

Technical Specifications (In-Cash Procurement)

CFE - Diagnostic Interface Engineering support

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.

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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

SSD: See System Design

IO-TRO: ITER Organization technical Responsible Officer.

For a complete list of ITER abbreviations see: [ITER Abbreviations \(ITER_D_2MU6W5\)](#).

4 References

Links inserted in text.

5 Estimated Duration

The duration shall be for 12 months from the starting date of the Contract. Services are to be provided generally off-site, with at least three visits per week for meetings, or as per business requirements.

6 Work Description

Work descriptions shown below describe the systems for which CAD design shall be produced under each particular deliverable. The achievement of each deliverable shall be accompanied by a brief report with the links to the corresponding CAD design drawings and incorporated graphic description (overview CAD design drawings) of the tasks performed.

D01 55.GC, captive supports and studs at L1 level in Bldg 11 (IO)

Supports in L1 support two DN50 pipes, which enclose an optical fibre bundle each.

To finalise the EWP 2D drawings and 3D/2D drawings of the captive supports of the gallery. The design work should include design of the supports based on standard components from the supplier's catalog (checked for compliance and consistency) and the associated engineering analysis to verify compliance with requirements.

The consistent design of the support structure in the Port Cell has to be also incorporated.

D02 55.C7 captive supports and studs at L1 level in Bldg 11 (IO)

The design of captive supports in L1 to support the high power water-cooled launcher transmission waveguide (DIN 100, 88.9 mm ID WG standard) and receiver waveguides (DN 65, 63.5 mm ID WG standard). The region of captive supports will comprise waveguides, associated flanges, and secondary windows/ valves. The captive supports will also be required to support a firebox to protect components therein. The design work will include design of the supports based on standard components from the supplier's catalog, and the associated engineering analysis to verify compliance with requirements.

D03 55.E4 captive supports at L1 gallery level in Bldg 11 (IO) and**D08 55.E4 captive supports at B1 gallery level in Bldg 11 (IO)**

55.E4 conduits are located in B1,L1&L2 levels of Building 11 and in B1,L1 and L2 levels of Building 14. Some of supports are captive and some are sharing supports with other PBSs. The design work will include follow up of DIN and HIT activities in both buildings, design of the supports based on standard components from the supplier's catalogue, and the associated engineering analysis to verify compliance with requirements, update of models and drawings for EWP.

D04 55.C6 captive supports and studs at L1 level in Bldg 11 (IO)

55.C6 has captive supports in L1 to support the laser beam lines. The region of captive supports will comprise laser beam lines of SS tubing (DIN125, schedule 5), associated flanges, bellows and safety shutters. The captive supports will also be required to support a firebox to protect components therein. The design work will include design of the supports based on standard components from the supplier's catalog, and the associated engineering analysis to verify compliance with requirements.

D05 55.C1 captive supports in galleries at L1 level in Bldg 11 (IO)

55.C1 has captive supports in L1 to support the laser beam lines. The region of captive supports will comprise laser beam lines of SS tubing. The work will also include associated flanges, safety valves and cable trays.

The captive supports will also be required to support a firebox to protect components therein.

The design work will include design of the supports based on standard components from the supplier's catalog, and the associated engineering analysis to verify compliance with requirements.

D06 55.C5 and 55.F1 captive supports in galleries at L1 level in Bldg 11 (IO)

55.C5 and 55.F1 share captive supports in L1 to support the laser beam lines and waveguides. The region of captive supports will comprise wave-guides, laser beam lines of SS tubing (DIN125, schedule 5), associated flanges, bellows and safety shutters. The captive supports will also be required to support a firebox to protect components therein. The design work will include design of the supports based on standard components from the supplier's catalog, and the associated engineering analysis to verify compliance with requirements.

D07 55.C2 captive supports in galleries at L1 level in Bldg 11 (IO)

55.C2 has essentially the same requirements of C1(D05), with the exclusion of the DN100 pipe

D09 55 Captive supports 55.C4, G8 and studs in Gallery at B1 level in Bldg 11 (IO)

Supports and pipes in B1, which enclose the laser beams.

Final adjustments and corrections for EWP for supports and captive components. The diagnostic laser beamlines need to be modified to include flanges, bellows, windows and valves. The design of the firebox need to be included.

D10 55.B8 Neutron Activation System

55.B8 NAS has captive supports and tubes (12mm OD) installed in Vertical Shafts – VS12, VS13 and VS18 at B1, L1, L2 and L3 levels as well as in L3.Gallery. The supports and tubes routing need to be designed and integrated with the environment. Due date is end of July 2020 to allow for start of manufacturing in October for delivery in March 2021.

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.

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 a desk when required at IO premises.

8 List of Deliverables and due dates

D#	Description	Due dates
D01	Prepare CAD design drawings for 55.GC, captive supports and studs at L1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+2 months
D02	Prepare CAD design drawings for 55.C7 captive supports and studs at L1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+2months
D03	Prepare CAD design drawings for 55.E4 captive supports at L1 gallery level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+4 months
D04	Prepare CAD design drawings for 55.C6 captive supports and studs at L1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+4months
D05	Prepare CAD design drawings for 55.C1 captive supports in galleries at L1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+6 months
D06	Prepare CAD design drawings for 55.C5 and 55.F1 captive	T0+6 months

	supports in galleries at L1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out and prepare and upload appropriate report with links to all work carried out.	
D07	Prepare CAD design drawings for 55.C2 captive supports in galleries at L1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+6 months
D08	Prepare CAD design drawings for Prepare CAD design drawings for 55.E4 captive supports at B1 gallery level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+7 months
D09	Prepare CAD design drawings for 55 Captive supports 55.C4, G8 and studs in Gallery at B1 level in Bldg 11 (IO) and prepare and upload appropriate report with links to all work carried out.	T0+10 months
D10	Prepare CAD design drawings for 55.B8 Neutron Activation System and prepare and upload appropriate report with links to all work carried out.	T0+12 month

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.

This task is a PIA.

“The supplier must comply with the all requirements expressed in “Provisions for implementation of the generic safety requirements by the external actors/interveners” (SBSTBM)”