



IDM UID  
**457QHR**

VERSION CREATED ON / VERSION / STATUS  
**20 Jan 2021 / 1.2 / Approved**

EXTERNAL REFERENCE / VERSION

## Technical Specifications (In-Cash Procurement)

### **CFT - Support of Port Integration Engineering**

This tender is for supporting of port integration engineering of IO ports, covering areas inside port plugs, in the port interspaces and in the port cells. It is imperative now that these integrated ports do not fall behind in the schedule and as a result, the need for this work is urgent. One port is needed for the First Plasma.

# Support of port integration engineering

IO/21/CFT/70000626/INU

## Call for Nomination

### **1. Purpose**

This tender is for supporting of port integration engineering of IO ports, covering areas inside port plugs, in the port interspaces and in the port cells. It is imperative now that these integrated ports do not fall behind in the schedule and as a result, the need for this work is urgent. One port is needed for the First Plasma.

The purpose of this Contract is to provide port infrastructure development and engineering justification services for integration of tenant diagnostics, Disruption Mitigation System (DMS), Glow Discharge Cleaning (GDC) system and services in IO ports. The diagnostics have to be integrated within Port Plugs (including Diagnostic First Walls and Diagnostic Shield Modules), Interspace Support Structures (ISS) and Port Cell Support Structures (PCSS). Systems passing through the closure plate of the port plugs are forming confinement barriers. Transmission lines, vacuum extensions, cables and cubicles will be located in different places across the port structures 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, including integrated ports, are the scope of the Domestic Agencies (DAs). About 30% of the Diagnostic scope is however completely IO scope. The IO ports development is covered by this contract.

This document specifies the requirements for the development of ITER ports infrastructure and their 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**

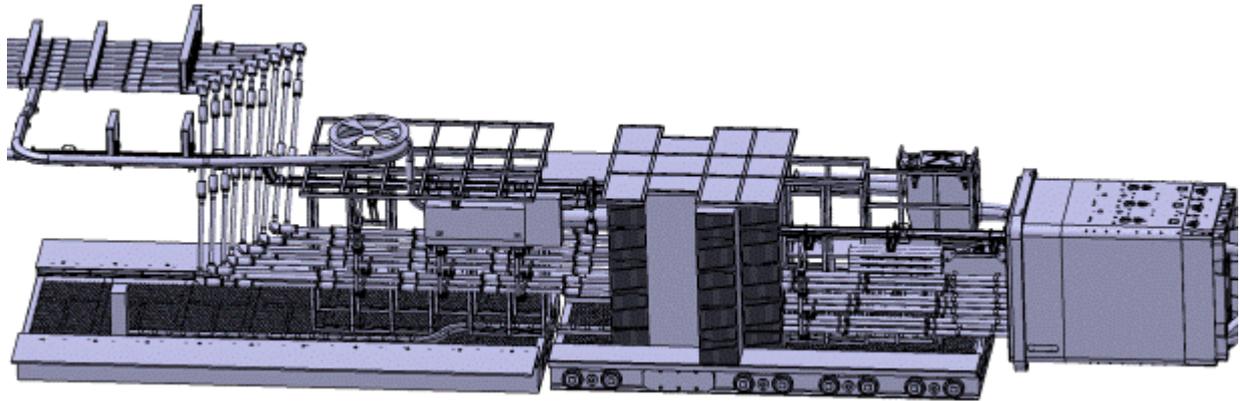
Diagnostics are a critical part of the operation of ITER. They provide the means to observe, control and sustain the plasma performance over long timescales. ITER will operate with a plasma current in the region of 15 MA and toroidal fields of 5 T. The pulse lengths will be in the region of 500 s typically 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.

Many diagnostics, as well as systems like DMS and GDC, shall be integrated into ports and their infrastructure, which hold these diagnostics in place. Figure 1 gives an overview of the typical integrated diagnostic port in ITER.

There are 25 diagnostic ports in ITER, and one more port, Equatorial Port #2, is also hosting diagnostic systems. Each equatorial and upper diagnostic port consist of the port plug structure with three integrated Diagnostic Shield Modules and Diagnostic First Walls, Interspace Support Structure and Port Cell Support Structure. The lower ports do not have port plugs but

they use diagnostic racks to host in-vacuum components and diagnostics. Each port hosts one or more tenants (diagnostics, Glow Discharge Cleaning, Disruption Mitigation System) and services (water, gas, electrical). The in-port plug components will be assembled at Port Integrator's sites at DAs or at IO.

Most of the integrated port systems are being procured in kind from the Domestic Agencies (DAs) to functional specifications. However, two (2) equatorial ports, three (3) upper ports, one (1) lower port and one (1) equatorial port with DMS are the IO full responsibility from conceptual design to procurement.



*Figure 1: Overview of diagnostics inside integrated port.*

### **3. Scope of work**

The scope of the diagnostic port integration engineering 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 port integration systems. The work is to provide the Diagnostic Port Integration Engineering Services to progress the technical development of IO integrated port-based systems.

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

- Support in mechanical engineering of port infrastructure (DSMs, ISS, PCSS) for diagnostic integration in IO ports,
- Support in evaluation and management of the structural integrity analysis / load definitions of IO diagnostic ports and integrated systems,
- Support in evaluation of design compliance with ITER requirements and with requirements for integrated port systems, including nuclear safety requirements,
- Support in evaluation of Human and Organizational factors for IO diagnostic ports and integrated systems,
- Support in assessment of RAMI and technical risks for IO diagnostic ports and integrated systems,
- Support in maintenance and Remote Handling assessment of integrated IO ports,
- Support in assessment of neutronics and Occupational and Radiation Exposure to workers during maintenance,
- Support in interface definitions and follow up between IO ports and tenants,

- Support in manufacturing assessment, preparation for manufacturing activities and technical specifications for manufacturing,
- Support in documentation management for IO integrated ports.

These technical scopes 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	January 2021
Issue Pre-Qualification Application	March 2021
Closing date for Pre-Qualification	April 2021
Issue Call for Tender	May 2021
Submission of tenders	June 2021
Contract Start date	November 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:

- Expertise in concept, design, realisation, interface definition and documentation for complex mechanical and nuclear systems,
- Vacuum/ confinement barriers specification and development for nuclear environment,
- Expertise in Human and Organizational Factors definition and assessment,
- Expertise in RAMI and technical risks assessment of complex integrated systems,
- Expertise in fusion plasma diagnostic development and integration,
- Expertise in electromagnetic, neutronic, thermal-hydraulic and structural analysis of complex mechanical and nuclear systems,
- Integrated project organization and implementation,
- Mechanical design engineering,
- Expertise in Remote Handling and maintenance,
- Expertise in manufacturing of nuclear components following nuclear codes and standards,
- Interface management in complex mechanical, fusion and/or nuclear systems,
- Design engineering (with aid of CATIA V5).

The detailed criteria will be communicated during Pre-Qualification stage.

#### **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.