



## Call for Nomination

# Diagnosics Specialized Development

Ref. IO/16/CFT/70000227

### **Purpose**

The purpose of this Contract is to provide specialized development services for many different Diagnostics. 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 techniques are covered by this Contract.

### **Background**

The Diagnostics System provides accurate measurements of plasma behavior and performance. Those measurements include the ones for machine protection, basic machine control, advanced plasma control, and the ones required for evaluation and physics studies. This includes first wall measurement functions as well.

In total there are about 50 diagnostic systems grouped in 7 groups which respond to these requirements. The groups are listed below:

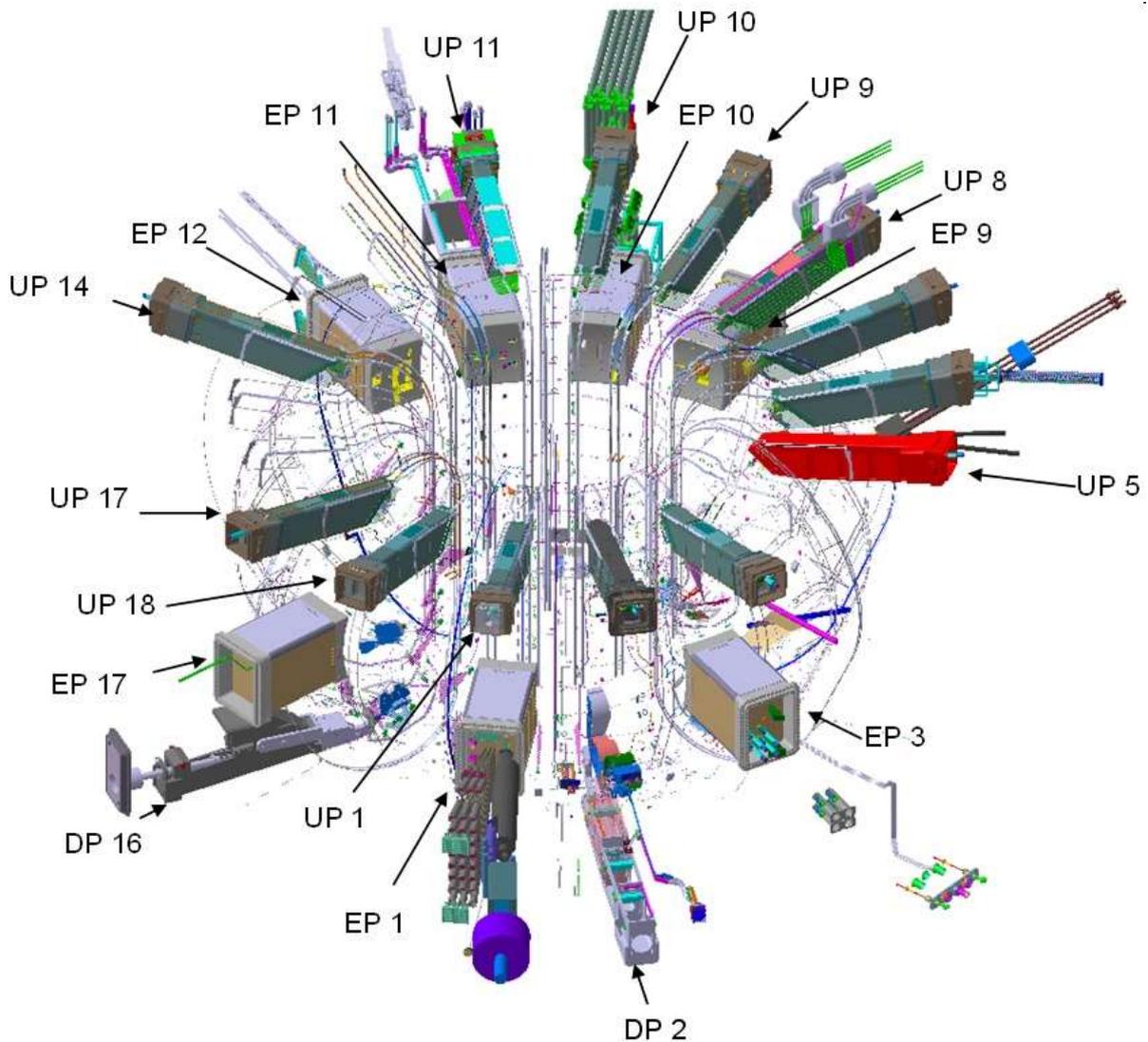
- Magnetic diagnostics
- Diagnostics for neutrons and fusion products
- Optical diagnostics
- Bolometers
- Spectroscopic diagnostics
- Microwave diagnostics
- Plasma-facing wall and plasma-edge diagnostics

A common feature for most of these diagnostics is that they are used to varying degrees for investment protection, plasma control and physics purposes.

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 diagnostic scope inside the tokamak.

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. These are thermocouples, erosion monitor, dust and tritium inventory monitors, first wall samples and plasma boundary flow monitor, in vessel electron cyclotron heating protection probes.



**Figure 1: Overview of diagnostics inside the tokamak (EP means Equatorial Port, UP Upper Port, DP Divertor Port) – note regarding scale: one EP has a cross section of 2m \* 2.5 m approximately**

**Scope of work:**

The scope of the development services requested in this specification requires that the Contractor's company provides specialized expertise to contribute to, establish and reinforce the ITER diagnostic systems for IO and DA scopes)

Diagnostics' work for the Das consists in:

- Oversight during the design development and procurement:
  - reviewing of technical documents,
  - organization and follow up of review and progress meetings
- Interface development and maintenance at IO
- Preparation and management of reception (factory acceptance, site acceptance)
- Preparation and management of installation
- Preparation and management of commissioning

Diagnostics' work for IO consists in:

- Design development from concept to manufacture readiness
- Prototyping
- Procurement (preparation of Technical Specifications)

As a general statement, the details of the services to be provided by the Contractor will be defined in the Task Order Technical Specification.

These Technical Specifications will be defined specifically for each Task Order depending on the actual requirement and will include a technical scope, the organization of the Task Order within IO and a description of the deliverables.

The volume of the work to be carried out under this Framework Contract corresponds on average to 12 FTE (Full Time Equivalent) of specialised physicists and engineers (diagnosticians) for the full Contract duration.

The ITER project diagnostic scope (IO-CT and DA scope together) comprises of 100 diagnostics projects. They require a variety of specialised activities. Often these specialised activities will be needed for more than one project. As a consequence the workload for the specialized activities to be performed will not match exactly the number of individual resources. The number could vary from 5-20 resources.

## **Experience**

The Contractor shall have adequate experience for the work and activities as detailed below.

- General diagnostics and engineering,
- Diagnostics development from concept to scientific exploitation – including documentation;
- Magnetics diagnostics systems,
- Neutron diagnostics,
- Optical diagnostics;
- Bolometric diagnostics;
- Spectroscopic diagnostics;
- Microwave diagnostics;
- Plasma-facing wall and plasma-edge diagnostics;
- Shutter systems;
- First Mirror cleaning systems;
- In-Vacuum and ex-vacuum electrical distribution systems;
- Vacuum Windows;

- In Vessel Viewing systems;
- Diagnostics engineering interfaces resolution;
- Integration of Diagnostic systems in Buildings and site infrastructure;
- Diagnostics Instrumentation and Control;
- Diagnostics project organization and implementation.

### **Work description**

Diagnostic System Development requires skills to progress the technical development of diagnostics in-vessel, ex-vessel and port-based systems.

The scope of work covers the provision of **on-site** diagnostics engineering expertise. The following activities are foreseen:

- Interfacing with partners at DAs and suppliers across the world to ensure the coherent development of diagnostic systems,
- Development of diagnostic solutions for various ITER Diagnostics,
- Evaluation and advancement of various diagnostic reports,
- Evaluation of diagnostic reports for accuracy and provision of expert 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,
- Supervision of prototyping, manufacturing, acceptance testing of Plasma diagnostic systems,
- Installation, commissioning, operation, scientific exploitation and documentation of Plasma diagnostic systems,
- Management of other tasks as relevant to progress development of diagnostic systems,
- Provision of component designs as needed.

### **Duration of services**

The Contract will be carried out over an initial firm period of four (4) years and an optional period of two (2) years. The Contract is scheduled to come into force in January 2017.

## Timetable

The tentative timetable is as follows:

Call for Nomination	April 2016
Release of Prequalification	May 2016
Prequalification results	June 2016
Release of Call for Tender	July 2016
Tender submission date	September 2016
MAC Approval	November 2016
Indicative award date	December 2016
Indicative Contract signature	December 2016
Indicative Contract start date	January 2017

## 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 from the tender procedure.

## Reference

Further information on the ITER Organization procurement can be found at:

<http://www.iter.org/org/team/adm/proc/overview>