

Summary of the Project

Contract for In-Vessel Coil power supply systems support services

1. Purpose

The purpose of this Service Contract is to provide the services to the ITER Organization concerning the development of the In-Vessel Coil (IVC) Power Supply (PS):

- 1) to prepare the conceptual design, the drawings of IVC PS, the input data for building design and cost estimate with the industry
- 2) to resolve some technical issues related to design and development of IVC PS.

2. Background

ITER is the world's largest Tokamak, which is under construction in Cadarache, in the South of France. ITER is based on the 'Tokamak' concept of magnetic confinement, in which the plasma is contained in a doughnut-shaped vacuum vessel. The fuel - a mixture of Deuterium and Tritium, two isotopes of Hydrogen - is heated to temperatures in excess of 150 million°C, forming a hot plasma. Strong magnetic fields are used to keep the plasma away from the walls; these are produced by superconducting coils surrounding the vessel, and by an electrical current driven through the plasma.

ITER is a large research facility made of a combination of large conventional industrial equipments such as the cooling water system and challenging new high tech components such as diagnostics, superconductive magnets, etc. To ensure the future operation of all ITER subsystems a large amount of power and control cables will have to be designed, identified, routed and installed.

In-Vessel Coil System (IVCS) shall provide the magnetic perturbations resonant with the edge magnetic field for ITER operational scenarios in order to minimize potentially high power deposition onto plasma facing components by Edge Localized Modes (ELM) and be upgradable to be able to provide control of moderately unstable resistive wall modes (RWM) and provide fast vertical stabilization (VS) of the plasma.

Preliminary design review of In-Vessel Coils (IVCs) was held in July 2010. Based on the output of the review and requirements, next step is going to be the conceptual design review of IVC power supply systems (IVCPSS). It includes ELM power supply systems and VS3 power supply system. ITER Organization will perform the conceptual design review of IVCPSS and is currently developing the conceptual design and will issue the Technical Specification for IVCPSS.

3. Scope of Service

Within the scope of this service contract, the Contractor shall perform the following tasks: conceptual design, cost estimation and technical/engineering support works of VS3 power supply system.

- 3.1. The work of Conceptual design of IVC power supply system could be divided into 2 sub-tasks:
 - a) Review, comment on, and develop the IVC power supply system document
 - b) Conceptual design of IVC power supply system
- 3.2. The Cost estimation of IVC power supply system task will develop a report estimating the cost of IVC power supply system and it will include several breakdowns: engineering activities, manufacturing, factory testing, package & transportation, on-site acceptance tests, documentations and QA, and spares.
- 3.3. The Technical/engineering support works of VS3 power supply system task will follow:
 - a) Support for resolving some technical issues related to design and development of VS3 power supply system
 - b) Proposal for R&D tasks of VS3 power supply and associated cost estimation, which might be required (or recommended) to support (and/fully demonstrate) the feasibility of the conceptual and/or detailed design

The primary engineering analysis and CAD software tools presently used by the ITER Organization for those tasks are:

- a) CATIA/ENOVIA, (<http://www.dassault.com>), for 3D designs
- b) See System Design, (www.ige-xao.com) with specific ITER customization, for 2D electrical diagrams
- c) Matlab/Simulink/Powersys (www.mathworks.com/products/simpower/) for power systems simulation
- d) PSCAD/EMTDC (www.pscad.com) for power systems simulation
- e) PSIM (www.powersimtech.com) for power systems simulation
- f) AutoCAD (used primarily for integrating third party designs into the ITER CATIA models)

- g) Primavera software for scheduling
- h) Microsoft Office Suite for general purpose document preparation

Subject to the availability of sufficient funds, ITER Organization may decide to award two independent Contracts to the tenders, which would offer the best value for money (i.e. the first and second tenders after the consequential tender procedure). The initial duration of the Contract will be 8 months from the date of the formal signature.

The estimated resources for the engineering support on IVC power supply engineering for a period of 8 months are expected to be about 1 person per year for a professional/manager profile and 1 person per year for a technician profile.

The Contractor must note and accept that the performance of the present contract shall require the presence of his personnel also at the working site of the ITER Organization, c/o CEA – Centre d'Etudes de Cadarache, 13115 St Paul Lez Durance, France, for the purpose of design review and data gathering.

4. Experience

The Contractor and its personnel shall have adequate experience in the high-voltage/high-current thyristor converter and switching power supply system. This includes but it is not comprehensive:

- Experience in design, manufacturing, testing, installation and commissioning of high power four quadrant thyristor rectifiers (above 20 kA, 1 kV and 20 MVA) and high power switching power converters based on IGBT and IGCT technology (above 5 MVA) and parallel operation of switching converters (above 10 MVA)
- Experience in auxiliary systems for large power conversion plants, e.g. cooling water system, voltage/current transducers, disconnectors, protective switches and busbars
- Experience in writing design description documents, installation, operation and maintenance handbooks, and management of spares
- Experience of handling and limitation of EMI/EMC issues in complex installations of high power conversion plants (above 5 MVA)
- Experience with IEC (International Electro-technical Commission) or IEEE (Institute of Electrical and Electronics Engineers) standards
- Proficient use of the software tools listed in section 3
- Competence in both spoken and written English. The working language of the project is English and all document preparation shall be in English. The contractor's staff shall nonetheless be experienced in working in a multi-national, multi-cultural environment.

5. Timetable

The tentative timetable is as follows:

- Call for Pre-qualification April 2011
- Call for Tender May 2011
- Tender Submission July 2011
- Contract placement September 2011
- Works start October 2011

6. 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 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 prior 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 references and may exclude such legal entities from the pre-qualification procedure.