

## Technical Specifications (In-Cash Procurement)

# CFE - CAD and Engineering support of in-vessel and ex-vessel diagnostics

This document describes technical needs for in-vessel and ex-vessel diagnostics design support.

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## 1 Purpose

This document describes technical needs for in-vessel and ex-vessel diagnostics design support.

## 2 Scope

The work aligns with the ITER project, currently under construction in France. This device will study the Fusion concept on a scale previously unequalled on earth. To study the behaviour of this device, a set of monitoring systems (called diagnostics) are required. This will provide all the information to show and understand the performance of the device.

The work involves technical expertise in providing engineering solutions for mechanical designs of diagnostic systems located in the ports, as well as interfacing with other areas in the tokamak complex, such as tokamak building galleries, diagnostic building and assembly hall. The diagnostic systems shall be designed to be fully integrated within port infrastructure and to meet construction and safety requirements.

## 3 Definitions

IO: ITER Organization

DA: Domestic Agency

DSM: Diagnostic Shield Module

EPP: Equatorial Port Plug

IO: ITER Organization

IO-TRO: ITER Organization technical Responsible Officer

ISS: Interspace Support Structure

LP: Lower Port

PA: Procurement Arrangement

PCSS : Port Cell Support Structure

PP : Port Plug

PR: Project Requirements

R&D: Research and Development

SSD: See System Design

VV: Vacuum Vessel

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

## 4 References

Links inserted in text.

## 5 Estimated Duration

The contract duration shall be for 12 months.

Work shall not commence until the contract has been signed by both parties. Services are to be provided mainly off-site, and with three visits per week for meetings, or as per business requirements.

## 6 Work Description

The work involves technical expertise in providing engineering solutions for mechanical designs of integrated and distributed diagnostic systems. All these diagnostic projects are in the design development phase. Mechanical models have to be created or updated and prepared for engineering analysis. A special attention shall be paid to the assembly feasibility and maintainability of the integrated mechanical components. The work is to be done in close collaboration with IO-TROs.

The input data provided will be given during the KOM of the respective subtasks. Design models from CATIA/ENOVIA will be made available by IO-CT to the Contractor, too. The work assumes one (1) design engineer profile to execute all activities both onsite and offsite. ITER technical and quality requirements, guidelines and procedures related to the Port Integration, including those for Safety (see Sections 13 – 15), are applicable for the execution of work.

It involves many areas of activity that have to be documented:

- Preparation of mechanical models (in CAD) of individual diagnostics and integrated diagnostic systems in the ports;
- Adaptation of the Nuclear Shielding to the Diagnostics in the standardized Port Plug;
- Adaptation of the Nuclear Shielding to the Diagnostics in the standardized Interspace and Port Cell Support Structures;
- Assessment of mechanical models of integrated diagnostic systems for their assembly feasibility and maintenance;
- Preparation of mechanical models for further engineering assessment and analysis;
- Technical review and preparation of 2D diagrams;
- Technical review and preparation of 2D detailed drawings prior to manufacturing or prototyping;
- Technical review of mechanical drawings from DAs or suppliers;
- Technical input in support of project change requests, deviation requests and other actions;
- Technical input to interface sheets;
- Technical input to assembly procedures;
- Technical input to design reviews and design review documentation;
- Input documents, presentations, meeting notes related to Monthly DA meetings;
- Implementation reports for IO-related actions from DA meetings;
- Record of progress against schedule;
- Input documents, presentations, meeting notes related to meetings of DA representatives with IO experts;
- Guidance notes for DAs on execution of PA technical activities related to mechanical models and procedures.

## 7 Responsibilities

### 7.1 Contractor's Responsibilities

In order to successfully perform the tasks in this Technical Specification, 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.
- Provide suitable hardware and software to contractor's personnel in case if there is no possibility to perform work at the IO-CT work site

## 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 below in the Table.

The typical summary report (D05) shall have appendix with a complete list of all relevant IO IDM, CAD (Enovia/ CATIA, SSD etc) and all other relevant database references with version number.

Note: deliverables to be commenced on Instruction to Proceed basis which will defined the start of work and delivery of each deliverable and could – upon mutual agreement between IO and the supplier – introduce a redefinition of the exact scope of the deliverable. The order of the deliverables does not reflect the priority.

D #	Description	Due Dates
D01	55.E4 Design work for EWP. DM/CM updates for B1, L1 and L2 of Building 14. Preparing assembly drawings for construction.	T0 + 4 months
D02	55.E4 Design activities for update of interfaces and CMs on Divertor Cassette, LP#2 , EP#1, UP#1	T0 + 7 months
D03	55.G9 Design work update of in vessel design as follow up of analysis outcome. EWP for in-vessel subsystem. Drawings for prototyping and manufacturing of in vessel components.	T0 + 10.5 months
D04	55.E2 Design work for update of CMs in EP 11 12 Gallery and Diagnostic Building	T0 + 12 months
D05	Summary of activities for the performed work: a report in IDM.	T0 + 12 months

## 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

- Creation of mechanical models in CATIA/ Enovia;
- Engineering design and assessment of mechanical designs of diagnostic systems for fusion facilities;
- Experience in creation and interpretation of 2D diagrams;
- Understanding of assembly drawings;
- Experience relevant to all techniques in deliverables list;
- Monitoring and reporting of status of projects;
- Generation of technical documents;
- Communication with international local and remote teams in context of nuclear fusion; research or similarly complex research and engineering environment;
- Organization, taking minutes and action tracking of international meetings.

## 11 Work Monitoring / Meeting Schedule

Work is monitored through quarterly reports (see List of Deliverables section) and at monthly project meetings for each of the four projects.

## 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 Software qualification policy (ITER\_D\_KTU8HH).

## 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 \(AW6JSB v1.0\)](#) ).

Compliance with [Defined requirements for PBS 55 - Diagnostics \(NPEVB6 v2.0\)](#) or its flowed down requirements in [SRD-55 \(Diagnostics\) from DOORS \(28B39L v5.2\)](#) is mandatory.