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Engineering Validation and Design Justification of Diagnostic Components

Technical Specifications

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1 Abstract

This document describes the specific technical needs of the **Diagnostics Division with particular reference to Design Justification and Engineering Validation Work,** predominantly in the following areas:

- mechanical
- thermo-hydraulics
- electromagnetics
- hazards

2 Background and Objectives

ITER is a major new device that is under construction at St. Paul-lez-Durance, near Marseille, 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 described below is related to the design of the equipment required to physically support the diagnostics in ITER, e.g. port plugs and similar structures, and in some cases the diagnostics themselves.

3 Scope of Work

The objective of this engineering contract is primarily to support the ITER Diagnostic Team in the analysis that supports the diagnostic design, with particular emphasis in the areas of mechanical, thermo-hydraulic and electromagnetic analysis.

4 Estimated Duration

The duration shall be up to 600 working days. The services shall be rendered on a full-time basis at the ITER site.

5 Work Description

Description of the tasks to perform:

1. To validate engineering designs of diagnostic systems in terms of structural integrity in preparation for Design Reviews.

2. To suggest improvements to the mechanical design of diagnostic components.

3. To apply and to justify the use of appropriate codes and standards against diagnostic designs, examples of such codes would be such like RCC-MR and ASME codes.

4. To perform 3D numerical thermal and structural analysis of various diagnostic components.

5. To provide appropriate Structural Analysis, Technical Analysis and Structural Integrity Reports, as well as Load Specifications, following IO guidelines and rules.

6. To support the Diagnostic Division, as appropriate, to fulfil its mission in the design engineering and analysis area.

6 Acceptance 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.

7 Specific requirements and conditions

The staff proposed by the bidder to carry out the work described in Section 5 must satisfy the following areas:

- Analysis of tokamak diagnostic and associated systems (minimum 2 years)

- at least three years of experience in writing/ reviewing load specifications and structural integrity reports in a major facility e.g. JET or ITER

- at least three years of experience in applying ITER-applicable codes and standards (e.g. ASME VIII Div 2, ASME III, RCC-MR) to the structural assessment of systems and components in large mechanical engineering structures that have significant electromagnetic loads

- at least three years experience in design and analysis follow-up of safety-relevant Tokamak components, such as closure plates, bolts, seals etc

- at least three years of experience in working with CATIA v5.0/ ENOVIA and adaptation of models for analysis in ANSYS workbench

- Capability to work in English language, both verbally and written

- Demonstrable technical writing skills

8 Work Monitoring / Meeting Schedule

Meetings and Progress Reports

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 weekly or bi-weekly or as needed, via videoconference.

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

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.

Every 3 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.

The Quarterly Progress Report shall illustrate the progress against the baseline work plan and indicate variances that should be used for trending. Performance indicators, suitable to measure the progress of the work as compared to the approved work plan, shall also be reported in the Quarterly Progress Report.

9 Payment schedule

Interim monthly payment, after submission and acceptance of the Monthly Progress Report with supporting timesheet to the ITER Organization.

10 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).

11 References / Terminology and Acronyms