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Technical Specification

ITER_D_SCX4DY_V2.0 Dated 24th February 2016

for

Documentation, Logistics, and Interface Management for CIS V.1 and CIS V.2 construction contract.

This document describes the technical specifications for the contract: Documentation, Logistics, and Interface Management for CIS V.1 and CIS V.2 construction. The objective of this service contract is to develop and manage the CIS technical documentation, logistics, interfaces and quality assurance tools used for the development of the Central Interlock System V.1 and V.2.

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1 Purpose

This document specifies the tasks and deliverables related to the documentation and logistics management for the construction of the CIS V.1 and CIS V.2 by the ITER interlock team.

These technical specifications define the work to be done in these areas during the 24 months after the CIS Final Design Review has been completed.

2 Scope

The investment protection at ITER is provided by the Interlock Control Systems. These are the systems in charge of implementing all the instrumented protection functions of the tokamak and its associated plant systems. These functions are divided into:

- Local interlock functions, which are limited to one plant system and have no effect on the rest of the machine. The interlock event and the mitigation action are performed within the same plant system.
- Central interlock functions, which involve two or more plant systems.

In May 2016, the Central Interlock System shall complete its Final Design Review and enter into its construction phase. The Central Interlock System work-packages during the 24-month duration of this contract are:

- Delivery of CIS Hardware (May 2016 – February 2017)
- Construction and Configuration of CIS V.1 (February 2017 – April 2017)
- Factory Acceptance Tests of CIS V.1 (May 2017 – August 2017)
- Release of CIS V.2 (September 2017 – June 2018)
- Preparation of CIS Tests in K-STAR (April 2018 – June 2018)

This contract is should provide the management of the technical documentation, interfaces, logistics and quality assurance tools used for the performance of the tasks above.

In addition to this, the supplier shall manage the external international shipments needed by the Control System Divisions. This includes supplying the documentation required by the Custom Officials of the different ITER countries and the ITER common shipment contractor, as well as the hand-over forms between ITER CT and the Domestic Agencies.

The objective of this service contract is to develop and manage the CIS technical documentation, logistics, interfaces and quality assurance tools used for the development of the Central Interlock System V.1 and V.2.

3 Definitions

The interlock terminology used in the different documentation is the following:

• CIS

The Central Interlock System (CIS) forms together with CODAC and the Central Safety System (CSS) part of the ITER I&C Central Systems. The CIS is in charge of implementing the Central Protection Functions via the Plant Interlock Systems (PIS). It also provides access to the local interlock data of the different Plant Interlocks System.

• PIS

The Plant Interlock Systems (PIS) are part of the Plant System I&C. Each PIS provides local protection implementing the Local Interlock Functions of the corresponding plant system. Most of the PIS also participate on the Central Interlock Functions coordinated by the CIS.

All the sensors and actuators in ITER involved in machine protection are connected to, at least, one PIS of their plant system. The PIS constitutes the interface between the CIS and the plant systems.

Only Plant Systems I&C participating in inter-plant interlock or having a local investment protection are integrated in the Interlock Control System (ICS) architecture.

• CIN

The Central Interlock Network provides connection between the Plant Interlock Systems and the Central Interlock System for inter-plant systems investment protection functions.

Only plant system I&C participating in inter-plant system investment protection functions or performing local investment protection functions shall be connected to CIS via CIN.

• PIN

The Plant Interlock Network provides connection between the components involved in the investment protection functions inside one plant system. The PIN connects the PIS in a plant system to the sensors and actuators of the same plant system. For the plant systems with more than one PIS the PIN is also in charge of connecting them together.

The Plant Interlock Network in one Plant System shall not be shared with other Plant Systems except for the hardwired loops.

• ICS

The Interlock Control System is in charge of the supervision and control of all the ITER components involved in the instrumented protection of the Tokamak and its auxiliary systems. It is constituted by the Central Interlock System (CIS), the different Plant Interlock Systems (PIS) and its networks (CIN and PIN). The ICS does not include the sensors and actuators of the plant systems but it is in charge of their control.

• Interlock action

Measure or sequence of measures carried out by the CIS and/or the PIS to mitigate the risks following an interlock event. These protection actions are managed by the PIS when the measures are restricted to the plant system that generated the interlock and by the CIS when different plant systems are involved.

• Interlock function

Logical description of the interlock actions following an interlock event. These functions are classified into two categories: local and central.

• Interlock event

Plant system state or combination of states involving different plant systems that triggers an action of the corresponding PIS and/or the CIS

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

4 References

[RD1] Central Interlock System (PBS-46) - Design Description Document (DDD) (ITER_D_QCH3GJ v.2.1)

[RD2] Bill of Materials BoM and Component Classification (ITER_D_RSAZ2S)

[RD3] System Integrated Logistic Support Plant – ILS (ITER_D_RKB5VN)

[RD4] CIS Factory Acceptance Tests – FAT (ITER_D_PP5CDP)

[RD5] Initial Proposal to Use KSTAR to Test CIS V.2 (ITER_D_REUZK5)

[RD6] List of CIS Final Design Documentation (ITER_D_SEKMZ7)

[RD7] CIS Functional Analysis (ITER_D_PNYD8Y)

5 Estimated Duration

The duration of services under this contract shall be for one (1) year during which the deliverables 1 to 4 (see table below) shall be produced, with the option to extend it for one (1) more year during which deliverables 5 to 8 shall be produced.

6 Work Description

The tasks associated to each CIS work-package consist of:

1. Delivery of CIS Hardware (May 2016 – February 2017)

The description of the CIS hardware to be managed and its configuration can be found in [RD1] and [RD2].

The logistics plan explaining the detailed work that needs to be performed from the logistics point of view during CIS V.1 construction is detailed in [RD3]

- Management of the technical documents related to CIS hardware procurement
- Supervision of the CIS hardware inventory (in IO and worldwide) and population of hardware inventory database
- Participation and logistic coordination of the review in Seoul of the CIS V.1 readiness for construction review.

2. Construction and Configuration of CIS V.1 (February 2017 – April 2017)

The documents to be managed during CIS V.1 configuration and FAT are listed in [RD4], [RD6].

- Management of the technical documents related to CIS V.1 configuration
- Management of the technical documents related to CIS V.1 FAT procedure

3. Factory Acceptance Tests of CIS V.1 (May 2017 – August 2017)

The work to be performed concerning logistics and technical documentation management during the FAT of CIS V.1 is described in [RD3] and [RD4].

- Management of the technical documents related to CIS V.1 FAT performance and evaluation
- Participation and logistic coordination of the CIS V.1 FAT in Seoul.

4. Release of CIS V.2 (September 2017 – June 2018)

The description of the CIS hardware to be managed and its configuration during the transition from CIS V.1 to CIS V.2 can be found in [RD1] and [RD2].

The logistics plan explaining the detailed work that needs to be performed from the logistics point of view during CIS V.2 construction and configuration is detailed in [RD3]

- Management of the technical documents related to CIS V.2 release
- Supervision of the CIS hardware inventory (in IO and worldwide) and population of hardware inventory database during the CIS V.2 delivery phase.
- Participation and logistic coordination of the review in Seoul of the CIS V.2 readiness for release.

5. Preparation of CIS Tests in K-STAR (April 2018 – June 2018)

The tasks description and the logistical work required for performing the tests of CIS V.2 in K-STAR tokamak in Daejeon (Korea) are described in [RD5] and [RD3].

- Coordination of the shipments of all CIS hardware from Seoul to Hefei (Korea)

The continuous tasks to be performed by the supplier during the whole duration of the contract for the Interlock Team and the CSD Division are:

For the Interlock Team and Control Systems Division

- Management of the technical documentation related to the ITER Machine Protection [RD6], [RD7].
- Maintenance of the central interlock functions databases [RD7].
- Logistics and secretariat of the CIS team meetings
- Management of CSD shipment logistics

7 Responsibilities

The responsibilities of the contractor in charge of providing these deliverables are the ones described in Section 6.

The person will be in charge of all the activities of the interlock team within the CSD Division related to the logistics and technical documentation management during the construction of CIS V.1, CIS V.2 and the tests of the ITER interlock system in KSTAR.

8 List of deliverables and due dates

The deliverables are

Subtask	Deliverable(s)	Milestone
1	KoM Minutes, CIS hardware inventory status , CSD Logistics Summary May-July, Central Interlock Functions DB status	July 2016
2	CIS hardware inventory updates, CSD Logistics Summary August-October, new CIS functions summary.	October 2016
3	CIS V.1 readiness review MoM, CIS hardware inventory updates, 2017 CSD Logistics Summary, new CIS functions summary, Final CIS V.1 BoM.	January 2017
4	CIS hardware inventory updates, CSD Logistics Summary January-April, new CIS functions summary.	April 2017
Phase 2 – Option Release		
5	Option Release KoM Minutes, CIS hardware inventory status, CSD Logistics Summary May-July, Central Interlock Functions DB status, FAT Preparation Report and MoM(s).	July 2017
6	FAT Performance Report and MoM, CIS hardware inventory updates, CSD Logistics Summary August-October, new CIS functions summary.	October 2017
7	Preparation of CIS V.2 MoM, CIS hardware inventory updates, 2017 CSD Logistics Summary, and new CIS functions summary.	January 2018
8	Report on CIS shipment to K-STAR, CIS V.1 tests in K-START preparation MoM, CIS hardware inventory, CSD Logistics Summary March-May, CIS functions DB status.	April 2018

9 Acceptance Criteria

The acceptance criteria for the deliverables described in the table above are:

- All the technical and logistics documentation (including custom and import/export official documents) have to be uploaded in IDM and approved by the TRO of the contract or his/her line management.
- Logistic documentation shall strictly reflect the status of the system in each of the country involved in the CIS V.1 and CIS V.2 project (Korea, France, India, Italy and Spain).
- All formal procedures regarding custom regulation shall be completed according to the national law of each involved country.
- All FAT and other test documentation shall follow the interlock quality plan defined in [RD1]

10 Specific requirements and conditions

The contractor who is in charge of preparing the deliverables above shall meet the following technical and personal requirements.

Key qualifications:

Professional expertise in the following disciplines is important;

- Knowledge of the ITER document tools and quality procedures.
- Experience writing technical documentation
- Experience and/or knowledge of the ITER interlock systems would be an asset

Key skills and competencies:

- Excellent communication & inter-personal skills
- Excellent attention to detail
- Ability to be consistent and work well under pressure
- Responsive & engaging in complex situations
- Proactive
- Innovative
- Excellent technical writing skills in English and French.

11 Work Monitoring / Meeting Schedule

The Contractor who is in charge of preparing the deliverables will be expected to attend regular Group Progress Meetings as requested, and to the formal exchange of documents transmitted by emails required. Progress Meetings will be called by the ITER Organization, to review the progress of the work, the technical problems, the interfaces and the planning.

Where necessary or appropriate, Contractor Managers may be invited to participate in some progress meetings via videoconference.

It is expected that on some occasions the Contractor will be required to make a presentation to Topical Technical 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 Contract Responsible. Each report will be stored in the ITER IDM in order to ensure traceability of the work performed.

The contractor will be required to attend two meetings of one week each in the CIS manufacturer supplier site in Seoul during the first phase of the contract and two more during the second phase.

12 Delivery time breakdown

See Section 8.

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 [20].