be 41 weeks.

Procurement Time table

A tentative time table is outlined as follows:

Call for Nomination release	24 June 2013
Receipt of Nominations	22 July 2013
Issuance of Call for Tender	August 9 2013
Tender Proposals Due Date	End-September 2013
Estimated Contract Award Date	Mid October 2013

Estimated Contract Start Date	Mid-October 2013

Experience

The companies interested in this tender should have:

1) In-house availability of a suitable testing facility to accommodate the assembled prototypes and with the required loading capacity at RT and 77K:

2) An adequate cryogenic system with thermal insulation enabling to carry out the mechanical tests at 77K.

3) Availability of a computerised input/output system for the monitoring of the test parameters (deformations and stresses in the prototype components, electrical insulation, etc.) and the control of the applied loads.

Candidature

Participation is open to all legal persons participating either individually or in a grouping (consortium) which is established in an ITER Member State. A legal person cannot participate individually or as a consortium partner in more than one application or tender. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization. The consortium cannot be modified later without the approval of the ITER Organization.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Bidders' (individual or consortium) must comply with the selection criteria. IO reserves the right to disregard duplicated references and may exclude such legal entities form the tender procedure.

Reference

Further information on the ITER Organization procurement can be found at: **HTTP://WWW.ITER.ORG/ORG/TEAM/ADM/PROC**