

Technical Specifications (In-Cash Procurement)

Project Integration of ITER Neutron Diagnostics

This document describes technical needs of ITER/TED/PPD Diagnostics Division, with particular reference to the requirement for engineering work in Neutron Diagnostics, including project, integration, engineering, manufacturing and follow up activities, as appropriate.

Technical Specifications

**for
Project Integration
of ITER Neutron Diagnostics**

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1 Purpose

This document describes technical needs of ITER/TED/PPD Diagnostics Division, with particular reference to the requirement for engineering work in Neutron Diagnostics, including project, integration, engineering, manufacturing and follow up activities, as appropriate.

2 Background and Objectives

ITER is a major new device that is under construction at Cadarache, near Marseille, in the South of France.

The ITER Organization (IO) is bringing together people from all over the world to be part of this unique project and to contribute to building the ITER device which requires the best people from many disciplines. The work environment is flexible and dynamic with opportunities to work closely with many people and cultures from around the world. The device (figure 1.) will study the potential of controlled nuclear fusion to provide energy for the future of mankind. In order to study the behaviour of this device, a set of monitoring systems (called Diagnostics) are required.

The success of ITER will come through its ability to produce large amount of high energy neutrons, i.e. fusion power, for long time.

These measurements are carried out by means of the Neutron Diagnostics systems.

In particular, measurements of neutron emission and fusion power are essential for achieving ITER goals, in particular the fusion gain factor, Q , related to the reactor performance as well for plasma control, machine protection and for plasma optimization.

The work described below is related to the project, integration, engineering support needed for the Neutron diagnostics. An example of a neutron diagnostic integration is shown in fig 2.

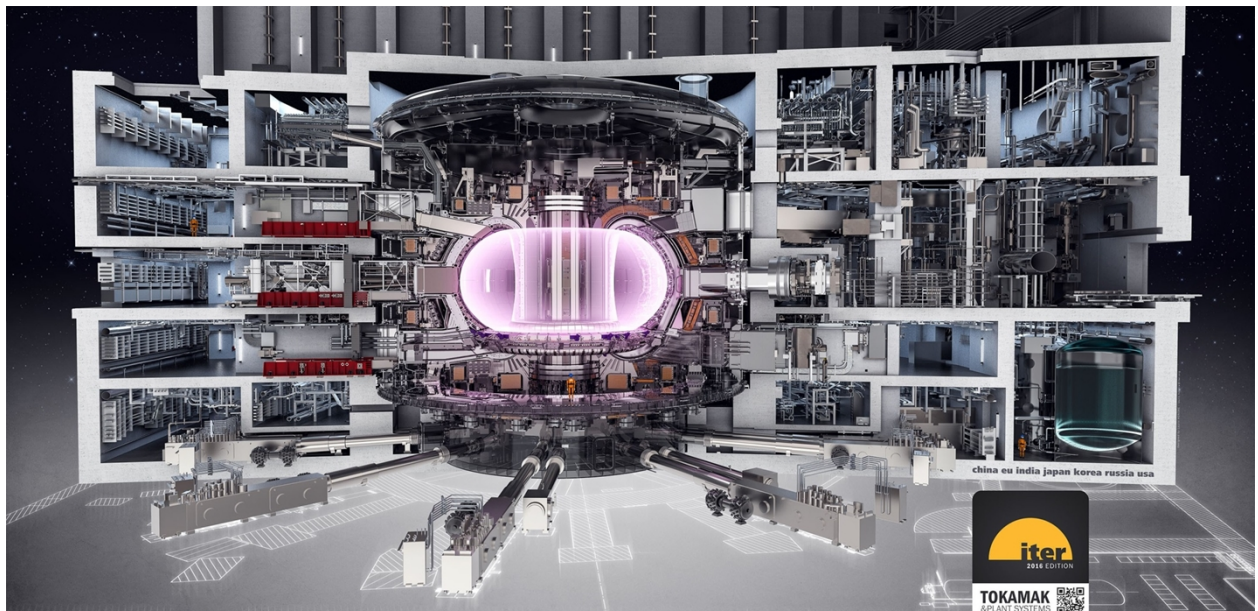


Figure 1. ITER Tokamak.

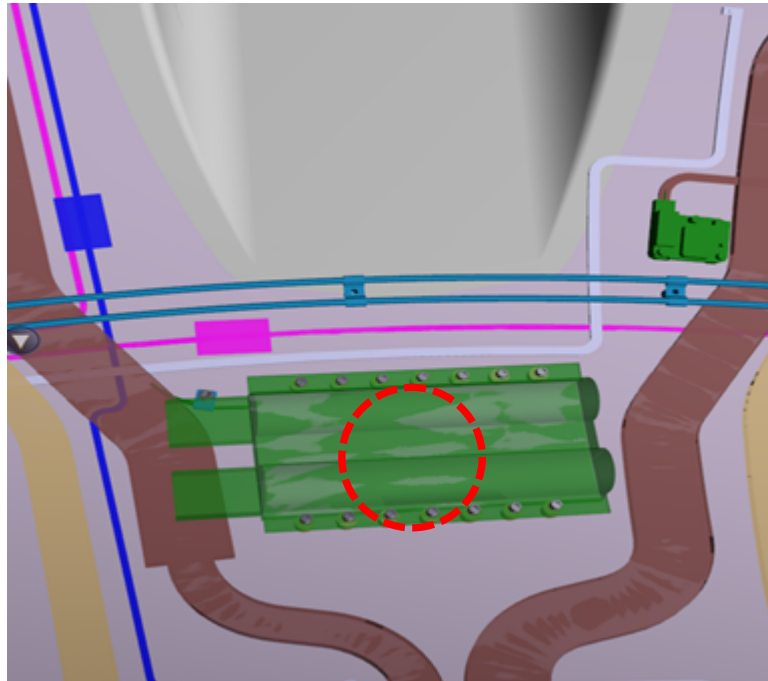


Figure 2. Integration of Divertor Neutron Flux Monitor (red circle) on the bottom of the ITER Vacuum Vessel.

3 Scope of Work

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

ITER technical and quality requirements, guidelines and procedures including those for Safety (see Sections 13 – 15), are applicable for the execution of work. The primary objective of this engineering activity is with the ITER Neutron Diagnostics in the technical oversight of engineering, project and integration design, including preparation of design reviews and their follow-up as well manufacturing of the various systems.

4 Definitions and references

IO: ITER Organization

DA: Domestic Agency

IO-TRO: ITER Organization technical Responsible Officer.

For a complete list of ITER abbreviations see: ITER Abbreviations (ITER_D_2MU6W5).

5 Estimated Duration and Start of activity

The duration shall be for 12 months from the starting date of Contract. Services to be provided at 100% off site . Travel to the DA or other sites may be required to carry out the work.

6 Work Description

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

- To assist with the design and reviews activities of 55B Neutron Diagnostics
- Technical review of DA models of individual diagnostics and integrated diagnostic systems in the ports and ex vessel area;
- Assessment of models of integrated diagnostic systems for their assembly feasibility and maintenance;
- Technical review of various engineering analyses
- Technical review diagrams;
- Technical review of 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 meetings of DA representatives with IO experts;
- Promoting safety and quality at all times in all job site activities.
- Ability to provide and deliver documentation in appropriate way

There will be a requirement to liaise with IO personnel and particular external teams over the period of the contract. It will be necessary to collect inputs from these teams and use them to generate internal IO documentation.

There may also be additional appropriate design works as may arise in the duration of the contract.

7 Responsibilities

Contractor shall :

- strictly implement the IO procedures, instructions and use templates;
- be bound by the rules and regulations governing the IO ethics, safety and security IO rules.

The ITER Organization may request Contractor to travel and work at places other than ITER site).

8 List of deliverables and due dates

Deliverable	Due date
D.1 -- Support DA manufacturing and FAT activities of 55B4 NFM EQ#7 Support Frame by monitoring the progress via MIP and by ensuring that documents are stored correctly (PLM/IDM) and in the Manufacturing Data Base, to coordinate the safety records and to provide safety documentation update; -- Update and follow up of Interfaces sheets of 55B4 NFM in EQ#8 and EQ# 1 for Port Integration PDR EQ1 and EQ#8 -- Provide support to DA for activities on the “Alternative Design” of the 55BC NFM in the LP 2,8 and 14;	T.0 +3 months
D.2 -- Support DA for DRR-Delivery by monitoring and following up the related documentation; prepare all necessary documents of the SAT activities of 55B4 NFM EQ#7 Support Frame. -- Manage Interfaces Review of 55B4 NFM in EQ#8 and EQ#17, EQ# 1 for “Remaining” NFM PDR and update of interface documents between NFM diagnostics and various PBS (vacuum, radwaste, assembly, etc.)	T.0 + 6 months
D.3 -- Support Assembly team in the installation and commissioning of 55B4 NFM EQ#7 Support Frame: by contributing with related drawings and documents within the CWP TOC 4 activity; -- Support DA PDR Review of “Remaining “ 55B4 NFM in EQ#8 and EQ#17, EQ# 1, by following up the Documents Input Package status and readiness for the DR and to organize with DA the Design Review (Notification, Agenda, etc.) ,	T.0 + 9months
D.4 -- Support preparation activities of the DA PDR Review of 55B2 Lower Vertical Neutron camera (LVNC) in LP #14 by following up the Documents Input Package status and readiness for the DR and to organize with DA the Design Review (Notification, Agenda, etc.) ,	T.0 + 12months

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 7, Table of deliverables.

10 Specific requirements and conditions

Person(s) to carry out the work described in this document must have proven experience, as appropriate.

- Demonstrated knowledge and experience of ITER neutron diagnostics systems;
- Demonstrated Experience on engineering aspects and interfaces / integration of ITER neutron diagnostics;
- Experience in structural assessments for ITER neutron diagnostics using ITER-relevant nuclear Codes and Standards
- Experience in creation/review of Load Specifications for ITER complex diagnostics systems and management of interface loads;
- Demonstrated experience in engineering analysis and modelling
- Demonstrated experience in working with CAD models and engineering diagrams;
- Knowledge and experience of neutron/nuclear diagnostics
- Demonstrated experience in working within international organizations
- System requirements management
- Technical document generation

11 Work Monitoring / Meeting Schedule

Work is monitored through quarterly reports (see List of Deliverables section 7) and at monthly project meetings.

It is expected that on occasion the Contractor will be required to make a presentation to Topical Technical Meetings either by videoconference or in person. If in person, the ITER Organization will reimburse travelling expenses, if appropriate, for off-site meetings

12 Delivery time breakdown

See List of Deliverables section.

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 document [ITER Procurement Quality Requirements \(22MFG4\)](#)

Prior to commencement of the task, a Quality Plan [Quality Plan \(22MFMW\)](#) 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.

Prior to commencement of any manufacturing, a Manufacturing & Inspection Plan [Manufacturing and Inspection Plan \(22MDZD\)](#) must be approved by ITER who will mark up any planned interventions.

Deviations and Non-conformities will follow the procedure detailed in IO document [MQP Deviations and Non Conformities \(22F53X\)](#)

Prior to delivery of any manufactured items to the IO Site, a Release Note must be signed [MQP Contractors Release Note \(22F52F\)](#).

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, it should comply with guideline [ITER_D_PQT8AC - GUIDELINE- FRAMEWORK INSTRUCTION FOR SAFETY DEMONSTRATION ART 3.8 INB ORDER](#) .

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.

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)”