

Technical Specifications (In-Cash Procurement)

I&C system conceptual design of ITER type B Radwaste Treatment System

The purpose of this contract is to advance in the design of the Instrumentation and Control (I&C) system of the ITER type B Radwaste Treatment System that will be implemented in the Hot Cell Building.

This is a deliverable based contract to be performed at the contractor's office.

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1 Purpose

The purpose of this contract is to advance in the design of the Instrumentation and Control (I&C) system of the ITER type B Radwaste Treatment System that will be implemented in the Hot Cell Building.

2 Scope

ITER radwaste will be generated in various ITER buildings such as Tokamak, hot cell (HCB), radwaste (RWB), personnel access control (PACB), and tritium plant buildings during the machine operation and maintenance periods.

ITER radwaste management systems should be designed for the treatment and storage of the intermediate-level and long-lived (Type B: in-vessel component replacement) radwaste, purely tritiated waste (tritium plant and fuelling system maintenance), low-level solid and liquid radwaste (Type A: process and housekeeping waste), and very low-level radwaste (TFA).

The Type B (intermediate level) radwaste management systems are accommodated in level B2 and B1 of the Hot Cell building. They are remotely operated from Personal Access and Control building.

The design of the I&C system will be performed in parallel with the design of the process.

The foreseen tasks will be needed to:

- Define the inputs needed to develop the Type B I&C system and required at the CDR stage, based on the current process design and on the ITER I&C policy (see [RD14]).
- Update the current draft version of the detailed design document of the Type B I&C system based on the required deliverables and on the ITER I&C design handbook (see [RD13]).

3 Definitions

In the following table denominations and definitions are given of all the actors, entities and documents referred to in this Specification, together with the acronyms used in this document.

Denomination	Definition	Acronym
ITER Organization	For this Contract the ITER Organization	IO
ITER Organization Task Responsible Officer	Person delegated by the IO-RO for all technical matters, but limited to one specific task order	IO-TRO
Radioactive Materials Engineering Section	Radioactive Materials Engineering Section	RMES
I&C	Instrumentation and Control	I&C
Conceptual Design Review	Conceptual Design Review	CDR
Plant Control Design Handbook	Plant Control Design Handbook	PCDH

For a complete list of ITER abbreviations see: [ITER Abbreviations \(ITER_D_2MU6W5\)](#).

For PBS 66 I&C, see [Identifiers, Acronyms and Glossary for the PBS 66 I&C \(N5U2FH\)](#).

4 Reference documentation for the contract

- [RD1] RPrS (to be consulted on site only)
- [RD2] SRD-66 (Radwaste Treatment and Storage) from DOORS (2EWUFD)
- [RD3] Updated design descriptions: Type B and purely tritiated waste management systems (3TBNLV)
- [RD4] DWO-66-307 Type B equipment development and engineering (<https://user.iter.org/?uid=67BJBV>)
- [RD5] User's control requirements for Type B radwaste system (LY8T7D)
- [RD6] HAZOP analysis for PBS66 Type-B System (PQQ9QJ)
- [RD7] Overview of the Type B Radwaste System I&C (L3YG9D)
- [RD8] Overview of the Type B Radwaste System Remote Handling Platform (L894LV)
- [RD9] References for the PBS 66 I&C (N5TUG6)
- [RD10] Radwaste System I&C Overview (D1A) (FFTNTB)
- [RD11] Safety Functions, Systems, Signals Definition for I&C CSS Design (3R7ECW)
- [RD12] I&C nuclear safety function specification for "Control Gas Treatment System O2 Concentration" (PP6D57)
- [RD13] Plant Control Design Handbook (PCDH) (27LH2V)
- [RD14] Methodology for Plant System I&C specifications (353AZY)
- [RD15] Guidelines for PSOS SM management by COS SM (AC2P4J).
- [RD16] Type B Radwaste System I&C DDD (QB4JU7)
- [RD17] Cable data list for PBS 66 SSC in HCC (35JE3Q)
- [RD18] PBS66 HIRA Risk Table
- [RD19] Type B P&ID
- [RD20] Type B PFD

5 Estimated Duration

The duration of this work is estimated to 8 months (i.e. 36 weeks, 180 days).

6 Work Description

6.1 Required tasks

Following the specifications given in [RD13], the work will include the following tasks:

- [T1] A preliminary specification of I&C controller types and of the network interfaces configuration (PCDH deliverable D5).
- [T2] A preliminary estimation of the signals connected to the plant system I&C (including name, type, sampling rate, I&C cubicle allocation, etc.) and of the cabling inputs (PCDH deliverable D6).
- [T3] A preliminary estimation of the data exchanged with the Central I&C System, based also on [RD6] and [RD7] (PCDH deliverable D7).

- [T4] A preliminary version, based also on [RD7], of the hardware configuration of the I&C cubicles showing the cubicle interfaces with Central I&C infrastructure, buildings, power supply and HVAC, where and when feasible (PCDH deliverable D8).
- [T5] Update of [RD8], focussing on the means to remotely control the process and on the interfaces with PBS 23 (Remote Handling System) and PBS 62 (Buildings).
- [T6] Creation of Interface Sheet with CODAC System : IS 45-66-001
- [T7] Creation of Interface Sheet with CSS System : IS 48-66-001
- [T8] Creation of Interface Sheets with Interlock System : IS 48-66-001

Tasks [T1] to [T4] shall be included in an updated version of [RD16].

In parallel, the risk analysis, interlock and safety functions identification should be completed as necessary.

Task [T6] an [T7] deliverables shall be put on IDM.

6.2 Additional tasks

6.2.1 CDR tasks

A preliminary draft version of the D1 documents shall be presented at a CDR type meeting. This presentation shall describe the Plant system I&C architecture. This includes a high level functional analysis (D1A), a detailed functional breakdown with functional links and the characterization of functions (D1B), and the physical and functional architecture (D1C).

The work then includes the resolution of the chits following the CDR and the update of documents accordingly.

6.2.2 PCDH deliverable tasks

The work will also include an update of the specifications for the Plant System Operating States (PSOS) and the critical review of the mapping with the ITER Common Operating States (COS). The reference document will be [RD15] (PCDH deliverable D9). This work will be included in an updated version of [RD16] as well.

6.2.3 Type A Radwaste System tasks

The type A Radwaste management system is accommodated in building 23, Radwaste Building.

Considering interface and safety requirements, the following documents have to be updated:

- I&C design and cable information for Type A system
- Electrical power requirement for Type A system

7 Responsibilities

Not applicable

8 List of deliverables and due dates

The list of the deliverables and the target dates are the following:

- 1) A work plan to be submitted in IDM at the beginning of the contract.
- 2) Additional Type A task shall be planned in parallel of the other tasks
- 3) A preliminary draft version of [T1] shall be delivered within 5 weeks.

- 4) A preliminary draft version of [T2] shall be delivered within 10 weeks.
- 5) A preliminary draft version of [T3] shall be delivered within 15 weeks.
- 6) A preliminary draft version of [T4] shall be delivered within 20 weeks.
- 7) A preliminary draft version of [T5] shall be delivered within 25 weeks.
- 8) A preliminary draft version of [T6], [T7] and [T8] shall be delivered within 30 weeks.
- 9) Additional CDR and PCDH tasks shall be planned at least within 30 weeks.
- 10) The final versions of [T1], [T2], [T3], [T4], [T5], [T6] and [T7] shall be delivered 3 weeks before the end of the contract, for revision and approval including CDR comments.

The order of deliverables 2), 3), 4), 5) and 6) can be changed, following an agreement between the Contractor and the TRO. This will be formalized in IDM through an update of the work plan.

9 Acceptance Criteria

The Contractor shall organize weekly meetings with the IO Contract Manager in order to examine progress of design activities, to review schedules.

The minutes of these meetings shall be written by the Contractor in the simplified form of a table of action items and archived in IDM.

The Contractor shall submit written progress reports to the IO Responsible Officer every month. The progress report shall be in .doc(x) format and include at least the following information for the reporting period:

- Summary of the work carried out.
- Description of any problems encountered.
- References to any produced deliverables.
- Schedule.

The progress report shall be submitted three working days before a regular weekly meeting and discussed there.

The progress report shall be approved by the IO-RO.

The deliverables shall be reviewed by the IO-TRO for technical acceptability and adequacy.

All along the contract, the contractor shall acquire good knowledge of the ITER Radwaste Treatment and Storage System and question its large I&C system's risk and functional analysis.

10 Specific requirements and conditions

The job will be performed at the Contractor's premises.

Progress and working meetings shall be organised at ITER Organization Office. For this, the Contractor will be provided with a regular IO badge for external contractors, valid for the whole length of the contract, allowing him to enter the ITER site whenever needed without the need of prior approval.

The official language of the ITER project is English. Therefore all input and output documentation relevant for this Contract shall be in English.

Documentation developed shall be retained by the contractor for a minimum of 5 years and then may be discarded at the direction of the IO.

The Contractor will be granted IDM access according to the job needs.

For all deliverables submitted in electronic format the Contractor shall ensure that the release of the software used to produce the deliverable shall be the same as that adopted by the ITER Organization.

The criteria for selecting the company are:

- 10 to 15 years' experience
- Good knowledge of the ITER Radwaste Treatment and Storage System.
- Practical experience in the design of large scale I&C systems for conventional plant control, in respect of requirements of standards in force on the ITER project.
- Practical experience in design of interlock I&C systems, in respect of requirements of standards in force on the ITER project.
- Practical experience in design of nuclear and occupational safety I&C systems, in respect of requirements of standards in force on the ITER project.
- Experience in risk and functional analysis of large I&C systems.
- Good knowledge of Siemens PLCs (S7-400 series).
- Good knowledge of SCADA systems based EPICS and on COTS products (e.g.: Siemens WinCC OA).
- Knowledge of the following IEC standards: 61508, 61511 and 61513.
- Knowledge of the French INB order of 7 February 2012,
- Ability to communicate in spoken and written English.
- Good level of autonomy

11 Work Monitoring / Meeting Schedule

A weekly progress meeting will be held at ITER Organization Office.

Work meetings can be scheduled depending on the contractor's need.

Meeting minutes will be written by the contractor and submitted to ITER Organization for review.

12 Delivery time breakdown

See chapter 8 for required tasks.

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

No CAD design work has been identified for this contract.

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].

16 Technological requirements

For conventional plant control, design of interlock I&C systems and design of nuclear and occupational safety I&C systems, requirements of standards in force on the ITER project to be respected are the following:

- Siemens PLCs (S7-400 series).
- SCADA systems based EPICS and on COTS products (e.g.: Siemens WinCC OA).
- IEC standards: 61508, 61511 and 61513.