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EXTERNAL REFERENCE

## Technical Specification

# Neutron\_Engineer\_Techs Specs

Technical specifications

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**Engineer/Experimentalist for Project,  
Integration and support  
of ITER Neutron Diagnostics**

**Technical Specifications**

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## 1 Abstract

This document describes technical needs of ITER Diagnostics Division, with particular reference to the requirement for an Engineer to support Neutron Diagnostics, including project, integration, engineering 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.

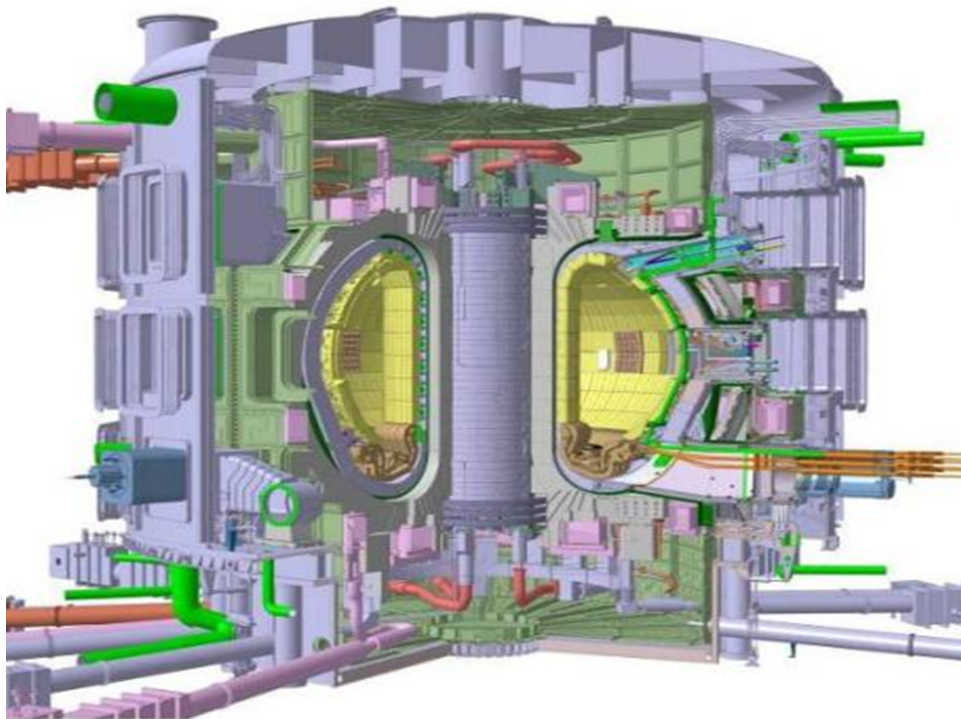


Figure 1. ITER Tokamak.

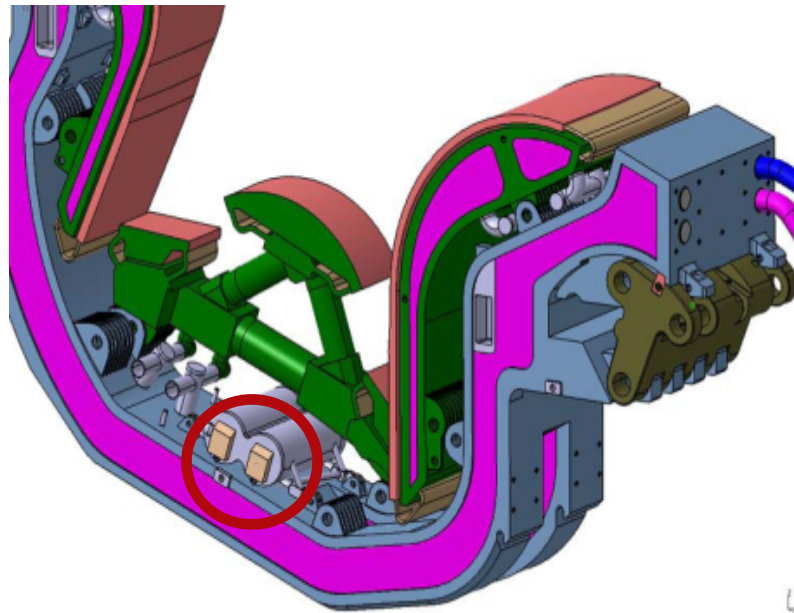


Figure 2. Integration of Divertor Neutron Flux Monitor (red circle) in ITER Divertor Cassette.

### 3 Scope of Work

The primary objective of this engineering activity is to support the ITER Neutron Diagnostics in the technical oversight of engineering, project and integration design, including preparation of design reviews and their follow-up.

The objective of this contract is to

- 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

The duration of the contract can be for up to 3 years from the starting date of the contract.

The services shall be rendered on a full-time basis at the ITER site, the Expert may be asked by the RO to perform travel missions of short duration for the purpose of the execution of the Contract.

## 5 Work Description

- To support the design and reviews activities of Neutron Diagnostics.
- Review technical designs/models and reports from Domestic Agencies
- To contribute to technical design of the interfaces and integration of the neutron diagnostics with the tokamak
- Other appropriate work as may be required by the RO
- Promoting safety and quality at all times in all job site activities.
- Ability to be consistent and work well under pressure
- Ability to provide and deliver documentation in appropriate way
- Promotion of own ideas and thoughts aiming to contribute and to the Diagnostic advancement

### Note:

If a candidate wishes to discuss and have more informations please request contact with the Neutron Diagnostic Responsible Officer.

## 6 Responsibilities (including customs and other logistics)

When applicable.

## 7 List of deliverables and due dates (proposed or required by ITER)

Progress Reports as outlined in following Section on Work Monitoring / Meeting Schedule

## 8 Acceptance Criteria (including rules and criteria)

The criteria shall be the basis of acceptance by IO following the successful completion of the Work. These will be in the form of monthly progress reports as indicated in section 6 above and further detailed below:

Report and Document Review criteria

Reports as deliverables shall be stored in the ITER Organization's document management system, IDM by the Contractor for acceptance. A named ITER Organization's Contract Technical Responsible Officer is the Approver of the delivered documents. The Approver can name one or more Reviewers(s) in the area of the report's expertise.

The Reviewer(s) can ask modifications to the report in which case the Contractor must submit a new version. The acceptance of the document by the Approver is the acceptance criterion.

## 9 Specific requirements and conditions

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

**Demonstrated:**

- Education to a minimum Master degree level is desirable
- Knowledge and experience of neutron/nuclear measurements would be an advantage
- Experience on plasma or high energy physics devices (minimum 3 years)
- Appropriate project management experience
- High level of achievement in previous activities
- Experience in working with CAD designers
- Ability to work well under pressure
- Strong commitment and afford personal contribution to ITER Diagnostic advancement as well to the progress of the ITER project
- ability to work with partners and host to define optimum/critical needs for ITER
- ability to work with ITER processes to achieve optimum results
- ability to align work priorities with overall project schedule
- excellent technical writing skills
- excellent communication, inter-personal and influencing skills
- ability to work in team environment
- appropriate ability to comprehend technical issues and ensure addressed by others
- excellent command of the English language both written and spoken

**10 Work Monitoring / Meeting Schedule**

The work will be managed by means of Progress Meetings and/or formal exchange of documents transmitted by emails which provide detailed progress. Progress Meetings will be called by the ITER Organization, to review the progress of the work, the technical problems, the interfaces and the planning. It is expected that Progress Meeting will be held frequently as required, generally weekly.

The main purpose of the Progress Meetings is to allow the ITER Organization/Diagnostics Division and the Contractor Technical Responsible Officers to:

- a. Allow early detection and correction of issues that may cause delays;
- b. Review the completed and planned activities and assess the progress made;
- c. Permit fast and consensual resolution of unexpected problems;
- d. Clarify doubts and prevent misinterpretations of the specifications.

In addition to the Progress Meetings, if necessary, the ITER Organization and/or the Contractor may request additional meetings to address specific issues to be resolved.

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

For all Progress Meetings, a document (the Progress Meeting Report) describing tasks done, results obtained, blocking points and action items must be written by the Contractor. Each report will be stored in the ITER IDM in order to ensure traceability of the work performed.



After the first monthly report, every 2 months, the Contractor shall submit to ITER Organization a Progress Report to be issued five working days before a Progress Meeting so that the report can be reviewed prior to, and discussed at, that Meeting.

## 11 Payment schedule / Cost and delivery time breakdown

Interim monthly payments. At the end of each month, the Contractor shall submit an invoice for the services rendered. This invoice will be accompanied with a duly signed time sheet. This time sheet will clearly indicate the contract reference number, the name of the assigned person, the dates and the total of the working days and the number of hours worked per day.

## 12 Quality Assurance (QA) requirement

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 \(258LKL\)](#).