

Technical Specifications (In-Cash Procurement)

Technical Specification_ Engineering assessment and justifications of Diagnostics systems

This document describes technical needs of for specialist work relating to engineering assessment and justification of diagnostic systems.

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1 Purpose

This document describes technical needs of for specialist work relating to engineering assessment and justification of diagnostic systems.

2 Scope

The work aligns 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 comprises of design of the equipment required to physically support the diagnostics in ITER, e.g. diagnostic racks, port plugs and similar structures, and the diagnostics themselves, both located in-vessel and ex-vessel. The designs have to be justified from the engineering point of view, with particular emphasis in the areas of mechanical, thermo-hydraulic and electromagnetic analysis of diagnostic port-based and in-vessel systems.

3 Definitions

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

PCSS: Port Cell Support Structure

SLS: System Load Specifications

StIR: Structural Integrity Report

UPP: Upper Port Plug

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

4 References

Links inserted in text (where applicable). Also, the current guidelines and descriptive documents to for the production of Structural Integrity Reports and System Load Specifications would be applicable references for the proper execution of works:

- [Integrated approach for Structural Integrity Reports \(StIR\) production of Port Plug related Systems, Structures and Components \(SSC\) \(ITER_D_TF5DWV v1.0\)](#)
- [Building good Load Specifications \(ITER_D_SNT6NX v1.0\)](#)
- [Building Good Structural Integrity Reports \(ITER_D_SNTA78 v1.0\)](#)
- [Guidelines for Load Specifications of Interspace and Port Cell Components \(ITER_D_MU9C6C v1.5\)](#)
- [3D VV Global FE model description and analysis for the specification of interface loads in diagnostic systems \(ITER_D_QALKZZ v2.0\)](#)

5 Estimated Duration

The duration shall be for 12 months from the starting date of the task order. Services are to be provided at 50% of time 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 involvement in the following areas:

- Meeting preparatory notes, including agenda and draft attendee selection;
- Record of progress against schedule;
- Modelization, dynamic behaviour and load characterization of diagnostic components and its support structures or diagnostics themselves attached to the Vacuum Vessel, port plugs or to the buildings;
- Thermo-mechanical analyses, structural analysis and seismic analysis of diagnostic components;
- Seismic analysis for hard core components;
- Creation of Finite Element models, load characterization, and development of handling routines to update the models and insert detailed components;
- Creation of SLS for diagnostic systems;
- Creation of analysis reports and StIRs;
- Input documents, presentations, meeting notes related to the development of the work.
- Contributions to design workshops on specific topics.

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 in the table below.

| D # | Description | Due Dates |
|-----|--|---------------|
| D01 | Assessment and verification of Structural, EM and Thermo-hydraulic analyses for different diagnostic systems which have their Design Reviews scheduled in the Q1 of 2017. In this task it is included the calculation and control of the different interfaces which could affect the performing of these analyses. Deliverable is the assessment and verification of Structural, EM and Thermo-hydraulic analyses upon request + Control Interfaces + Technical reports in IDM. | T0 + 1 months |
| D02 | Review/Creation of system load specifications (SLS) for different diagnostic systems which have their Design Reviews scheduled in the Q1 of 2017. Apply the Template/Guideline for Load Specification for in-Port and In-Vessel components. Deliverable is Review/Creation of SLS upon request + Technical reports in IDM. | T0 + 3 months |
| D03 | Assessment and verification of Structural, EM and Thermo-hydraulic analyses for different diagnostic systems which have their Design Reviews scheduled in the Q2 of 2017. In this task it is included the calculation and control of the different interfaces which could affect the performing of these analyses. Deliverable is the assessment and verification of Structural, EM and Thermo-hydraulic analyses upon request + Control Interfaces + Technical reports in IDM. | T0 + 4 months |
| D04 | Review/Creation of system load specifications (SLS) for different diagnostic systems which have their Design Reviews scheduled in the Q2 of 2017. Apply the Template/Guideline for Load Specification for in-Port and In-Vessel components. Deliverable is Review/Creation of SLS upon request + Technical reports in IDM. | T0 + 6 months |
| D05 | Assessment and verification of Structural, EM and Thermo-hydraulic analyses for different diagnostic systems which have their Design Reviews scheduled in the Q3 of 2017. In this task it is included the calculation and control of the different interfaces which could affect the performing of these analyses. Deliverable is the assessment and verification of Structural, EM and Thermo-hydraulic analyses upon request + Control Interfaces + Technical reports in IDM. | T0 + 7 months |

| | | |
|-----|--|----------------|
| D06 | Review/Creation of system load specifications (SLS) for different diagnostic systems which have their Design Reviews scheduled in the Q3 of 2017. Apply the Template/Guideline for Load Specification for in-Port and In-Vessel components. Deliverable is Review/Creation of SLS upon request + Technical reports in IDM. | T0 + 8 months |
| D07 | Assessment and verification of Structural, EM and Thermo-hydraulic analyses for different diagnostic systems which have their Design Reviews scheduled in the Q4 of 2017. In this task it is included the calculation and control of the different interfaces which could affect the performing of these analyses. Deliverable is the assessment and verification of Structural, EM and Thermo-hydraulic analyses upon request + Control Interfaces + Technical reports in IDM. | T0 + 10 months |
| D08 | Review/Creation of system load specifications (SLS) for different diagnostic systems which have their Design Reviews scheduled in the Q4 of 2017. Apply the Template/Guideline for Load Specification for in-Port and In-Vessel components. Deliverable is Review/Creation of SLS upon request + Technical reports 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

Experience in design and development of diagnostic designs for fusion or nuclear facilities;
 Experience in Mechanical Engineering;
 Experience in FEA codes (e.g. ANSYS, CFX);
 Experience in application of appropriate industrial Codes and Standards of nuclear/non-nuclear equipment (e.g. ASME VIII Div 2, ASME III, RCC-MR);
 Experience in 3D and 2D drawings interpretation;
 Experience relevant to all techniques in deliverables list;
 Organization, taking minutes and action tracking of international meetings.

11 Work Monitoring / Meeting Schedule

Work is monitored through reports on deliverables (see List of Deliverables section) and at monthly project meetings.

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