

Technical Specifications (In-Cash Procurement)

technical summary of static magnetic test facility

The purpose of the envisaged Service Contract is to provide the whole test facility for ITER static Magnetic testing.



Technical summary of Static Magnetic Test Facility

Call for Nomination

1 Purpose

The purpose of the envisaged Contract is to supply and install all component required to build at the ITER site a facility suitable to perform static Magnetic qualification tests, in accordance with the ITER testing requirements for electrical equipment under the static magnetic induction higher than 5 mT.

ITER is a nuclear facility identified in France by the number 174 (INB no. 174). In consequence, the Order 7th February 2012 (INB Order) applies to all the components important for the protection (PIC) and the activities important for the protection (PIA). This test facility would also be used to qualify PIC system to static magnetic field.

2 Background

ITER is the next generation fusion machine. It will operate with tritium plasmas.

The maximum Bdot, and thus the maximum of eddy currents and EM loads induced in the conducting structures located inside the TKM building, are expected to occur during plasma disruptions or during the plasma normal operation (at plasma initiation or at plasma end). All the components working there will be subjected to magnetic field it caused.

The aim of this work is to design, supply, deliver, install and commission the required test facility in order for the IO (the ITER Organization) to qualify components to be used in Tokamak building.

3 Regulation

The components for the Test Facility shall be supplied for use in Saint Paul Lez Durance in France, and then the requirements for CE marking shall be met along with the essential safety requirements for machinery and test equipment. CE report shall be provided together with CE certificate. This shall be completed prior to the initial design review and be presented as part of that review. The design modifications approved during the design reviews shall be implemented in the final design and presented at that review.

All relevant equipment shall be fully compliant with Directive, such as the Low Voltage Directive and EMC. The device to be used in the system shall carry a CE mark.

Regarding the implementation of safety requirements and the propagation of safety information to subcontractors, Provisions for implementation of the generic safety requirements shall be applied in agreement with the notification required in the INB Order. In addition, the contractor must design, supply, install, commission the whole solution complied with French and EU regulation on safety of working environment and ITER requirement; The contractor shall be compliant with the French INB order of 2012; The contractor shall be compliant with French Labour Code; provision with ICPE regulation is also needed.

The contractor is responsible to provide a Quality plan for the supply, installation and commissioning of the facility, which allows ITER to qualify the components for the operation under static magnetic field induction.

The contractor shall provide the information necessary to operate the machinery safely, such as instructions and training in operation.

4 Scope of work

4.1 General Scope and Phases

The work will be carried out with staged approach from design to commissioning.

The Contractor shall ensure that the whole Test Facility shall be composed of pre-assembled skids that in the future may be dismantled from the initial location and easily transported to allow the relocation of the Test facility.

Two separate test stands are required for the test facility. The two test stands are fully independent, including power supplies, magnet coils, control systems, Data acquisition systems, and other auxiliaries. One sample instalment and commissioning testing shall be provided by contractor for each test stand.

Test stand 1: designed to produce a magnetic field up to about 45 mT for cubicles with test volume up to 2.2m×2.2m×0.8m, for all 3 orthogonal directions;

Test stand 2: designed to produce a magnetic field up to about 250 mT for equipment with test volume up to 1m×1m×1m, for all 3 orthogonal directions.

For each test stand, it consists of the following basic components:

- One programmable power supply with filter
- One induction coil
- Control system and instrumentations (regulation, measurements, auxiliaries)
- Data acquisition system
- A cooling system to control the coil temperature based on the coil design and space ventilation. Coils cooled by forced air ventilation are preferred.

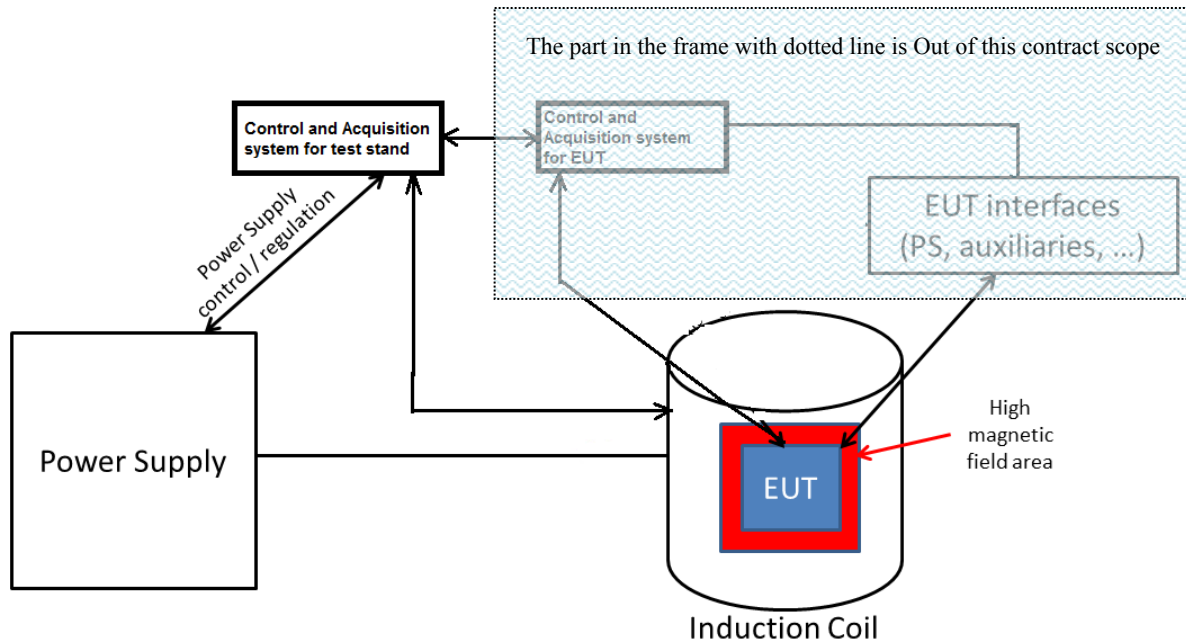


Figure 1. Example of a possible configuration to be used for each test stand. Other configurations could be proposed by the contractor

The contract is expected to be executed according to the following phases:

Phase 1: Design of Test Facility from IO concept. Two separate Magnetic field Simulation reports for each test stand shall be delivered to IO as evidence of magnetic field value.

Phase 2: Manufacturing design, fabrication and factory testing.

Phase 3: Delivery to IO of the static magnetic test system.

Phase 4: Installation on site including any post-delivery assembly and IO staff training.

Phase 5: Commissioning with site acceptance testing report on one real sample for each test stand, accreditation certificate by 3rd party and handover of static magnetic test system.

4.2 Scope of Delivery

The contractor shall provide the hardware and software to be indicated in technical specification, together with below document list. The contractor shall be responsible for system installation, commissioning and accreditation by third party.

As the two test stands are fully independent but for different test volume and maximum magnetic field, below delivery list is only for one test stand. As a result, two independent sets of all deliveries listed below (including A, B & C) shall be provided by contractor.

A) Outline technical description of the components for each test stand to be delivered

The hardware for each test stand shall at least include:

- a. A programmable power supply with filter suitable to be supplied at 400 V, ac, 3 phases.
- b. A power distribution board with different current rating for equipment under test (EUT) supporting system usage, related cables shall be provided.
- c. An independent magnetic coil with field homogeneity better than 3 dB [0~+3dB].
- d. One Control & Data acquisition system for test stand to adjust & indicate the testing current & the test duration and to record the data in order for the acceptance criteria of the qualification. Control system with software including but not limited to power supply regulation (reference, current and voltage measurements, commands and status); safety checks. Interface provision shall be defined for analogue input/output and digital input/output, including the signal exchange with control system for EUT.

Note: the control system for EUT is out of scope of this contract.

- e. One handling system to insert and support the equipment under test (EUT) inside coil, including turning system in order for EUT direction adjustment on direction X,Y,Z. Max EUT weight is about 2 tons. All handling tool shall be provided by supplier and Operation procedure shall be provided together.

Note: Crane may be as option when considering the whole test facility installation and control system to lift & turn EUT on direction X, Y, Z.

- f. An internal fastening system to immobilize the EUT during the tests.
- g. Sensors and auxiliaries related to test stand itself, including but not limited to: Measurements (voltage, current, temperature etc.), Power supplies (example: 24 V, current generator), Loads (resistors), Breakers, Gauss meter and so on.
- h. A protection and interlock system to protect the components.
- i. A thermal protection of the coils to avoid overheating in case of control error.
- j. Prevention and Protection of persons, like safety lock, interlock, access switch and emergency stop with a pushbutton, and fences and so on.
- k. A 3-colour signalling system (green: off, yellow: stand-by / no current, red: operate).

B) Software for each test stand

The complete test bed will be controlled from a computer by a software (e.g. Labview) with a friendly graphical interface. It concerns:

- a. the power supply regulation (reference, current and voltage measurements, commands and status)
- b. Data acquisition system to record the data required for the acceptance criteria of the qualification.
- c. the safety checks (emergency stop, door contacts, cooling operation if needed)

C) Document for each test stand

The contractor will provide the following documents (tentative list to be updated in the technical specifications at the time of call for tender):

- a. A practical plan for installation.
- b. A procedure to connect and disconnect the whole test stand
- c. A definition of all the cables (number of conductors, cross-section, length...), sensors, interfaces.
- d. Operation procedure for testing, including how to move and rotate EUT.
- e. Safety instructions, prevention plan for safety concern
- f. Calibration report
- g. Site acceptance test report
- h. Accreditation Certificate of test facility by third party
- i. A software manual (for coil current and acquisition unit control).
- j. Maintenance procedure.
- k. Minimum 1-year warranty for any part of the test facility.

5 Contract duration

The duration of the contract will be 12 months from the signature date.

6 Procurement schedule

The tentative timetable of the relevant Call for Tender procedure is as follows:

Action	Tentative date(s)
Call for nomination	Apr 2018
Pre-qualification	May 2018
Call for tender	Jul 2018
Tender submission	Sep 2018
Contract Award	Oct 2018
Contract signature	Nov 2018

7 Experience

The Contractor shall have adequate experience and capacity related to the following aspects of magnetic test systems:

- Power Supply design & supply
- Magnet coil design & supply
- Design & supply of complex industrial control systems
- Systems engineering, including controlling, auxiliaries, interface
- Verification and validation of control system requirements
- Installation & Commissioning of the whole test system
- Process development and continuous improvement

8 Candidature

Participation is open to all legal entities established in an ITER Member State. Entities can participate either individually or in a consortium. A legal entity 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 groupings shall be presented at the pre-qualification stage. The tenderer's composition cannot be modified without the approval of the ITER Organization after the pre-qualification.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Candidates (individual or consortium) must comply with the selection criteria. The IO reserves the right to disregard duplicated reference projects and may exclude such legal entities from the pre-qualification procedure.