

**Technical Specifications (In-Cash Procurement)**

**Mechanical and system engineering analysis for  
Diagnostics Magnetics systems**

This document describes technical needs for mechanical and system engineering analysis for ITER magnetic diagnostics systems.

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## 1 Purpose

This document describes technical needs for mechanical and system engineering analysis for ITER magnetic diagnostics systems.

## 2 Scope

The work is with the ITER project, currently under construction in France. This device will study the potential of controlled nuclear fusion to provide energy for mankind. In order to study the behaviour of this device, a set of monitoring systems (referred to as Diagnostics) is required; these systems will provide the information required to understand the performance of the device. The work involves the design of equipment required to measure magnetic properties of the machine. The designs have to be well prepared from the engineering point of view, with particular emphasis in the areas of assembly and spatial planning, tooling, interface definition and prototyping.

## 3 Definitions

CM	Configuration Model
DA	Domestic Agency
DFW	Diagnostic First Wall
DIR	Design Integration Review
DSM	Diagnostic Shield Module
DR	Diagnostic Rack
DM	Detail Model
EM	Electromagnetic
IDM	ITER Document Management
ISS	Interspace Support Structure
IO	ITER Organization
IO-TRO	ITER Organization Technical Responsible Officer
PBS	Plant Breakdown Structure
PCSS	Port Cell Support Structure
PDR	Preliminary Design Review
PP	Port Plug
RH	Remote Handling
SIR	System Integration Review
VDE	Vertical Displacement event
VV	Vacuum Vessel

For a complete list of ITER abbreviations see: [ITER Abbreviations \(ITER\\_D\\_2MU6W5\)](#).

## 4 References

Links inserted in text (where applicable).

## 5 Estimated Duration

The duration shall be for 12 months from the starting date of the contract. Services are to be provided predominantly at the IO work site. Travel to the DA or other sites may be required to carry out the work.

## 6 Work Description

The work involves technical expertise in the design of the equipment required to physically support magnetics in ITER, such as clamps, baseplates, tubing, piping, cabling and fibre connectors etc. It has three broad technical themes: A. Engineering of the fibre optic current sensor front end B: Supporting integration of cable looms and C: Design and documentation of jigs and assembly tooling. It involves many areas of activity that have to be documented:

- Meeting preparatory notes, including agenda and draft attendee selection;
- Meeting notes for IO meetings called by interfacing systems and review bodies;
- Draft minutes for IO meetings;
- Draft deviation requests;
- Technical input in support of project change requests and other actions;
- Draft interface sheets;
- Draft assembly procedures;
- Input documents, presentations, meeting notes related to Port integrator meetings;
- Input documents, presentations, meeting notes related to Interface meetings;
- Technical review notes for technical documents in IO IDM. Documents include technical reports, draft deviation requests, compliance and requirements matrixes etc. Several technical documents per month need to be reviewed;
- Input documents, presentations, meeting notes related to Monthly project meetings
- Implementation reports for IO-related actions from project meetings;
- Implementation reports for Chit resolution from IO design reviews; Amended and reviewed sections of IO schedule;
- Record of progress against schedule;
- Schedule improvements and fix scheduling problems;
- Input documents, presentations, meeting notes related to meetings of manufacturer representatives with IO experts;
- Guidance notes for manufacturers on execution of technical activities;
- Updated and re-evaluated loads, including nuclear loads and other engineering specifications;
- Contributions to design workshops on specific topics (e.g. shutters, neutronics);
- Updated measurement requirements;
- Technical specifications for R&D tasks;
- Drafts and amended requirements-related documentation including joint documents with plasma operations;
- Project risk register updates (technical, cost and schedule);
- Annual internal review of progress (schedule, cost and risk evolution) and related documents;
- Input documents, presentations, meeting notes related to at workshops and conferences.

Travel to the DA or other sites (including conferences) may be required to carry out the work.

## 7 Responsibilities

### 7.1 Contractor's Responsibilities

In order to successfully perform the tasks in these Technical Specifications, the Contractor shall:

- Strictly implement the IO procedures, instructions and use templates;
- Provide experienced and trained resources to perform the tasks;
- Contractor's personnel shall possess the qualifications, professional competence and experience to carry out services in accordance with IO rules and procedures;
- Contractor's personnel shall be bound by the rules and regulations governing the IO ethics, safety and security IO rules.

### 7.2 IO's Responsibilities

The IO shall:

- Nominate the Responsible Officer to manage the Contract;
- Organise a monthly meeting(s) on work performed;
- Provide offices at IO premises.

## 8 List of Deliverables and due dates

The main deliverables are provided as follows:

D #	Description	Due Dates
D01	<i>OVC Baseplate report</i> : Review of the performance of the baseplate prototype prepared by IO, including detailed suggestions for improvement and amended component specifications or deviation requests, as applicable.	T0 + 1m
D02	<i>OVC Welding jig report</i> : Review of the performance of the welding jig prepared by IO, including detailed suggestions for improvement and amended component specifications or deviation requests, as applicable.	T0 + 2m
D03	<i>Looms Cable distribution report</i> : Re-assignment of the distribution of the feed-outs in the lower ports, consistent with design integration, documented in a report to guide cable assignment.	T0 + 3m
D04	<i>FOCS fibre Summary of options report</i> : Search and documentation of fibre-optic options for the FOCS. Define both front-end and back-end FO in IO catalogue.	T0 + 4m

	Agree sealing and installation options for the back end.	
D05	<i>FOCS Interface re-definition report</i> : Define IS between PBS44 and FOCS (back end and front end)	T0 + 5m
D06	Draft technical specification for the prototype and test of the assembly tool for FOCS.	T0 + 6m
D07	Draft the technical specification for FOCS front end component procurement.	T0 + 7m
D08	Draft the technical specifications of the Crimp / Weld tool for MIC cable clips.	T0 + 9m
D09	<i>FOCS Assembly report</i> : Compile report on the KOM of the FOCS assembly tool prototype including all required design modifications.	T0 + 10m
D10	Revised final technical specification for FOCS front end components.	T0 + 11m
D11	Compile report on early results of the assembly tool prototype including all required design modifications.	T0 + 12m

## 9 Acceptance Criteria

The deliverables will be posted in the Contractor's dedicated folder in IDM, and the acceptance by the IO will be recorded by their approval by the designated IO TRO. These criteria shall be the basis of acceptance by IO following the successful completion of the services. These will be in the form of reports as indicated in section 8, Table of deliverables.

## 10 Specific requirements and conditions

- Configuration control;
- Experience in 3D and 2D drawings interpretation;
- Experience of techniques in deliverables list;
- Schematics definition;
- Design organization;
- Design review organization;
- Technical action follow-up;
- Technical document generation;
- Generation of technical specifications;
- Manufacturing follow-up;
- Testing follow-up;
- Maintenance and assembly troubleshooting.

## 11 Work Monitoring / Meeting Schedule

Work is monitored through reports (see List of Deliverables section).

## 12 Delivery time breakdown

See Section 8 “List Deliverables section and due dates”.

## 13 Quality Assurance (QA) requirements

The organisation conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system.

The general requirements are detailed in [ITER Procurement Quality Requirements \(ITER\\_D\\_22MFG4\)](#).

Prior to commencement of the task, a Quality Plan must be submitted for IO approval giving evidence of the above and describing the organisation for this task; the skill of workers involved in the study; any anticipated sub-contractors; and giving details of who will be the independent checker of the activities (see [Procurement Requirements for Producing a Quality Plan \(ITER\\_D\\_22MFMW\)](#)).

Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc. shall be reviewed and approved by the IO prior to its use, in accordance with [Quality Assurance for ITER Safety Codes \(ITER\\_D\\_258LKL\)](#).

## 14 CAD Design Requirements (if applicable)

For the contracts where CAD design tasks are involved, the following shall apply:

The Supplier shall provide a Design Plan to be approved by the IO. Such plan shall identify all design activities and design deliverables to be provided by the Contractor as part of the contract.

The Supplier shall ensure that all designs, CAD data and drawings delivered to IO comply with the Procedure for the Usage of the ITER CAD Manual ([2F6FTX](#)), and with the Procedure for the Management of CAD Work & CAD Data (Models and Drawings [2DWU2M](#)).

The reference scheme is for the Supplier to work in a fully synchronous manner on the ITER CAD platform (see detailed information about synchronous collaboration in the ITER [GNJX6A](#) - Specification for CAD data production in ITER Contracts.). This implies the usage of the CAD software versions as indicated in CAD Manual 07 - CAD Fact Sheet ([249WUL](#)) and the connection to one of the ITER project CAD data-bases. Any deviation against this requirement shall be defined in a Design Collaboration Implementation Form (DCIF) prepared and approved by DO and included in the call-for-tender package. Any cost or labour resulting from a deviation or non-conformance of the Supplier with regards to the CAD collaboration requirement shall be incurred by the Supplier.

## 15 Safety requirements

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 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 ([PRELIMINARY ANALYSIS OF THE IMPACT OF THE INB ORDER - 7TH FEBRUARY 2012 \(AW6JSB v1.0\)](#)).