Annex II

Technical Specifications

Operational Systems

Diagnostics Engineering Services

ITER_D_ SD8PNK v.1.3

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1 Purpose

This document describes technical needs for Operational Systems Diagnostics Engineering Services.

2 Scope

The work aligns with the ITER project, currently under construction in France. This device will study the Fusion concept on a scale previously unequalled on earth. To study the behaviour of this device, a set of monitoring systems (called diagnostics) are required. This will provide all the information to show and understand the performance of the device.

The work involves technical expertise for specific diagnostic projects and some work in parallel for several diagnostics systems.

- The specific diagnostics projects are the following ones: **Collective Thomson Scattering** (PBS 55.C7), **Bolometers** (PBS 55.D1), **Plasma Position Reflectometer** (PBS 55.F3), **In Vessel Viewing System** (IVVS PBS 57.I1), **Lower Ports Integration** (PBS 55.L2, PBS 55.L8 and PBS 55.L14), **Equatorial Ports Integration** (PBS 55.Q1, PBS 55.Q3, PBS 55.Q8, PBS 55.Q9, PBS 55.QA, PBS 55.QB, PBS 55.QC, PBS 55.QH), **Upper Ports Integration** (PBS 55.U1, PBS 55.U2, PBS 55.U3, PBS 55.U4, PBS 55.U5, PBS 55.U6, PBS 55.U7, PBS 55.U8, PBS 55.U9, PBS 55.UA, PBS 55.UB, PBS 55.UE, PBS 55.UH, PBS 55.UI).
- The parallel activity will be to work on the propagation of requirements from High level ITER documents like the Project Requirements (PR) to Systems Requirement Documents (SRD) for several diagnostics systems.

3 Definitions

IO: ITER Organization

DA: Domestic Agency

SSD: See System Design

IO-TRO: ITER Organization technical Responsible Officer

CTS: Collective Thomson Scattering

IVVS: In-Vessel Viewing System

SRD: System Requirements Document

PA: Procurement Arrangement

PR: Project Requirements

PPR: Plasma Position Reflectometer

R&D: Research and Development

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

4 References

Links inserted in text (where applicable).

5 Estimated Duration

The duration shall be for 24 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.

6 Work Description

The work involves technical expertise for seven diagnostic projects and **parallel activity for requirement propagation as explained in section 2**. All these diagnostic projects are in the design development phase. The work to be done is to provide technical expertise to work with the IO-TRO. It involves many areas of activity that have to be documented:

- Meeting preparatory notes, including agenda and draft attendee selection;
- Meeting notes for IO meetings called by interfacing systems and review bodies;
- Draft minutes for IO and DA meetings;
- Draft deviation requests;
- Technical input in support of project change requests and other actions;
- Draft interface sheets;
- Draft assembly procedures;
- Input documents, presentations, meeting notes related to Port integrator DA meetings;
- Input documents, presentations, meeting notes related to Interface meetings;
- Technical review notes for DA technical documents in IO IDM. Documents include technical reports, draft deviation requests, compliance and requirements matrixes etc. Several technical documents per month need to be reviewed;
- Input documents, presentations, meeting notes related to Monthly DA meetings
- Implementation reports for IO-related actions from DA meetings;
- Implementation reports for Chit resolution from IO and DA design reviews; Amended and reviewed sections of IO schedule;
- Record of progress against schedule;
- Schedule improvements and fix scheduling problems;
- Input documents, presentations, meeting notes related to meetings of DA representatives with IO experts;
- Guidance notes for DAs on execution of PA technical activities;
- Updated and re-evaluated loads, including nuclear loads and other engineering specifications;
- Contributions to design workshops on specific topics;
- Contribution to conferences on specific topics;
- Updated measurement requirements including in particular requirement propagation form PR to system SRDs;
- Technical specifications for R&D tasks;
- Drafts and amended requirements-related documentation including joint documents with plasma operations;
- Project risk register updates (technical, cost and schedule);
- Annual internal review of progress (schedule, cost and risk evolution) and related documents;
- Input documents, presentations, meeting notes related to at workshops and conferences.
- Support for cost estimates.

Travel to the DA or other sites (including conferences) may be required to carry out the work.

7 Responsibilities

7.1 Contractor's Responsibilities

In order to successfully perform the tasks in these Technical Specifications, the Contractor shall:

• Strictly implement the IO procedures, instructions and use templates;

• Provide experienced and trained resources to perform the tasks;

• Contractor's personnel shall possess the qualifications, professional competence and experience to carry out services in accordance with IO rules and procedures;

• Contractor's personnel shall be bound by the rules and regulations governing the IO ethics, safety and security IO rules.

7.2 IO's Responsibilities

The IO shall:

• Nominate the Responsible Officer to manage the Contract;

• Organise a monthly meeting(s) on work performed;

• Provide offices at IO premises.

8 List of Deliverables and due dates

The main deliverables are provided for the following projects:

Collective Thomson Scattering (PBS 55.C7), **Bolometers** (PBS 55.D1), **Plasma Position Reflectometer** (PBS 55.F3), **In Vessel Viewing System** (IVVS PBS 57.I1), **Lower Ports Integration** (PBS 55.L2, PBS 55.L8 and PBS 55.L14), **Equatorial Ports Integration** (PBS 55.Q1, PBS 55.Q3, PBS 55.Q8, PBS 55.Q9, PBS 55.QA, PBS 55.QB, PBS 55.QC, PBS 55.QH), **Upper Ports Integration** (PBS 55.U1, PBS 55.U2, PBS 55.U3, PBS 55.U4, PBS 55.U5, PBS 55.U6, PBS 55.U7, PBS 55.U8, PBS 55.U9, PBS 55.UA, PBS 55.UB, PBS 55.UE, PBS 55.UH, PBS 55.UI) and **parallel activity for requirement propagation**.

The typical yearly report (D13, D26) shall have appendix with a complete list of all relevant IO IDM, CAD (Enovia/ CATIA, SSD etc) and all other relevant database references with version number.

D #	Description	Due Dates
D01	Propagation of interfaces and engineering justifications for Equatorial Port 12 in preparation for the face-to-face meeting between stakeholders at IO-CT	T0 + 1 months
D02	Safety requirements propagation from Project Requirements to System Requirements for Diagnostics (PBS-55) uploaded in IDM.	T0 + 2 months
D03	List of all other Project Requirements applicable to Diagnostics (PBS-55), In-Vessel Viewing System (PBS-57)	T0 + 3 months

	uploaded to IDM	
D04	Propagation of all other Project requirements to Systems Requirements for Diagnostics (PBS-55) uploaded in IDM.	T0 + 4 months
D05	SRD for Bolometer - document preparation and review	T0 + 5 months
D06	Propagation of engineering assessment and updated designs of tenant systems to launch the PDR analysis activities after the meeting organized by the Port Integrator of Equatorial Port 12	T0 + 5 months
D07	Annex B for Bolometer - document preparation and review	T0 + 6 months
D08	Finalization of PDR pass engineering models and design schedule with tenants and services in Equatorial Port 12.	T0 + 7 months
D09	Management of input provision for F4E regarding mechanical structural support for IVVS	T0 + 7 months
D10	Review technical documents related to the advancement of Upper Ports 11 and 14 integration as they are progressing towards PDR. Regularly document progress reports for upper ports and upload them in the IDM in the corresponding progress meeting and PDR folders	T0 + 8 months
D11	Management of input provision for F4E regarding tolerance study for IVVS	T0 + 8 months
D12	Review technical documents related to the preparation of 55F3 Plasma Position Reflectometry PDR for captive components and related port integration activities. Document all relevant reports and findings in the IDM.	T0 + 9 months
D13	PDR for bolometer - document review and preparation (several sub-deliverables according to document plan)	T0 + 9 months
D14	Review technical documents related to the advancement of Lower Ports (#02, #08 and #14) integration as they are progressing towards PDR. Regularly document progress reports for IO lower ports and upload them in the IDM in the corresponding progress meeting and PDR folders	T0 + 10 months
D15	Functional Analysis Review for IVVS of the document supplied by F4E; report comments in IDM	T0 + 11 months
D16	Review technical documents related to the preparation of Upper Ports 4, 5, 6 PDR. Manage PDR meeting preparation and document all relevant reports and findings in the IDM.	T0 + 11 months

D17	Review technical documents related to the advancement of IO Equatorial Ports (#8 and #17) integration as they are progressing towards PDR. Regularly document progress reports for IO equatorial ports and upload them in the IDM in the corresponding progress meeting and PDR folders	T0 + 12 months
D18	Review technical documents related to the preparation of 55C7 Collective Thomson scattering Annex B signature and ongoing PDR activities. Manage documentation for the PDR preparation of ex-vessel CTS components. Document all relevant reports and findings in the IDM.	T0 + 12 months
D19	Summary of activities for the first 12 months of the work: a report in the IDM	T0 + 12 months
D20	Management of contract on SRD coaching - finer scale points (monthly deliverables over 1 year) in [ITER_D_RX56MS]	T0 + 13 months
D21	PDR closure document preparation for Bolometers	T0 + 14 months
D22	Review technical documents related to the preparation of Upper Port #18 PDR. Manage PDR meeting preparation from IO side and document all relevant reports and findings in the IDM.	T0 + 15 months
D23	Review technical documents related to the preparation of Upper Ports #11 and #14 SIR. Manage SIR meeting preparation from IO side and document all relevant reports and findings in the IDM.	T0 + 16 months
D24	Review technical documents related to the preparation of IO equatorial ports (#8 and 17) SIR. Manage SIR meeting preparation from IO side and document all relevant reports and findings in the IDM.	T0 + 16 months
D25	PDR for IVVS - document review and preparation (several sub-deliverables according to document plan)	T0 + 20 months
D26	Review technical documents related to the preparation of a selected IO equatorial port PDR. Manage PDR meeting preparation from IO side and document all relevant reports and findings in the IDM.	T0 + 21 months
D27	Review technical documents related to the preparation of lower port #14 SIR. Manage SIR meeting preparation and document all relevant reports and findings in the IDM.	T0 + 22 months

D28	Review technical documents related to the preparation of Upper ports #11 and #14 PDR. Manage PDR meeting preparation from IO side and document all relevant reports and findings in the IDM.	T0 + 23 months
D29	Summary of activities for the second 12 months of the work: a report in the IDM	T0 + 24 months

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 8, Table of deliverables.

10 Specific requirements and conditions

Management of projects in fusion or nuclear facilities

Development of equipment designs for fusion or nuclear facilities

Operational experience of procedures in nuclear environment

Experience relevant to all techniques in deliverables list

Experience in System Engineering

System requirements management

Technical risk analysis

Monitoring and reporting of status of projects

Generation of technical, administrative, and managerial documents

Communication with international local and remote teams in context of nuclear fusion research or similarly complex research and engineering environment

Organization, taking minutes and action tracking of international meetings

Understanding of schematics and 3D models

11 Work Monitoring / Meeting Schedule

Work is monitored through progress reports (see List of Deliverables section) and at monthly project meetings for each of the eight projects.

12 Delivery time breakdown

See Section 8 "List Deliverables section and due dates".

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 Procurement Quality Requirements (ITER_D_22MFG4).

Prior to commencement of the task, a Quality Plan 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 (see Procurement Requirements for Producing a Quality Plan (ITER_D_22MFMW)).

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, in accordance with Quality Assurance for ITER Safety Codes (ITER_D_258LKL).

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)).