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VERSION CREATED ON / VERSION / STATUS
07 Jan 2022 / 1.1 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical Specification and Statement of Work for Provision of Maintenance of I&C Cubicle Services

This document is a technical specification and statement of work by ITER Controls Division for services in instrumentation and control (I&C) cubicle maintenance and lifecycle management.

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1. PURPOSE

This document is technical specification and statement of work for Technical Support for ITER Controls Division. It defines the scope of the support, services to be provided and their requirements, the process of defining task orders and the execution and the deliverables of those.
The document describes a Framework Contract (FWC), broken down into two lots. Task orders within each lots will be free-standing technical support activities with their own budgets. This document provides the information required for potential bidders to prepare a tender.

2. BACKGROUND AND OBJECTIVE

The ITER Controls Division is responsible of receiving and inspecting, testing, commissioning and operating a very large instrumentation and control (I&C) hardware and software infrastructure for manual and automated control and monitoring of all ITER plants and subsystems, including those for conventional instrumentation and control, investment protection, access control and safety.

The objective of the framework contract is to provide support the ITER Controls Division to assure the maintenance of those systems.

3. SCOPE OF WORK

The scope of work is the maintenance of Instrumentation & Control (I&C) cubicles ranging from conventional control systems with slow and fast input/output (I/O) and industrial grade networks to the investment protection (interlocks) systems, access control systems and occupational safety systems.

Maintenance of I&C cubicles covers hardware but no software which is dealt by other parties.

The support requested covers instrumentation and control (I&C) cubicles maintenance and lifecycle management henceforth, ranging from single device units to large plant systems, containing several I&C cubicles located in several buildings.

The maintenance of Instrumentation and Control cubicles and similar electrical enclosures containing the interfacing electrical and electronics components between the central I&C servers and the field level signals and actuators is in the scope of this contract.

The maintenance of process facing sensors and actuators, signal conditioning cubicles and the cabling leading to those is out of the scope of this contract.

Nuclear safety systems are out of the scope of this contract.

4. DEFINITIONS

CAD	Computer Aided Design
CLM	Component Lifecycle Management Database (see PSP)
CODAC	Control Data Access and Communications
CRO	Contract Responsible Officer
FWC	Framework Contract
I&C	Instrumentation and Control
I/O	Input / Output
IO	The ITER Organization
IDM	ITER Document Management system
INB	*Installation Nucléaire de Base* (an authorization)
IPC	Industrial PC – an industrial, server grade computer
LRU	Line-Replacement Unit
LV	Low Voltage (*basse tension* <1000 Vac)
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PLC	Programmable Logic Controller
PIA	Activity Important to Protection
PIC	Protection Important Component
PSP	Plant system profile database for I&C design, see CLM
PPSPS	*Le plan particulier de sécurité et de protection de la santé*
RO	Responsible Officer
SCC	Signal Conditioning Cubicle or Component
SIC	Safety Important Component
SIL	Safety Integrity Level
QA	Quality Assurance
TO	Task Order
TRO	Technical Responsible Officer

5. REFERENCES

[RD1] ITER Procurement Quality Requirements (22MFG4)

[RD2] ITER Organization – “Plan de Prévention” – Prevention Plan Template (T76WJE)

[RD3] ITER Organization – Contractor Safety Management Instruction (Q2GBJF)

[RD4] Plant Control Design Handbook (27LH2V)

[RD5] CODAC System Design Description Document (6M58M9)

[RD6] I&C Cubicle Internal Configuration (4H5DW6)

[RD7] Maintenance Management Procedure (VH9LAB)

[RD8] Working Instruction for Spare Parts and Consumables Management (3SMZ47)

[RD9] Procedure for Identification and Controls of Items (U344WG)

[RD10] Procedure for the Preservation of Equipment (WML9CF)

[RD11] ITER Site Permit to Work Overarching Procedure (3E8289)

[RD12] Template for Specific Health and Safety Plans (PPSPS) – bilingual version (K7C6SZ)

6. CONTRACT START AND DURATION

The framework contract is scheduled to be launched in March 2023. The total duration of the framework contract is three (3) years, with an optional extension for two (2) additional year.

7. Work description

This summary covers the technical services to be provided to IO under the scope of this contract.

The Contract is divided into two (2) lots. They are described below including indicative services and deliverables.

The tasks orders will be issued per lot.

a. Lot 1: Generic Maintenance

The services requested as part of Lot 1 are organized in five major categories. The services requested are enumerated underneath for each service category:

1. I&C Spare parts management:
    a. Execution of preservation actions to maintain shelf life of spare parts ;
    b. Maintaining on-hand stocks in the IO premises for critical components to reduce the MTTR for those in [Appendix A] ;
    c. Maintaining long term stocks either in ITER warehouse or in external premises to the IO if the preservation measures require special conditions to maintain the shelf-lifetime ([RD10] and [Appendix A]) ;
    d. Managing the spare parts of I&C electrical components which are not under IO's control and in remote locations, for example available in institutes of Domestic Agencies ;
    e. Ordering of parts to maintain an appropriate level of available components to guarantee MTTR within the requirements ;
    f. Reception/inspection of deliveries, registration to ITER Component Lifecycle Management (CLM) database [RD5], execution of component level verification based on procedures defined by the component manufacturer or the IO ;
    g. Shipment of damaged components for repair ;
    h. Following up the reparation of damaged components and their return testing ;
    i. Management of required tools ;
    j. Tracking of calibration certificates ;

k. Other similar supporting actions related to the spare part management.

2. Planned and preventive maintenance:
    a. Regular inspection and cleaning of cubicles [RD6];
    b. Replacement of LRU parts (memory batteries, air filters, etc.) ;
    c. Verification of electrical protective devices (trip breakers, etc.) ;
    d. Verification of termination contact correct tightening torque ;
    e. Verification of thermal profile of I&C cubicles, with infrared camera or by remote or local temperature measurements ;
    f. Verification of cable strain reliefs ;
    g. Verification and assuring the cleanness of optical connectors and surfaces ;
    h. Verification and recording of cable attenuation and other characteristics.

3. Corrective maintenance:
    a. Transport of tools and spare parts ;
    b. Implementing localized electrical safety measures ;
    c. Replacement of parts ;
    d. Restoration of the components configuration from version controlled artefacts (settings, firmware) ;
    e. Restoration of the operation of the relevant functions ;
    f. Execution of documented verification procedures ;
    g. Activity reporting (findings, work/time log).

4. Change projects:
    a. Removal of components to be disposed of ;
    b. Mechanical modifications as required ;
    c. Cabling modifications as required ;
    d. Installation of new components ;
    e. Request, organize, assist and collect reports of Legal Inspections before energizing ;
    f. Field support during the change Verification and Validation (V&V) phase ;
    g. Disposal of the removed components [RD7].

5. Reporting:
    a. Test reports as per test plans and inspection procedures ;
    b. Improvements in test plans and inspection procedures ;
    c. Log entries and the IO operation and maintenance management systems ;
    d. Work time and other logs in the IO workflow management systems.

b. Lot 2: SIL preservation

SIL preservation activities are to ensure the required Safety Integrity Level (SIL) of each Safety Instrumented Function is maintained during operation. SIL preservation is applicable only to systems implementing SIL functions according to IEC 61508 / IEC 61511 and comes in addition to preventive and corrective maintenance.
The services requested as part of Lot 2 are enumerated below:

- Preparation of detailed procedures according to functional safety standards (IEC 61508 / IEC 61511) and in accordance to the system Safety Requirement Specification (SRS);

- Execution of proof-test procedures for every Safety Instrumented Function (SIF) to reveal dangerous failures undetected by diagnostics;
- Execution of non-regression tests after preventive and corrective maintenance actions performed by others on field devices;
- Verification of post-conditions before restoring the operation of the Safety Instrumented System;
- Maintain up-to-date all results of the tests and inspection including the “as-found” condition, all faults found (including the failure mode) and the "as-left" condition.

8. LOCATION

The work location is the ITER Organization construction site and the office spaces around it, located in Cadarache, France.
The Contractor shall be able to provide personnel to be located permanently and in daily basis in ITER site with occasional work in the ITER manufacturing and reception industrial locations in the radius of the 80 kilometers from the main construction site. One of the currently known locations where equipment is prepared is located in Corbières-en-Provence (04), approximately 20 kilometers by road from the ITER construction site.

9. Required competencies

a. Competencies applicable to both lots

The **Contract Responsible Officer (CRO)** role shall be covered by a I&C Engineer with minimum seven years of industrial experience of I&C system operation and maintenance.

b. Lot 1: Generic Maintenance

The necessary competencies to provide the requested services, defined in Chapter 7.a for Lot 1, shall be included in the skills of the following professional roles:
Senior and junior electronics technician shall be capable to support all works in I&C cubicles: dismantling, re-assembly, configuration and testing of individual I&C components; including signal interfaces and signal conditioners, hardware management, I&C software configuration control and maintaining the component lifecycle management database.

They shall be as well capable to manage the reception, inspection and testing, storage with required preservation measures of I&C spare parts ranging from single electronics devices to entire electrical enclosures and cabinets, including their repacking and redelivery for calibration or reparation.

The required competences for above mentioned technicians include:

1. Electrical certificates needed to work in LV electrical installation ;

2. Electrical certificate as isolation (*consignation*) authority ;
3. Work in heights authorization for at least one technician ;
4. Experience of factory floor / machine front-end level signal interfacing, isolation, grounding and cabling ;
5. Experience in using continuity and resistance testing devices and multimeters ;
6. Experience in using oscilloscope, signal generator and other laboratory equipment ;
7. Experience in Siemens S7-300/S7-400/S7-1500 PLC family including remote I/O ;
8. Experience in PROFINET networking, knowledge of PROFISAFE is an asset ;
9. Experience in Siemens TIA Portal and Step 7 software development environment ;
10. Experience of equipment configuration ;
11. Experience in Linux command prompt level operation is an asset ;
12. Experience in C/C++ programming and scripting to write test programs is an asset ;
13. Experience in managing spare stocks and implementing preservation measures ;
14. Experience in using Experience in using MS Office
15. Ability to communicate in spoken and written English in an international work place

The number of required personnel will increase in time. The need for it can be estimated by studying the growth of the installed systems requiring maintenance, in [Appendix A].

Initially, the resources needed are estimated to consist of the CRO/I&C Engineer role, assisted by one senior I&C technician and one junior I&C technician on-site during normal business hours.

It is not required to have 24/7 on-site presence, but an 24/7 on-call service will be requested to support similar on-call services of the IO, notably the CTRL on-call service. The requirement for the presence on-site after a request made is J+2 hours, the interventions always organized and taking place under the supervision of the CTRL on-call person in duty.

c. Lot 2: SIL preservation

The necessary competencies to provide the requested services, defined in Chapter 7.b for Lot 2, shall be included in the skills of the following professional roles:

Senior and junior technician or engineer shall be capable to support all works related to safety related systems maintenance procedure definition, to troubleshoot safety control systems devices, execute the tests and maintenance procedures and records all results in the Computerized Maintenance Management System.

The required competences for above mentioned technicians include:

L2REQ-01 Extensive experience (> 5 years) in the preparation of detailed maintenance procedure of safety related systems as per IEC 61508 / IEC 61511, including the preparation of proof test procedures and their justification.

L2REQ-02 Practical experience (> 5 years) with Siemens safety S7-400 (FH) PLC configuration for safety systems, including safety remote I/Os.

L2REQ-03 Experience (≤ 5 years) in troubleshooting of safety control systems implementing SIL functions.

L2REQ-04 Experience (≤ 5 years) in Computerized Maintenance Management System to streamline, organize and document all asset tracking and maintenance management efforts.

L2REQ-05 Practical experience (≤ 5 years) in the usage of tools allowing troubleshooting of I&C control systems: multimeter, signals generator, continuity and resistance testing devices, etc.

L2REQ-06 Experience (≤ 5 years) in the execution of proof-test procedures for Safety Instrumented Function to reveal dangerous failures undetected by diagnostics

L2REQ-07 Experience (> 5 years) in Siemens Step 7 software development environment for safety application including experience with Siemens software safety libraries;

L2REQ-08 Ability in using Microsoft Office tools.

L2REQ-09 Ability to communicate in spoken and written English in an international work place.

The level of experience of the personnel will be detailed in the task-orders.
For information, it can be considered:

- Junior Technician / Engineer (< 5 years)
- Confirmed Technician / Engineer (5 years ≤ experience < 10 years)
- Senior Technician / Engineer (≥ 10 years)

10. CONTRACT EXECUTION

Contract execution consist of execution of Task Orders (TO), each of which being its own entity with its own technical specification within the scope of this Framework Contract (FWC).

a. Monthly meeting

The Contractor shall organize monthly meetings related to the on-going task order, with the ITER Responsible Officer (RO) and concerned other ITER IO staff such as the dedicated task's IO Technical Responsible Officer (TRO), in order to examine progress of recent and ongoing activities, to review short-term schedules and to review new, eventual Task Orders or changes or necessary amendments in the existing ones.
The minutes of these meetings shall be written by the Contractor in the simplified form using the ITER provided template, with action items and submit the minutes for the approval of the ITER Contract Manager in ITER Document Management (IDM) system.
The Contractor written progress reports to the ITER Responsible Officer is a deliverable every month. The progress report shall be submitted in IDM and it shall include at least the following information for the reporting period:

1. Summary of the work carried out for all on-going Task Orders ;
2. Description of any problems encountered for all on-going Task Orders ;

3. References to any produced deliverables for all on-going Task Orders ;
4. Status and schedule of all on-going Task Orders ;
5. Time reports shall detail the days worked on which Task Order, rate of consumed and forecasted resource usage or deliverables status for each Task Order.

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 ITER Organization RO.

b. Ad hoc Meetings

To be scheduled at the discretion of the IO-RO or the Contractor depending on need. 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.

11. DELIVERABLES

The deliverables are defined in each Task Order (TO). A typical task order deliverables within this Framework Contract (FWC) consist of but are not limited to:

- Periodical summary reports of the tasks executed, extracted from the ITER workflow management system ;
- Periodical spare part status reports and updated plans for the stocks refurbishment ;
- Test reports – not limited to component reception testing but all I&C worked upon ;
- Software and configuration control deliveries in version control repository of ITER;
- SIL related maintenance procedure preparation or update

An approved deliverable is a report or document requested in a task order, delivered in the ITER document management system, submitted or reviewed by the CRO and approved by a TRO of the task or the RO of the contract.

12. PERFORMANCE

The performance criteria is defined in each Task Order (TO). A typical task order performance criteria within this Framework Contract (FWC) consist of but is not limited to:

- Time to start the execution of a submitted task in the IO workflow management system;
- Time to resolve of a submitted task in the IO workflow management system;
- Number of submitted tasks per the rolling past 30 days versus the pending tasks;
- MTTR;
- Stock status reports indicating no critical level for any component type;
- Time to provide personnel on-site during the on-call duty.

13. RESPONSIBILITIES

The Contractor will provide specialist resources and experts both in short and in long-term basis as required and when needed. These personnel shall normally be located at the ITER Organization site, be fully dedicated to performing the services agreed and not work for third parties other than the ITER Organization until the Task Orders they are assigned to are completed or terminated.

The Contractor personnel shall have the ability to communicate in spoken and written English in an international work place.
The Contractor personnel shall be experienced in using Microsoft Office tools.

The work will be performed according to deliverables defined in Task Orders.

The Contractor warrants, represents and undertakes that:

1. The Contractor will provide the services promptly and with all due skill, care and diligence, in a good and workmanlike manner and otherwise in line with best practice within its industry ;
2. Contractor's personnel will possess the qualifications, professional competence and experience to carry out such services in accordance with best practice within the industry ;
3. The Contractor will be responsible for maintaining such insurance policies in connection with the provision of the Services as may be appropriate or as the ITER Organization may require ;
4. Contractor's personnel will be bound by the rules and regulations governing IO safety and security and shall provide the required health and safety plans, such a PPSPS and a prevention plan following templates [RD2] and [RD12]. All technical personnel must have at least a valid "*Habilitation Electrique*" certificate at a minimum BR BC or B1V level. Other certification levels may be required in the task orders as required. Certified training on "Nuclear Safety Order 1984" may optionally be required ;
5. The Contractor will name one person at the Contractor premises or headquarters who will be the supervisor of the contracted manpower. The task order supervising IO-RO must be able to contact the Contractor's supervisor person directly without passing through contracted personnel.

The ITER Organization shall make available to Contractor's personnel dedicated and located on IO site at Cadarache:

1. Procedures, information, data and any specialized equipment necessary for the Contractor to perform its functions under this Scope of Work ;
2. A safe work area which meets the generally-accepted requirements for the satisfactory execution of the Services ;
3. Access to the premises and to the dedicated work areas ;
4. Any necessary and appropriate worksite related safety training.

14. PAYMENTS

The Contractor shall supply invoices to IO at completion of a Task Order (TO) or at specified payment milestones within a Task Order. Invoices shall be supplied only after the corresponding deliverable(s) for each Task Order, or its milestone has been approved by the ITER Organization's RO.

15. RESULTS DISSEMINATION

All results obtained in the frame of the work described in this document shall be made property of the ITER Organization and can be partially or fully used for further work.

16. QUALITY ASSURANCE (QA) REQUIREMENT

The organization 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 organization 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).

17. CAD DESIGN REQUIREMENTS

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.

No CAD design is included in this contract.

18. 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 External Contractors (Suppliers and Subcontractors, and their 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.

This framework contract is not producing any SIC, PIA or PIC deliverables.

Appendix A Estimated Quantities

Figure 1 gives estimated quantities of I&C cubicles of each ITER sub-system commissioned and operated yearly, until the first plasma has been reached. For the purpose of the scope of this framework contract, the subsystems they have been installed for are not relevant for the effort estimation but the color coding of various types of cubicles is important for that:

Slow – blue (lowest) – the cubicle contains mainly PLC-type of I&C components ;
Fast – orange (middle) –the cubicle contains typically one or several high performance industrial PCs (IPC) and equal or superior number of high-speed I/O card carrying chassis connected to it ;
SCC – grey (upmost) – signal conditioning cubicle – active or passive signal conditioners.

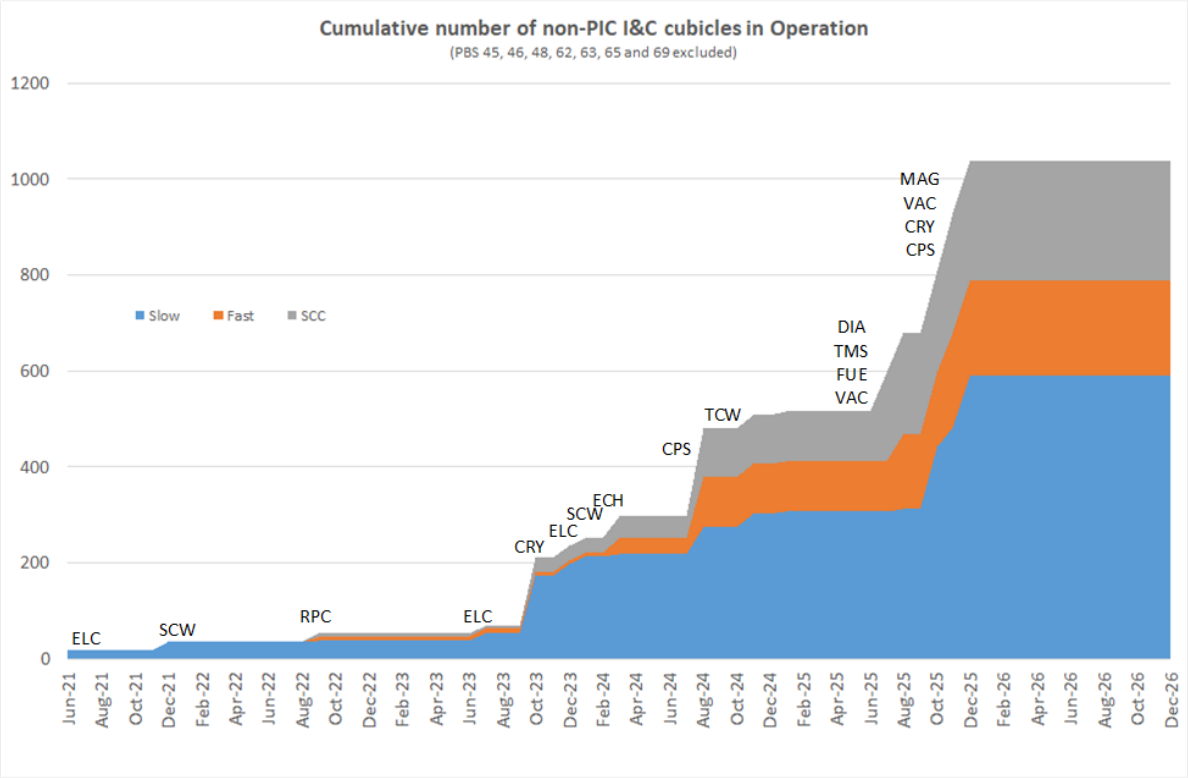

Figure 1: Number of I&C cubicles in operation in function of time

Estimation of the total number of slow controller (PLC) component spares consumed / needed in stock during the contract period: 4140.
Of which critical components: 159.

Estimation of the total number of fast controller (IPC and I/O) components during the contract period: 1400.
Of which critical components: 55.

Estimation of the total number of Signal Conditioning (SCC) component spares consumed / needed in stock during the contract period: 2821.
Of which critical components: 790.