IDM UID
**TLA2Z4**

VERSION CREATED ON / VERSION / STATUS
**26 Jul 2016 / 1.1 / Approved**

EXTERNAL REFERENCE / VERSION

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

# Technical specifications_Neutron Diagnostics project integration

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

china eu india japan korea russia usa

# Technical Specifications

## for
## Project, Integration
## of ITER Neutron Diagnostics

# Table of Contents


1 Purpose....3
2 Background and Objectives....3
3 Scope of Work....4
4 Estimated Duration and Start of activity....5
5 Work Description....5
6 Responsibilities....5
7 List of deliverables and due dates....5
8 Acceptance Criteria....6
9 Specific requirements and conditions....6
10 Work Monitoring / Meeting Schedule....6
11 Delivery time breakdown....6
12 Quality Assurance (QA) requirements....7
13 CAD Design Requirements (if applicable)....8
14 Safety requirements....8
15 References / Terminology and Acronyms....8

# 1 Purpose

This document describes technical needs of ITER/TED/PPD Diagnostics Division, with particular reference to the requirement for engineering expertise for the Neutron Diagnostics project, integration 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.

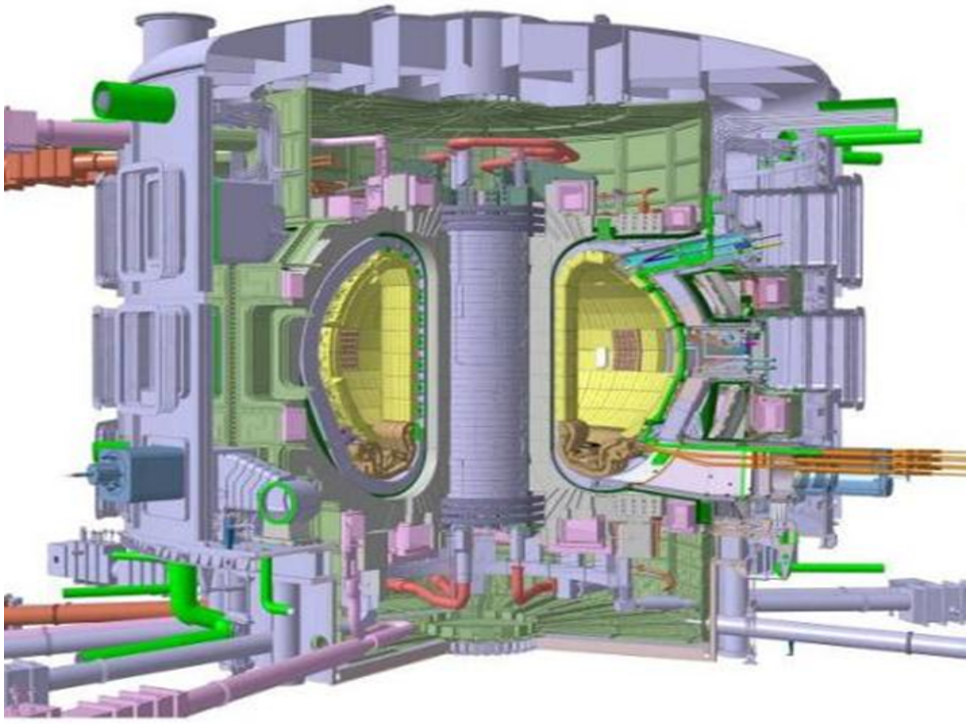

Figure 1. ITER Tokamak.

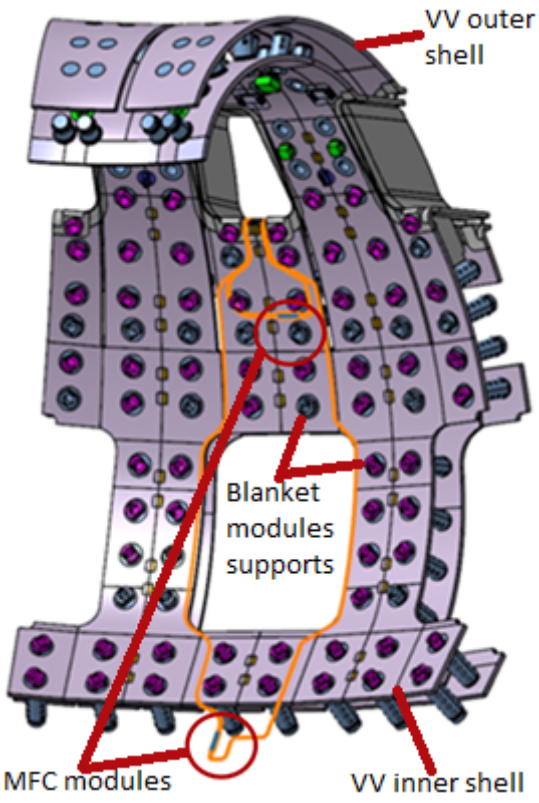


Figure 2. Two 55B3 MFC detector assemblies (red circles) on the outboard of the vacuum vessel. Yellow lines are the mineral-insulated cables for high voltage supply and signal transfer.

# 3 Scope of Work

The primary objective of this engineering activity is give expertise on the ITER Neutron Diagnostics in the technical oversight of engineering, project and integration design, including preparation of design reviews and their follow-up. Other elements of design and R&D work are also likely.
The objective of this contract is:

- Preparation (from both technical and organizational perspective) and associated follow up work, of design reviews, including all follow- up and documentation activities as appropriate;
- Coordinate design reviews;
- Support the Diagnostics team in the evaluation and development of neutron diagnostics
- Evaluate diagnostic designs

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.

# 4 Estimated Duration and Start of activity

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

The start of the activity is foreseen in November 2016

# 5 Work Description

- To support on Design Reviews activity concerning 55B1 Radial Neutron Camera, 55B3 Microfission Chambers, 55B7 Radial Gamma Spectrometers, 55B8 Neutron Activation System, 55BB High Resolution Neutron Spectrometers and other systems as required
- To develop to technical design of the interfaces and integration of the neutron diagnostics with the tokamak, particularly for the systems above mentioned systems
- To assist with the design and reviews activities of Neutron Diagnostics
- To review technical designs/models and reports from Domestic Agencies
- Document work as required: reports of the activity carried out, conferences reports and documentation required by STAC, MAC, TED/PPD Diagnostic division
- Other appropriate work as may be required by the RO
- Promote safety and quality at all times in all job site activities.
- Ability to provide and deliver documentation in appropriate way
- Contribution of own ideas and proposals aiming to support the Diagnostic advancement

# 6 Responsibilities

Services to be provided 100% at IO site.
The ITER Organization may request Contractor to travel and work at places other than ITER site (especially to make presentations in Topical Technical Meetings).

# 7 List of deliverables and due dates

| Deliverable | | Due date |
|---|---|---|
| 1 | Prepare and support Korean DA on Preliminary Design Review of the 55.B8.NAS Port Plug Components | T.0 +1 months |
| 2 | Prepare and support Japan DA on the Preliminary Design Review of the 55.B3.MFC ex-vessel. | T.0 + 4 months |
| 3 | Support EUDA in developing Conceptual Design of the 55.B7. RGRS and 55BB HRNS and related interfaces. Hold related Conceptual Design Reviews | T.0 + 7months |
| 4 | Manage the progress of the design of the 55.B1.RNC in cooperation with European DA. Prepare and support EUDA on Preliminary Design Review. | T.0 + 10months |
| 5 | Prepare and support Korean DA on Final Design Review of the 55.B8.NAS in-vessel components; | T.0 + 12months |
| 6 | -Executive summary of the performed activities and to draft next steps of engineering, project and integration design, for support to the Port Plug Diagnostics Division | T.0 + 12months |

| | | |
|---|---|---|
| | | |

# 8 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.

# 9 Specific requirements and conditions

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

- Education to a PhD degree level or equivalent
- Knowledge and experience of neutron/nuclear diagnostics
- Demonstrated Experience on plasma or high energy physics devices (minimum 3 years)
- Demonstrated Experience on engineering aspects and interfaces / integration of neutron diagnostics on tokamak
- Demonstrated Knowledge of ITER neutron diagnostics systems
- Demonstrated project management experience
- Demonstrated Experience in working within international organizations
- Demonstrated Experience in working with CAD designers
- System requirements management
- Technical document generation

# 10 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

# 11 Delivery time breakdown

See List of Deliverables section.

# 12 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 fulfil IO document on Quality Assurance for ITER Safety Codes Quality Assurance for ITER Safety Codes (258LKL).

# 13 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.

# 14 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 [20].

# 15 References / Terminology and Acronyms

References links inserted in text.
For a complete list of ITER abbreviations see: ITER Abbreviations (ITER_D_2MU6W5).