



Neutronics Analysis of ITER Diagnostics Components

Technical Specifications

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1 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 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. These systems will provide the information required to understand and control the performance of the device.

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.

2 Scope of Work

The objective of this contract is to support the ITER Diagnostic Team in the analysis of the diagnostic design. This will cover the area of neutronics analysis, e.g. nuclear heating, nuclear damage, helium generation, material activation and human dose rates.

3 Estimated Duration

The duration shall be 440 working days from the starting date of the contract. The Contract is intended to be placed for a duration of 2 years.

The IO expects the contractor to work :

- Off-site from his home institution / office for a maximum of 400 working days
- On-Site (IO premises) for a maximum of 40 working days

The IO Technical Responsible Officer (IO-TRO) will determine the exact dates of working On-Site depending on the workload.

4 Work Description

Description of the services to be performed:

1. Analytic and numerical calculations supporting diagnostic design and diagnostic port integration, in the area of neutronics analysis.
2. Collating and checking calculations
3. Suggesting means of improving design of diagnostic components based on these finds.

4. Document work as required: reports of the activity carried out, conferences reports and documentation required by STAC, MAC, CHD and Diagnostic division.

5 Specific requirements and conditions

The Contractor shall carry out the work described in Section 4.

He shall have proven experience in the following areas:

Role Description: Nuclear Expert

- Design and analysis of nuclear systems (at least 5 years)
- Neutronics analysis (MCNP or Attila) (at least 5 years)
- Excellent technical writing skills
- Capability to work in English language, both verbally and written

The ITER Organization may request Contractor's staff to travel and work at places other than ITER site (especially to make presentations in Topical Technical Meetings). The ITER Organization will reimburse travelling expenses as per IO procedures.

Presentations in Topical Technical Meetings can also be done via videoconference.

6 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 and via Live Meeting.

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.

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.

Monthly progress report are also requires by the IO-TRO.

This criterion shall be the basis of acceptance by IO following the successful completion of the services. These will be in the form of monthly progress reports.

Reports	Dates
Progress report	1 month after starting date
Progress report	On a monthly basis thereafter

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.

Calculation results must be in auditable form, i.e. code version and input data are part of progress reports.

7 Payment schedule

Interim payment will be made monthly upon satisfactory completion of the services. The acceptance of monthly progress report by the IO-TRO and the submission of correctly rendered invoice are requested to release payment.

8 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 \(258LKL\)](#).

9 References / Terminology and Acronyms

IDM: ITER Documents Management

MCNP: Neutron Transport code developed in US, Montecarlo Neutron Photon Code

STAC: Science and Technology Advisory Committee

MAC: Management Advisory Committee

CHD: CODAC, Heating and Diagnostics