Diagnostic Infrastructure Development and Engineering Services

IO/20/CFT/70000541/LLU

Call for Nomination

1. Purpose

This tender is for supporting the engineering justification of the first plasma diagnostic systems, diagnostic systems integrated in the buildings and inside port plugs, vacuum vessel and in the port cells. It is imperative now that these systems do not fall behind in the schedule and as a result, the need for this work is urgent.

The purpose of this Contract is to provide infrastructure development and engineering justification services for many different Diagnostics. The diagnostics have to be integrated within tokamak complex, as well as inside port plugs facing primary vacuum and forming confinement barriers. Transmission lines, vacuum extensions, cables and cubicles will be located in different places across the tokamak complex and have to be designed, integrated and assessed engineering-wise to withstand the loads, to ensure confinement and to provide functionality. Most of the Diagnostics are the scope of the Domestic Agencies (DAs). About 30% of the Diagnostic scope is however completely IO scope. A large variety of Diagnostics systems are covered by this contract.

This document specifies the requirements for ITER diagnostic infrastructure development and engineering justification services. It defines the scope of the services to be provided, the execution and the deliverables of those. This is a framework contract, where each task order is a free self-standing engineering activity with its own budget.

2. Background

Diagnostics are a critical part of the operation of ITER. They provide the means to observe, control and sustain the plasma performance over long timescales. ITER will operate with a plasma current in the region of 15 MA and toroidal fields of 5 T. The pulse lengths will be in the region of 500 s typically and will extend up to several thousand seconds during more advanced operation. A key objective of this device is Q=10 operation. This means that a typical fusion power of 500 MW will be provided for 50 MW input.

The diagnostics scope includes also port-plugs and other infrastructure, which hold these diagnostics in place, in the ports and the divertor. Figure 1 gives an overview of the typical integrated diagnostic port in ITER.

Most of the diagnostic systems are being procured in kind from the Domestic Agencies (DAs) to functional specifications. Exceptions for which IO has to do detailed design work are the magnetic sensors, and in vessel cable looms which will be procured through built to print contracts. For several other diagnostics IO has even the full responsibility from conceptual design to procurement.

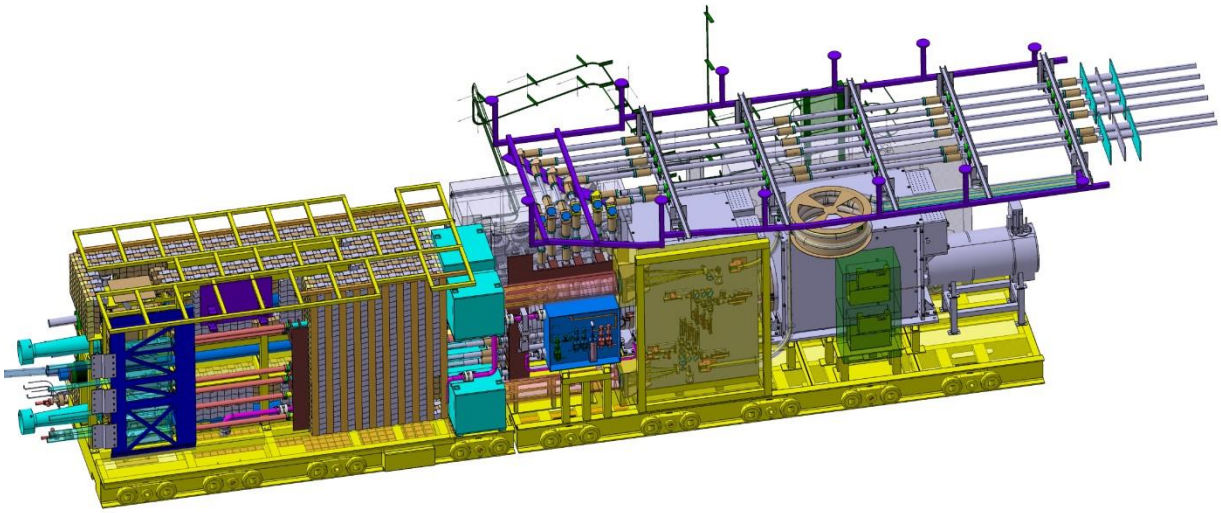

Figure 1: Overview of diagnostics inside integrated port.

3. Scope of work

The scope of the diagnostic infrastructure development and engineering justification services requested in this specification requires that the contractor's company provides suitable and experienced expertise to contribute to, to establish and to reinforce the ITER diagnostic systems. The work is to provide the Diagnostic System Engineering Services to progress the technical development of diagnostics in-vessel, ex-vessel and port-based systems.

The following activities are foreseen (but not limited to):

- Engineering of diagnostic solutions for various ITER Diagnostics,
- Evaluation and advancement of various diagnostic reports,
- Evaluation of diagnostic reports for accuracy and provision of advice on these reports,
- Identification of effective risk for diagnostic systems,
- Development of alternatives to conflicting designs of diagnostic systems,
- Management of diagnostic integration activities in to the ITER infrastructure,
- Development of the interface specification and negotiation to completion with opposite side for specified diagnostic and integrated diagnostic systems,
- Management of the structural integrity analysis / load definitions of diagnostic systems and their interfaces,
- Evaluation of design compliance with ITER requirements and with requirements for diagnostic systems,
- Management of other tasks as relevant to progress development of diagnostic systems,
- Provision of component designs as needed.

These technical specifications will be defined specifically for each Task depending on the actual requirement and will include a technical scope, the organization of the task in IO and a description of the deliverables.

4. Timetable

The tentative timetable is as follows:

Issue Call for Nomination to DAs	Beginning of April 2020
Issue Pre-Qualification Application	Beginning of May 2020
Closing date for Pre-Qualification	End of May 2020
Issue Call for Tender	Beginning of July 2020
Submission of tenders	Mid of August 2020
MAC Recommendation	End of November 2020
Contract Start date	Beginning of 2021

5. Experience

The contractor's company and its personnel shall have adequate experience for the work as detailed below.

Experience in Tokamaks is highly appreciated, and knowledge and experience in design for the following selected activities in nuclear environment is requested:

- General Diagnostics Engineering with ability to cover issues from sensor to data analysis,
- Expertise in concept, design, realisation, interface definition and documentation of Plasma diagnostic systems,
- Physics of diagnostics for tritium and dust analysis,
- Magnetics systems design, development and integration,
- Diagnostics Windows systems specification and development for nuclear environment,
- Vacuum/ confinement barriers specification and development for nuclear environment,
- Spectroscopy systems design, development and integration,
- Polarimetry systems design, development and integration,
- Diagnostics engineering interfaces resolution in complex environments,
- Diagnostics Instrumentation and Control, design and development,
- Diagnostics project organization and implementation,
- Mechanical design engineering,
- In-Vacuum electrical distribution systems,
- Integration of Diagnostic systems in Buildings and site infrastructure,
- Design engineering (with aid of CATIA V5).

ITER is a Nuclear Facility identified in France by the number-INB-174 ("Installation Nucléaire de Base").
For Protection Important Components and in particular Safety Important Class components (SIC), the French Nuclear Regulation must be observed, in application of the Article 14 of the ITER Agreement. In such case the Suppliers and Subcontractors must be informed that:

- The Order 7th February 2012 applies to all the components important for the protection (PIC) and the activities important for the protection (PIA).
- The compliance with the INB-order must be demonstrated in the chain of external contractors.

- In application of article II.2.5.4 of the Order 7th February 2012, contracted activities for supervision purposes are also subject to a supervision and surveillance done by the Nuclear Operator.

For the Protection Important Components, structures and systems of the nuclear facility, and Protection Important Activities the contractor shall ensure that a specific management system is implemented for his own activities and for the activities done by any Supplier and Subcontractor following the requirements of the Order 7th February 2012.

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 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 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.

On 31 January 2020, the UK left the EU and Euratom with a transition period from 1st February to 31 December 2020 to be used to determine the conditions of their future relationship. Euratom is the ITER Member and the withdrawal of the UK from Euratom leads to the fact that UK is not anymore party to the ITER project.

Until the 31 December 2020, current end date of the transition period, UK entities retain the right to participate in IO procurement procedures.