外部委託業者の募集

References: IO/26/OT/70001457/VML

"ECPS Integration and Circuit Commissioning "

（容器外コイル電源 ECPS と回路動作最終確認）

IO 締め切り 2026 年 4 月 14 日(火)

〇はじめに

本事前情報通知（PIN）は、作業契約の入札授与および実行につながる公開入札調達プロセスの最初のステップです。

この文書の目的は、作業範囲および入札プロセスに関する技術的内容の基本的な概要を提供することです。

〇背景

ITER は平和利用の核融合発電の科学的および技術的な実現可能性の実証を目的とした、国際共同研究開発プロジェクトです。ITER 機構の 7 つのメンバーは、;欧州連合（EURATOM が代表）、日本、中華人民共和国、インド、大韓民国、ロシア連邦、および米国です。

ITER の敷地はフランス南東部のブーシュデュローヌ地区にあり、ITER 本社（HQ）もあるフランス CEA サン・ポール・レ・デュランス に近いところに位置しています。詳細については、ITER のウェブサイト http://www.iter.org を参照して下さい。

〇作業範囲

本調達の範囲は、容器外コイル電源ECPSシステムのエンジニアリング解析、電源回路のシミュレーションとリルタイムのプラとフォーム検証、および据え付けと回路動作の最終確認の統合検証を行うことです。

供給範囲の詳細については、添付の技術仕様書（参照：FN8GDZv1.2）に記載されています。

〇調達プロセスと目的

目的は、競争入札プロセスを通じて供給契約を落札することです。

この入札のために選択された調達手続きは公開入札手続きと呼ばれます。

オープン入札手順は、次の 4 つの主要なステップで構成されています。

- ステップ 1-事前情報通知（PIN）

  事前情報通知は公開入札プロセスの第一段階です。IO は、関心のある候補企業に対し、以下の概略日程に示された期日までに担当調達担当官に添付の関心表明フォームで以下の情報を提出し、競争プロセスへの関心を示すよう正式に要請します。

  特に注意:

  関心のある候補企業は、IO Ariba の電子調達ツール 「IPROC」 に登録してください（まだ登録していない場合）。手順については、

https://www.iter.org/fr/proc/overview
を参照してください。

Ariba (IPROC) に登録する際には、お取引先様に最低１名の担当者の登録をお願いします。この連絡担当者は、提案依頼書の発行通知を受け取り、必要と思われる場合は入札書類を同僚に転送することができます。

- ステップ 2-入札への招待
  関心表明提出後、提案依頼書（RFP）を 「IPROC」 に掲載します。この段階では、担当の調達担当者に関心を示し、かつ IPROC に登録している関心のある候補企業は、RFP が公表された旨の通知を受けることができます。その後、RFP に詳述されている入札説明書に従って提案書を作成し、提出します。

  このツールに登録されている企業のみが入札に招待されます。

- ステップ 3-入札評価プロセス
  入札者の提案は、IO の公平な評価委員会によって評価されます。入札者は、技術的範囲に沿って、かつ、RFP に記載された特定の基準に従って作業を実施するために、技術的遵守を証明する詳細を提供しなければなりません。

- ステップ 4-落札
  認定は、公開されている RFP に記載されている、コストに見合った技術評価 60%、価格評価 40%の配点で、RFP に基づき最も費用対効果の高い 1 社に供給契約が付与されます。

〇概略日程

概略日程は以下の通りです：

マイルストーン	暫定日程
事前指示書（PIN）の発行	本文書
関心表明フォームの提出	2026 年 4 月 14 日
I-Proc での提案依頼書の要求	2026 年 4 月 16 日
入札会議（Teams にて）	適用外
入札提出	2026 年 5 月 28 日
契約授与	2026 年 6 月
契約調印	2026 年 6 月

〇契約期間と実行

ITER機構は2026年の6月Eごろに供給契約を授与する予定です。完成までの期間は3年の予定です。

〇候補

参加は、個人またはグループ/コンソーシアムに参加するすべての法人に開放されます。法人とは、法的権利及び義務を有し、ITER 加盟国内に設立された個人、企業又は機構をいいます。ITER 加盟国は欧州連合(EURATOM メンバー)、日本、中華人民共和国、インド共和国、大韓民国、ロシア連邦、アメリカ合衆国です。

法人は、単独で、またはコンソーシアムパートナーとして、同じ契約の複数の申請または入札に参加することはできません。共同事業体は、恒久的な、法的に確立されたグループ又は特定の入札手続のために非公式に構成されたグループとすることができます。

コンソーシアムのすべての構成員(すなわち、リーダーと他のすべてのメンバー)は、ITER 機構に対して連帯して責任を負います。

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どのコンソーシアムメンバーも IPROC に登録する必要があります。

【※　詳しくは添付の英語版技術仕様書「**ECPS Integration and Circuit Commissioning**」をご参照ください。**】**

ITER 公式ウェブ　http://www.iter.org/org/team/adm/proc/overview からもアクセスが可能です。

「核融合エネルギー研究開発部門」の HP：　http://www.fusion.qst.go.jp/ITER/index.html
では ITER 機構からの各募集（IO 職員募集、IO 外部委託、IO エキスパート募集）を逐次更新しています。ぜひご確認ください。

イーター国際核融合エネルギー機構からの外部委託
に関心ある企業及び研究機関の募集について

＜ITER 機構から参加極へのレター＞

以下に、外部委託の概要と要求事項が示されています。参加極には、提案された業務に要求される能力を有し、入札すべきと考える企業及び研究機関の連絡先の情報を ITER 機構へ伝えることが求められています。このため、本研究・業務に関心を持たれる企業及び研究機関におかれましては、応募書類の提出要領にしたがって連絡先情報をご提出下さい。

china eu india japan korea russia usa
Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

PRIOR INDICATIVE NOTICE (PIN)

OPEN TENDER SUMMARY

IO/26/OT/70001457/VML

for

ECPS Integration and Circuit Commissioning

Prior Indicative Notice annexes:
- Annex I: Expression of Interest Form
- Annex II: Technical Summary FN8GDZ v1.2

IO Contact Persons: Virginie.Michel@iter.org and Andrew.Brown@iter.org

Abstract

The purpose of this summary is to provide prior notification of the ITER Organization's intention to launch a competitive Open Tender process in the coming weeks. This summary provides some basic information about the ITER Organization, the technical scope for this tender, and details of the ECPS Integration and Circuit Commissioning.

1 Introduction

This Prior Indicative Notice (PIN) is the first step of an Open Tender Procurement Process leading to the award and execution of a Framework Contract.

2 Background

The ITER project is an international research and development project jointly funded by its seven Members being, the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA. ITER is being constructed in Europe at St. Paul–Lez-Durance in southern France, which is also the location of the headquarters (HQ) of the ITER Organization (IO).

For a complete description of the ITER Project, covering both organizational and technical aspects of the Project, visit www.iter.org.

3 Scope of Supply

The scope of this procurement is to perform integration commissioning of Ex-Vessel Coil Power Supply (ECPS) system, engineering analysis and simulations of power supply circuits and Realtime platform verification, and preparation for implementation and circuit commissioning.

For the scope of services, please see the attached Technical Specifications ref. FN8GDZ v1.2

4 Procurement Process & Objective

The objective is to award a Supply Contract through a competitive bidding process.

The Procurement Procedure selected for this Tender is a so-called **Open Tender** procedure.

The Open Tender procedure is comprised of the following four main steps:

- Step 1- Prior Information Notice (PIN)

  The PIN is the first stage of the Open Tender process. The IO formally invites interested Suppliers to indicate their interest in the competitive process by returning to the Procurement Officer in charge the attached "Expression of Interest and PIN Acknowledgement" (Annex I) by the date indicated in the procurement timetable below.

  Special attention:

  Interested tenderers are kindly requested to register in the IO Ariba e-procurement tool called "I-PROC". You can find all links to proceed along with instruction going to: https://www.iter.org/fr/proc/overview.

  When registering in Ariba (I-PROC), suppliers are kindly requested to nominate at least one contact person. This contact person will be receiving the notification of publication of the Request for Proposal and will then be able to forward the Tender documents to colleagues if deemed necessary.

- Step 2 - Invitation to Tender – Request for Proposal (RFP)

The Request for Proposals (RFP) will be published on our digital tool "Iproc" after the submission of Expression of Interest. This stage allows interested bidders who have indicated their interest to the Procurement Officers in charge AND who have registered in IPROC to receive the notification that the RFP is published. They will then prepare and submit their proposals in accordance with the tender instructions detailed in the RFP.

Only companies registered in this tool will be invited to the tender.

- Step 3 – Tender Evaluation Process

Tenderers' proposals will be evaluated by an impartial evaluation committee of the IO. Tenderers must provide details demonstrating their technical compliance to perform the works in line with the technical scope and in accordance with the particular criteria listed in the RFP.

- Step 4 – Contract Award

One Supply Contract will be awarded on the basis of Best Value for Money with a sharing of 60% for the technical offer and 40% for the financial offer according to the evaluation criteria and methodology described in the RFP.

Procurement Timetable

The tentative timetable is as follows:

Milestone	Date
Publication of the Prior Indicative Notice (PIN)	This publication
Submission of expression of interest form	14 April 2026
Request for Proposal launched on I-PROC	16 April 2026
Tenderers Conference (via teams)	Not applicable
Tender Submission	28 May 2026
Contract Award	June 2026
Contract Signature	June 2026

5 Quality Assurance Requirements

The Candidate shall have ISO 9001 or shall submit to the IO for approval its "Quality Assurance Program'' in the Tender Submission for the IO's review and acceptance.

6 Contract Duration and Execution

The IO shall award the Contract around June 2026. The Contract duration will be 3 years.

7 Candidature

Participation is open to all legal entities participating either individually or in a grouping/consortium. A legal entity is an individual, company, or organization that has legal rights and obligations and is established within an ITER Member State, being: the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA.

Legal entities cannot participate individually or as a consortium partner in more than one application or Tender of the same contract. A consortium may be a permanent, legally established grouping, or a grouping which has been constituted informally for a specific Tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the IO.

In order for a consortium to be acceptable, the individual legal entities included therein shall have nominated a leader with authority to bind each member of the consortium, and this leader shall be authorised to incur liabilities and receive instructions for and on behalf of each member of the consortium.

It is expected that the designated consortium leader will explain the composition of the consortium members in its offer. Following this, the Candidate's composition must not be modified without notifying the IO of any changes. Evidence of any such authorisation shall be submitted to the IO in due course in the form of a power of attorney signed by legally authorised signatories of all the consortium members.

All consortium members shall be registered in I-PROC.

8 Sub-contracting Rules

Subcontracting is limited to 40 % of the contract value and up to level 2.
All sub-contractors who will be taken on by the Contractor shall be declared with the Tender submission in I-PROC. Each sub-contractor will be required to complete and sign forms including technical and administrative information which shall be submitted to the IO by the Tenderer as part of its Tender.

All declared sub-contractors must be established within an ITER Member State in order to participate.

The IO reserves the right to approve (or disapprove) any sub-contractor which was not notified in the Tender and request a copy of the sub-contracting agreement between the Tenderer and its subcontractor(s). Rules on sub-contracting are indicated in the RFP itself.

IDM UID
FN8GDZ
VERSION CREATED ON / VERSION / STATUS
25 Mar 2026 / 1.2 / Approved
EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical Specification for ECPS Integration and Circuit Commissioning

This Technical Specification is prepared to define the scope of framework contract for the integration commissioning of Ex-Vessel Coil Power Supply (ECPS) system, engineering analysis and simulations of power supply circuits and Realtime platform verification, and preparation for implementation and circuit commissioning.

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1 Preamble

This Technical Specification is prepared to define the scope of framework contract for engineering services and associated supply of hardware related to the integration and commissioning of Ex-Vessel Coil Power Supply (ECPS) system. The scope includes engineering analysis and simulations of power supply circuits and Realtime platform verification, and preparation for implementation and circuit commissioning.

It also includes supply of the necessary components identified through the real-time platform validation, including delivery and testing.

This document is to be read in combination with the General Management Specification for Service and Supply (GM3S) – Ref [1] that constitutes a full part of the technical requirements. In case of conflict, the content of the Technical Specification supersedes the content of Ref [1].

2 Purpose

The large-scale ECPS system receives AC power from 400 kV High Voltage grid, through PPEN transformers and supplies controlled DC current up to 68 kA to the DL (for testing) or magnets (for plasma control). It includes the RPC & HF system, AC/DC power converters, SNUs, FDUs, PMS/MSs, complex DC busbar and earthing circuits, and the associated I&C, cooling water, pneumatic systems, etc. The complex operational strategies (which are not common in other industrial applications) such as 2-Quadrant, 4-Quadrant and sequential control operation strategies are applied to the converter circuits with associated current closed loop or voltage open-loop control will be tested to guarantee the functionalities of plasma operation. The dynamic reactive power consumed by the converter loads - supplied by the RPC & HF systems together with the grid to maintain system stability - must be evaluated through a complete system-level integration analysis.

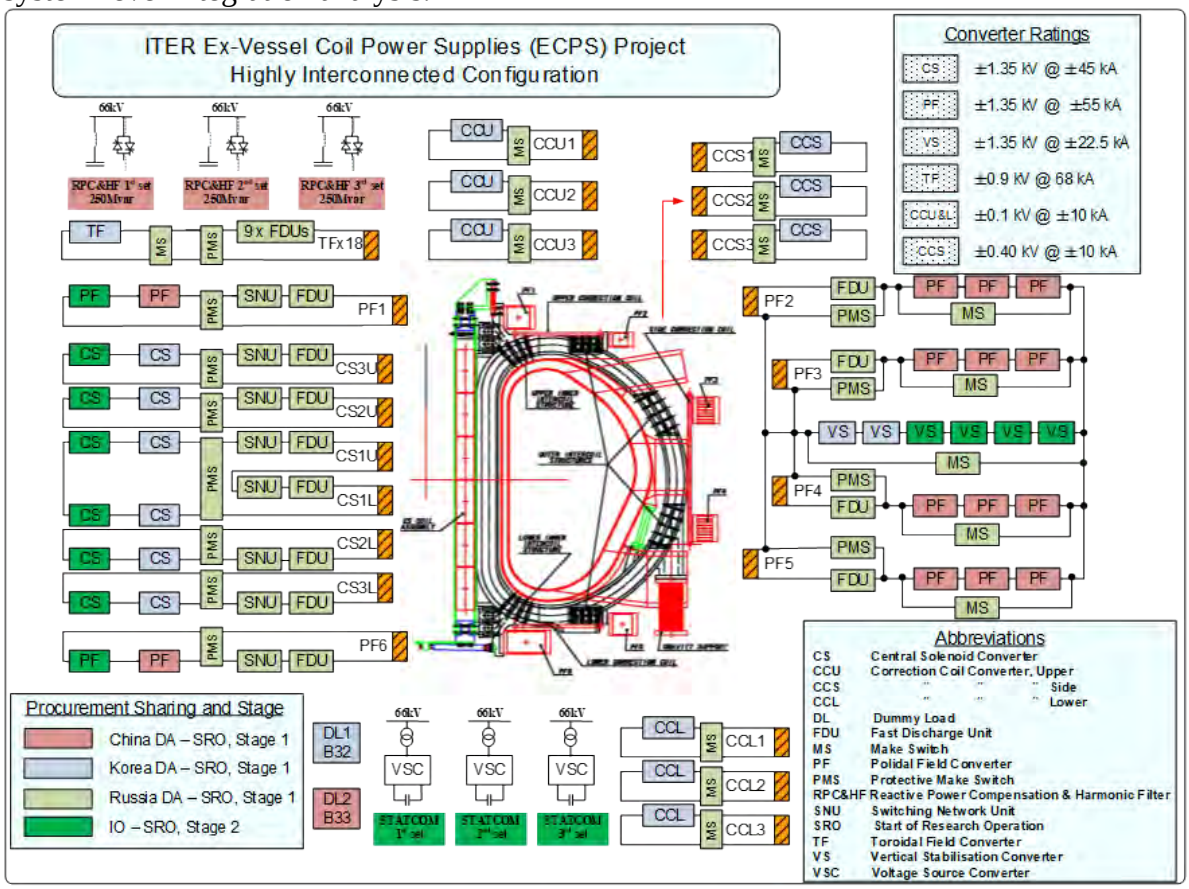

Figure 1: Ex Vessel Coil Power Supply System Overview

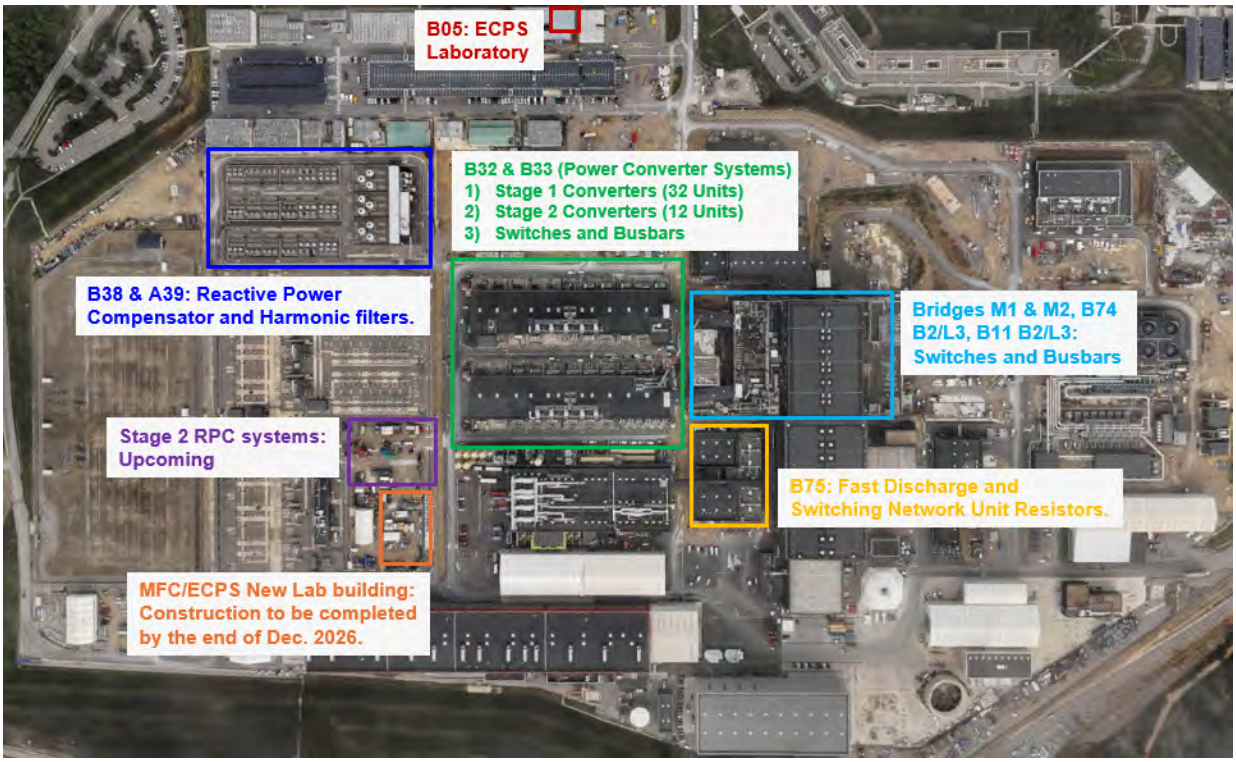

Figure 2: Geographical Scope Area

The purpose of this "Ex-Vessel Coil Power Supply integration and circuit commissioning" technical specification is to define the requirements of a framework contract for the provision of work to the ITER Organization regarding on-site engineering activities and associated supply of hardware related to ECPS Systems, simulations and testing using the real-time platform, structures and components, including upgrades, spare assemblies and replacement hardware necessary to support integration and circuit commissioning.

This technical specification outlines the scope and objectives of the services to be provided by the Contractor in support of the ITER Project. The Contractor is engaged to assist the Ex-Vessel Coil Power Supplies Project (ECPS) in executing key activities aligned with the technical and operational requirements of the project.

The Contractor shall contribute to support commissioning preparation and assistance in commissioning activities and facilitate interface coordination with all the RFDA/ CNDA/ KODA and the construction teams to ensure constructability. Additionally, the Contractor will participate in partial surveillance and control of the main installation and manufacturing contracts, with a particular emphasis on reviewing site drawings and designs.

All deliverables and activities under this Contract will be reported to the Ex-Vessel Coil Power Supplies Project team, ensuring alignment with ITER's quality and performance standards.

3 Acronyms & Definitions

3.1 Acronyms

The following acronyms are the main one relevant to this document.

Abbreviation	Description
CRO	Contract Responsible Officer
GM3S	General Management Specification for Service and Supply

Abbreviation	Description
IO	ITER Organization
PRO	Procurement Responsible Officer
ECPS	Ex-Vessel Coil Power Supplies Project
ESP	Electrical Systems Program
KoM	Kick off Meeting
PBS	Plant Breakdown Structure
TO	Task Order
TRO	Technical Responsible Officer
IDM	ITER Document Management System
TF	Toroidal Field
PF	Poloidal Field
CS	Central Solenoid
CC	Correction Coil
DL	Dummy Load
VS1	Vertical Stabilisation circuit1
RPC&HF	Reactive Power Compensation & Harmonic Filter
SLD	Single Line Diagram
CBD	Cable Block Diagram
DC	Direct Current
GDU	Gate Distribution Unit
I&C	Instrumentation and Control
SRO	Start of Research Operation
PPEN	Power Pulsed Electrical Network
EDH	Electrical Design Handbook
ITER	International Thermonuclear Experimental Reactor
PRO	Procurement Responsible Officer
DT	Deuterium-Tritium
PCDH	Plant Control Design Handbook
SNU	Switching Network Unit
FDU	Fast Discharging Unit
SNR	Switching Network Unit Resistor
FDR	Fast Discharge Unit Resistor
HV	High Voltage
LV	Low Voltage
DL	Dummy Load
ICC	Integrated Component Commissioning
ICD	Interface Control Document
IS	Interface Sheet
OCTC	Off Circuit Tap Changer

Abbreviation	Description
LCC	Local Conventional Controller
LIC	Local Interlock Controller
FLIC	Fast Local Interlock Controller
ECPS	Ex-Vessel Coil Power Supply
CCR	Circuit Controller
MRC	Master Controller
RT Platform	Real-Time Platform
CVOS	Converter Operating System
EMC	Electro Magnetic Compatibility
EMT	Electro Magnetic Transients
HV	High Voltage
IDM	Iter Document Management
ISO	International Organization for Standardization
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
SDDD	System Design Description Document

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

3.2 Definitions

Please note definition of the Contractor, although defined in Ref [1] 2.1 is duplicated here as the term is largely used within this document.

Contractor: shall mean an economic operator who have signed the Contract in which this document is referenced.

4 Applicable Documents & Codes and standards

4.1 Applicable Documents

This is the responsibility of the Contractor to identify and request for any documents that would not have been transmitted by IO, including the below list of reference documents.

This Technical Specification takes precedence over the referenced documents. In case of conflicting information, this is the responsibility of the Contractor to seek clarification from IO.

Upon notification of any revision of the applicable document transmitted officially to the Contractor, the Contractor shall advise within four weeks of any impact on the execution of the contract. Without any response after this period, no impact will be considered.

Ref	Title	IDM Doc ID
1	General Management Specification for Service and Supply (GM3S)	82MXQK
2	ITER Abbreviations	2MU6W5
3	Plant Control Design Handbook	27LH2V
4	EDH Part 1: Introduction	2F7HD2
5	EDH Part 2: Terminology & Acronyms	2E8QVA
6	EDH Part 3: Codes & Standards	2E8DLM

Ref	Title	IDM Doc ID
7	EDH Part 4: Electromagnetic Compatibility	4B523E
8	EDH Part 5: Earthing and Lightning Protection	4B7ZDG
9	SRD-41 (Coil Power Supply and Distribution)	28B6XQ
10	ITER Quality Assurance Program	22K4QX
11	ITER Procurement Quality Requirements	22MFG4
12	Requirements for Producing a Quality Plan	22MFMW
13	ITER Site Master Plan	27X5FM 37UASM
14	Single Line Diagram - PPEN	35RMBK
15	Interface Sheet –PPEN and CPS	5YBAQR
16	One Line Diagram – PF Converter	32N8HP
17	RPC & HF Busbars 1 One-Line Diagram	3ZSG7W
18	Interface Sheet – SSEN	LDDPFL 79UDUR
19	CPS Control Functions for CPS HIL Tests	4T89ZN
20	Commissioning Management Procedure	VH9352
21	Maintenance Management Procedure	3HZ4CU
22	ITER Policy on Safety Security and Environment Protection Management	43UJN7
23	SRD-41 (Coil Power Supply and Distribution) from DOORS	28B6XQ
24	System Design Description Document of RPC&HF	PNQBEC
25	SDDD for TF and CS AC/DC Converters	NVMPG9
26	SDDD for PF Converter	Q2J2EL
27	SDDD for VS and CC AC/DC Converters	HEJFM9
28	SDDD for DC Busbar and Switches	3WVGK3

4.2 Applicable Codes and Standards

This is the responsibility of the Contractor to procure the relevant Codes and Standards applicable to that scope of work.

Ref	Title
CS1	IEC 62103 Electronic equipment for use in power installations
CS2	IEC 61000: Electromagnetic compatibility
CS3	NF C 13 200: High voltage electrical installations
CS4	NF C 15 100: Low-voltage electrical installations
CS5	NF C 18 510: Operations on electrical network and installations and in an electrical environment
CS6	IEC 61936 Installation
CS7	IEC 60664 LV Insulation coordination

Ref	Title
CS8	IEC 60076 Power transformers
CS9	IEC 60909 Short-circuits currents in three-phase AC systems
CS10	IEC 60076: Power transformers
CS11	IEC 61071 Capacitors for power electronics
CS12	IEEE Std. 1031 IEEE Guide for the Functional Specification of Transmission Static Var Compensators
CS13	IEC 60871-1 Shunt capacitors for AC power systems having a rated voltage above 1000V– Part 1: General
CS14	IEEE Std. 519-2022 IEEE Standard for Harmonic Control in Electric Power Systems
CS15	IEC 62927: Voltage sourced converter (VSC) valves for static synchronous compensator (STATCOM)
CS16	IEC 60071 Insulation coordination

5 Scope of Work

This section defines the complete scope of activities associated with the ECPS system, it includes the system integration design (Physical and functional integration design), system level engineering analysis and simulations, Circuit Level Commissioning preparations (CLC) with DL. The system integration with physical and functional verification (control & protection) of the circuits including Power Converter Supply Systems, Switching Networks, Fast Discharge Units and DC busbars systems in conjunction with the RPC & HF system, in accordance with the relevant Interface Control Documents (ICDs) and System Engineering Guidelines.

In addition to engineering services, the contract includes the procurement, delivery and installation of selected ECPS-related hardware (such as sensors, interface modules, prototype boards, spare or upgraded converter sub-assemblies and associated civil/mechanical modifications) as identified by the analysis and real-time platform validation activities.

The below figure provides an overview of the engineering workflow.

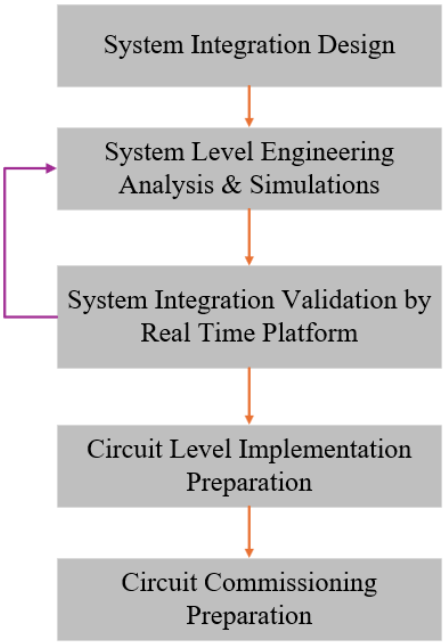

Figure 3: Overall Engineering Workflow for ECPS System Integration and Circuit Commissioning

The overall workflow begins with the system integration design of coil power supply system, continues with the system level engineering analysis & simulations, and system integration validation by Realtime platform, and preparation activities of circuit level implementation and commissioning.

The scope therefore includes the preparation of integrated commissioning of power converter circuits in Building B32, B33, and the laboratory; the simulation (offline & online) based verification and validation of control and protections for converters with DL and the RPC & HF systems; the integrated circuit level analysis of power conversion using detailed modelling of components.

5.1 Scope of Work #1

5.1.1 System Level Integration

This stage covers the physical interfacing design of the system, engineering analysis and circuit level functional design verification of ECPS systems in accordance with ITER engineering, protection, safety, and configuration-management requirements.

5.1.2 System Level Engineering Analysis and Simulations

This stage focuses on the detailed engineering analysis and simulations-based verification of the ECPS circuits, control and protection operations, ensuring their correct behaviour across all the operating modes, abnormal and fault scenarios in accordance with ITER system engineering.

It includes the verification of converter controller operation and the validation of protection functions for the B32/B33 converter systems using offline simulations, as well as ensuring coordinated operation with the RPC&HF systems. Control-loop stability analyses are performed to validate the robustness of current (four quadrant operation) and dynamic voltage operation across the different converter families in ECPS system.

5.1.3 System Integration Validation by Real Time Platform

This stage covers the functional verification and validation of the integrated circuits using Realtime Platform (RT-LAB). This stage verifies that all ECPS circuits operate correctly when functioning as an integrated power conversion system, with the converters and RPC&HF systems, and associated equipment connected to DL. The objective is to confirm that the integrated behaviour matches the expected performance derived from prior engineering analyses and simulations, and that the system interacts correctly under real-time operating conditions.

It includes upgrading the necessary components to achieve circuit-level commissioning readiness, as well as the procurement and preparation of any hardware required to support the analysis (Section 5.1.2) outcomes - such as sensors, interface modules, prototype boards, or converter subsystem components - and their installation, and testing activities using the RT Simulator or bench setups to confirm the analytical results prior to system-level validation. It also covers verification tasks, civil works such as foundations and routing, and the replacement of required components utilizing the RT platform.

All equipment installed in the laboratory shall be connected using hardwired I&C signal interfaces. Standard ITER-compliant interfaces shall be implemented to ensure the system is fully ready for real-time testing and integration of circuits.

Based on the results of this real-time validation, the Contractor shall propose to IO the necessary updates to control, protection thresholds, start-up sequencing tables, interfaces and interlock matrices. Provide technical feedback to the on-site commissioning teams during real-time validation and early energization tests.

This stage also includes the identification and assessment of potential risks related to control interactions, modelling uncertainties, or interface mismatches with upstream/downstream power and control systems. Resulting recommendations for corrective actions, parameter adjustments, or design refinements are documented and submitted to IO for approval.

5.1.4 Circuit Level Implementation Preparation

In accordance with Section 5.1.3, the Contractor shall prepare and submit a detailed implementation preparation plan for the system integration, ensuring that the plan is fully aligned with and based upon the integration design inputs specified in Section 5.1.1.

This stage establishes the preparation for the implementation of each ECPS circuit by validating the behaviour of the converter circuits supplying the DL coil under high-voltage test conditions. The implementation plan combines the outcomes of system-level analysis, real-time validation activities, and installation readiness checks to ensure each converter–circuit operates safely and meets ITER functional requirements.

The activities within this stage are divided into two parts as explained below:

5.1.4.1 I&C System Implementation preparation

According to IO instructions, the contractor shall prepare and submit the circuit implementation plan:

- Circuit energization test plan for each converter circuit with the DL configuration, including current ramping, voltage dynamic verification.
- Verification test plan for the control interactions, interlock dependencies, and protection sequences perform correctly for each converter - circuit.
- Integration test plan for the PF2-5VS1 converter circuits to ensure coordinated operation, balanced current distribution, and stable circuit performance verification.

5.1.4.2 Site Civil and Mechanical Work

This part describes the physical upgrades, alignments, and installation adjustments needed to ensure that the converter circuits supplying to DL including with RPC & HF system can be safely operated during real-time validation and integrated commissioning.

The Contractor shall:

- Inspect all DC busbars, flexible links, and mechanical supports associated with the converter - magnet circuits to determine readiness for real-time operation.
- Perform busbar realignment to correct mechanical tolerances, eliminate stress accumulations, and ensure uniform current distribution.
- Adjust or replace flexible links to accommodate the updated physical routing and electrical loading expected during integrated operation.
- Perform structural analysis in Staad/ Ansys and install additional mechanical supports, reinforcement hardware, or bracket upgrades where needed to ensure compliance with ITER mechanical integrity and safety criteria.

- Extend or modify cable trays, grounding provisions, and local support infrastructure to route new I&C cables, diagnostic wiring, or power leads required for real-time testing.
- Implement site upgrades required for the installation and operation of auxiliary real-time hardware such as sensors, interface modules, or temporary commissioning racks.
- Perform verification of all mechanical and civil upgrades and document “as-built” configurations with updated layout drawings, alignment measurements, and red-line markups.
- Procurement and installation of new hardware after validation in the laboratory using the RT platform.

These activities ensure that the ECPS physical installation is robust, safe, and fully prepared for the integrated real-time validation and subsequent system commissioning.

5.1.5 Circuit Commissioning Preparation

To prepare for the circuit commissioning of each circuit, the implementation plan defined in section 5.1.4 are used in this stage, to develop the circuit commissioning preparation for IO coordination and execution.

This stage represents the preparation phase for commissioning the ECPS circuit. The purpose is to ensure that all technical, analytical, procedural, and safety prerequisites are met so that commissioning execution can later proceed safely and in full compliance with ITER requirements. Preparation consolidates the results of installation verification, system-level analysis, simulation outputs, and circuit-level planning activities.

5.1.6 Interface requirements

The ECPS system interacts with multiple plant systems, facility infrastructures, and I&C networks. To ensure safe and reliable operation, all interfaces shall be periodically reviewed, validated, and maintained in accordance with ITER Interface Sheets (IS), Interface Control Documents (ICDs), and relevant system engineering guidelines.

5.1.7 Mechanical Requirements

The Contractor shall ensure that all mechanical aspects of the ECPS equipment, busbars, supports, and auxiliary structures meet ITER mechanical integrity, installation tolerances, and safety criteria.

Mechanical requirements include, but are not limited to:

- Verifying the correct installation, alignment, and physical integration of DC busbars, flexible links, converter terminals, and mechanical support structures in B32, B33, and laboratory areas.
- Ensuring compliance with ITER mechanical installation procedures, clearance requirements, torque specifications, and support-loading limits.
- Confirming that all mechanical interfaces with other plant systems - including RPC & HF system assemblies, SNUs, FDUs, cooling systems, and building structures - adhere to the applicable Interface Sheets (IS) and Interface Control Documents (ICDs).
- Performing inspections to ensure that vibration levels, thermal expansion allowances, and mechanical stresses remain within allowable limits during energization and operational transients.

- Installing or upgrading any required brackets, frames, seismic supports, and reinforcement hardware needed to ensure long-term stability of converter–magnet circuit paths.
- Documenting all mechanical modifications, red-line markups, as-built conditions, and verification records and submitting them to IO.

All mechanical installations shall comply with ITER safety, handling, and access requirements and shall be ready to support circuit-level implementation and commissioning activities.

5.1.8 Electrical Requirements

The Contractor shall ensure that all electrical installations, wiring, protection systems, and power interfaces of the ECPS equipment comply with ITER safety rules, electrical design standards, and system integration requirements.

The Contractor shall:

- Verify polarity, continuity, insulation resistance, grounding integrity, and correct connection of all DC busbars, converter terminals, measurement circuits, auxiliary supplies, and interface cables.
- Ensure compliance with the latest revisions of applicable IS, ICDs, electrical drawings, and ECPS design documentation.
- Validate the installation and correct parameterization of protection relays, circuit breakers, interlock devices, sensors, and power electronic components associated with RPC & HF, SNUs, FDUs, and converter systems.
- Confirm that all electrical circuits are properly rated for expected operational currents, fault levels, thermal loads, and transient conditions encountered during converter and magnet energization.
- Perform functional tests of protection and interlock circuits, including fault discrimination, selectivity checks, and coordination with converter controller protection functions.
- Ensure that cable routing, shielding, grounding methods, and separation distances comply with ITER electromagnetic compatibility (EMC) expectations and I&C noise-sensitivity constraints.
- Provide updated electrical diagrams, test records, parameter settings, and as-built documentation for IO approval.

All electrical installations shall be proven safe, fully functional, and ready for integrated operation under the subsequent commissioning stages.

5.1.9 Software requirements

The Contractor shall possess the necessary expertise and tools to perform modelling, simulation, control development, parameter tuning, and documentation activities required for ECPS integration and commissioning.

Minimum software requirements include:

- **Simulation and Modelling Tools:** Proficiency in MATLAB Phasor/ Simulink, Simscape and other tools necessary for converter modelling, power system analysis, control-loop validation, protections, commutation failure verification, thermal studies, and transient behaviour simulations.

Proficiency in EMT simulations necessary for modelling power electronic converters, analysing transients, validating control interactions, studying switching events, and performing detailed time-domain power system simulations.

- **Finite Element and Structural Analysis Tools:** Capability to use ANSYS, STAAD.Pro or equivalent software for mechanical structure assessments where required for busbar supports, frames, or auxiliary components.
- **Document and Configuration Management Tools:** Ability to use MS Office Suite (Word, Excel, PowerPoint), MS Teams, and Adobe Acrobat for preparation of engineering reports, testing records, configuration files, drawings, and procedural documentation.
- **Scheduling and Project Coordination Tools:** Capability to use Primavera P6, Microsoft Project, or equivalent for preparing schedules, coordinating commissioning activities, and reporting progress to IO.
- **CODAC and I&C Interface Tools (where applicable):** Familiarity with EPICS-based tools, configuration editors, signal mapping frameworks, and data-exchange tools required for CODAC Plant System I&C integration.

The Contractor shall ensure that all simulation files, configuration datasets, source files, and documentation produced using these software tools are version-controlled, traceable, and made available to IO upon request.

5.1.10 Material, welding and fabrication requirements

The Contractor shall ensure that all materials, welding activities, and fabrication processes used for ECPS-related components comply with ITER technical requirements, applicable codes and standards, and the quality expectations defined in GM3S and relevant project documentation.

Although the ECPS scope under this contract does not typically involve large-scale fabrication of pressure-bearing or nuclear-class components, certain mechanical structures, such as DC busbar supports, reinforcement brackets, frames, and auxiliary hardware - may require limited fabrication or modification. All such activities shall meet the requirements outlined below.

Material Requirements:

- All materials used for supports; brackets, adaptors, and other mechanical parts shall comply with ITER-approved material specifications and shall be traceable through certificates of conformity.
- Conductors, flexible links, and busbar components shall meet the appropriate electrical and thermal ratings, mechanical strength, and conductivity requirements specified in relevant design documents and ICDs.
- Corrosion protection measures (galvanization, painting, or equivalent treatment) shall be applied where required for environmental exposure or long-term operation.

Welding Requirements:

- Any welding activities (if required for support upgrades, reinforcement structures, or local modifications) shall be performed in accordance with qualified welding procedures and by certified welders approved according to relevant standards (e.g., ISO/EN norms).
- Welds shall meet the design requirements for mechanical strength, dimensional tolerance, and surface finish, and shall undergo inspection or non-destructive testing where mandated by ITER quality or safety rules.
- All welding activities shall be documented, and weld maps, procedure qualification records (PQRs), and welder qualification records shall be submitted to IO when applicable.

Fabrication and Assembly Requirements:

- Fabricated components - including support frames, mounting plates, cable-tray extensions, and auxiliary hardware - shall meet the dimensional tolerances and installation constraints defined by ECPS engineering teams and building integration requirements.
- All fabricated items shall be inspected prior to installation to verify conformity with drawings, tolerances, and material requirements.
- Where fabrication relates to electrical paths (e.g., busbar extensions, terminal adaptors, or clamps), assemblies shall be assessed for correct contact surface geometry, grounding performance, thermal expansion compatibility, and mechanical robustness.
- Any deviations identified during fabrication or installation shall be recorded and submitted to IO for approval through the appropriate deviation management processes.

Documentation and Traceability:

- The Contractor shall maintain full traceability of materials, welding procedures, and fabrication processes.
- All relevant certificates, inspection reports, as-built drawings, fabrication logs, and conformity documents shall be compiled and provided to IO as part of the deliverable documentation package.

All material, welding, and fabrication activities shall be completed in strict compliance with ITER quality, safety, and engineering requirements, ensuring reliable integration into ECPS systems and readiness for commissioning.

5.1.11 Spare Parts

The ECPS systems consist of power electronic converters, protection assemblies, measurement chains, I&C interfaces, and mechanical connection hardware that may require replacement during installation, testing, or commissioning. Although large-scale spare part delivery is not expected under this Contract, the Contractor shall ensure availability and traceability of critical components necessary to maintain continuity of engineering and commissioning activities.

The Contractor shall:

- Identify and maintain a list of critical spare parts required to support system-level testing, circuit implementation, and commissioning activities. These may include driver boards, control interface boards, sensors, protection modules, converter sub-assemblies, fuses, contactors, auxiliary relays, measurement components, and connector hardware relevant to ECPS systems.
- Ensure that all spare parts used or proposed for use are fully compatible with the original equipment, conform to ITER technical specifications, and comply with the applicable Interface Control Documents (ICDs) and configuration baselines.
- Provide certificates of conformity, traceability records, and revision status for all spare parts installed or supplied during work.
- Ensure that any replacement of parts during analysis, real-time validation, or commissioning is properly documented, including the reason for replacement, test results associated with the part, and the updated configuration records.
- Support IO with the identification of obsolescence or procurement risks for components that may affect long-term ECPS system availability and provide recommendations for mitigating actions when required.
- Return any unused IO-provided components (if applicable) in proper condition and provide inventory updates at the end of each Task Order.

All spare part usage, traceability, and configuration changes shall be recorded and submitted to IO as part of the engineering and commissioning documentation package.

5.1.12 Packing, preservation & shipping

The Contractor shall ensure that all equipment, components, tools, and materials supplied or transported under this Contract are packed, preserved, and shipped in accordance with ITER Organization requirements, applicable international standards, and the handling constraints associated with ECPS systems. Although the majority of work under this Contract is performed on-site, certain spare parts, prototype assemblies, or replacement components may require transport to or from the ITER site, laboratories, or supplier facilities. The following requirements shall apply.

Packing Requirements:

- All components shall be packed in a manner that prevents mechanical damage, moisture ingress, corrosion, contamination, or electrostatic discharge during handling and transport.
- Sensitive electrical and electronic components—such as controller boards, sensors, I/O modules, and protection devices - shall be packed using ESD-safe materials, antistatic bags, foam inserts, or shock-absorbing packaging as appropriate.
- Heavy or bulky items (e.g., flexible links, busbar sections, mechanical supports) shall be secured using wooden crates, reinforced containers, or customized packing frames to ensure safe handling using lifting equipment.
- All packaging shall be clearly labelled with the component identification, handling instructions, orientation markers, and any applicable safety warnings.

Preservation Requirements:

- All metallic components that may be stored temporarily on site (e.g., busbar assemblies, brackets, fasteners, grounding hardware) shall be treated with anti-corrosion protection where necessary.
- Items shall be stored in a clean, dry, and controlled environment to prevent dust accumulation, oxidation, or degradation of insulation or protective coatings.
- Storage conditions shall comply with ITER requirements for humidity, temperature, and environmental exposure for electrical and mechanical components.
- For long-term storage, the Contractor shall ensure that equipment is periodically inspected and re-preserved if required.

Shipping Requirements:

- The Contractor shall ensure that all items transported to the ITER site or to any off-site facility adhere to international transport standards (e.g., ISO transport rules, ADR regulations for any hazardous materials, and applicable customs procedures).
- Shipping documentation shall include packing lists, certificates of conformity, calibration certificates (where applicable), and traceability information for each item.
- The Contractor shall coordinate closely with IO logistics to ensure compliance with site access rules, delivery scheduling, unloading constraints, and safety procedures for bringing materials into controlled areas.
- Any damage, discrepancy, or nonconformance identified during transport or receiving inspection shall be reported immediately to IO, accompanied by photographs, incident descriptions, and proposed corrective actions.

Documentation:

- The Contractor shall provide all packing records, preservation reports, and shipping documentation as part of the deliverable package.
- All delivered or returned items shall be traceable through their identification numbers, revision status, and associated certificates.

All packing, preservation, and shipping activities shall be performed in a manner that ensures the integrity and readiness of ECPS equipment for installation, testing, and commissioning activities at the ITER site.

6 Skills and qualifications

6.1 Skills

The Contractor shall ensure the safety of individuals and goods within the facilities entrusted to it. Therefore, everyone must ensure a minimum service and perform his/her tasks even in case of social problems at the national scale or within the company.

Therefore, the Contractor undertakes to meet the following requirements:

- To implement the supervisory and preparation structure required to meet the objectives of the contract, and to execute the requested activities with expected autonomy level, the team members shall have at least 5 years of experience in the discipline(s) linked to the work to be performed.
- To ensure regular attendance on site for all activities, without any interruption, during normal working hours.
- To improve the training level of its staff in the field related to its function.
- To ensure that its staff has proper knowledge of the facilities and equipment to ensure technical efficiency in terms of Quality, Security and Safety.
- To implement a dynamic and flexible organisation, taking the possible workload variation into account for the whole term of the contract. This organisation must make it possible to meet the set objectives and deadlines.
- Ensure the qualification of the operators for each task.

6.2 Qualifications

The Contractor’s on-site team shall hold valid French LV and HV electrical certifications (Habilitation Electrique), as required for all work on the IO site in accordance with site safety and operational requirements.

7 IO Documents & IO Free issue items

No free issue item is expected from IO.

8 Deliverables and Schedule Milestones

8.1.1 Schedule for delivery

The Contractor shall provide all documentation, records, reports, analyses, configuration files, test results, and supporting material required to demonstrate compliance with the Scope of Work defined in Section 5. All deliverables shall be submitted through the ITER Document Management (IDM) system in accordance with GM3S Appendix II, using the latest templates and document classification rules.

The deliverables listed below represent the minimum required documentation for the ECPS integration and circuit commissioning activities. The Contractor may be requested to produce additional reports, analyses, or records at the discretion of IO to ensure full traceability and compliance.

Table 1.General schedule

Activities	Expected Deliverables
Engineering & Analysis Deliverables (5.1.1 & 5.1.2)	System Level Integration Report (Readiness, Interfaces, Power-up Tests)
	System Level Engineering Analysis & Simulation Report (Control, Protection, operation scenarios and faults)
	Hardware/Component Verification Reports
Real-Time Platform Integration Deliverables (5.1.3)	RT platform for Circuit commissioning verification Implementation Deliverables
	RT platform expansion, installation, commissioning and testing. RT platform upgradation.
	System Integration Validation Report (Real-Time Platform)
Circuit-Level Deliverables (5.1.4)	System upgrade detail implementation preparation document for Circuit integration
Circuit commission preparation (5.1.5)	Circuit Commissioning Preparation
Civil/ Mechanical, Electrical & Fabrication Deliverables (5.1.7 - 5.1.10)	Civil/ Mechanical Integration Documentation
	Electrical Integration Documentation
	Fabrication & Welding Documentation
Additional Contractual Deliverables	Spare Parts Register (5.1.11)
	Packing, Preservation & Shipping Documentation (5.1.12)
	Interface Verification Files (5.1.6)
	Monthly Progress Reports
	Task-Order Closeout Reports

For each Task Order (TO) issued under this framework contract, the Contractor shall prepare and update a document delivery schedule using the GM3S Appendix II document schedule template and submit it to IO within four weeks of the commencement date of the relevant TO.

The tables in this Section and in Appendix I provide the indicative list of deliverables; the detailed delivery dates shall be confirmed at TO level. The overall duration of the framework contract shall be three years in accordance with the provisions set out in the contract. Under this framework, the specific scope, schedule and deliverables of the work to be performed shall be defined in dedicated Task Orders issued by IO.

More information is provided in Appendix I.

8.1.2 List of deliverable documentation

The Supplier shall provide IO with the documents and data defined in the Appendix 1 of this Technical Specification (List of Deliverables).

9 Quality Assurance requirements

The Quality class under this contract is QC3, [Ref 1] GM3S section 8 applies in line with the defined Quality Class.

The organization conducting these activities should have an ITER approved QA Program. The general requirements are detailed in ITER Procurement Quality Requirements (ITER_D_22MFG4).

10 Safety requirements

The scope under this contract covers for components which are Non-PIC, [Ref 1] GM3S section 5.3 applies.

10.1 Nuclear class Safety

The safety class is NSR.

10.2 Seismic class

No specific safety requirement related to PIC and/or PIA and/or PE/NPE components apply.

10.3 Alert Procedures

The Contractor shall follow the Alert procedure on ITER construction site. During exercises/drills, the Contractor shall ensure participation of relevant personnel and incorporate any corrective actions into their procedures. The Contractor shall liaise with IO to identify the most suitable confinement place to shelter his personnel.

11 Special Management requirements

Requirement for [Ref 1] GM3S section 6 applies in full.

11.1 Contract Gates

This shall be defined in Task Order Level.

11.2 Work Monitoring

The Task(s) shall be launched after the Kick off Meeting or other progress review meetings. In some cases, there will be requirements to undertake several tasks simultaneously and re-prioritise tasks.

11.3 Meeting Schedule

The contractor shall attend weekly team coordination meetings as instructed by IO. Regular progress meetings shall be conducted between the Contractor and the IO TRO. In addition, the Contractor shall liaise with IO to decide which meetings it needs to attend to honour its result-based commitments.

12 Appendices

Please refer below.

Appendix I – List of Deliverables

The contractor shall provide IO with the documents and data required in the application of this technical specification, the GM3S Ref [1] and any other requirement derived from the application of the contract.

All engineering deliverables shall be version controlled. Final delivery timing/ dates shall be defined in each Task Order.

Table 2. List of Deliverable Documentation

Category	Document Type	Further Description	Expected Timing (T0+x) *
Engineering	Report	System Level Integration Report (Installation, Readiness, Interfaces, Power-up Tests)	To be defined in TO
Engineering	Analysis Report	System Level Engineering Analysis & Simulation Report (Control, Protection, Fault Studies)	To be defined in TO
Engineering	Data Package	Converter Controller Tuning Files & Protection Parameter Set (As-Analysed)	To be defined in TO
Integration / I&C	Configuration Package	I&C System Implementation Files (Controller Configurations, Logic Diagrams, Signal Maps)	To be defined in TO
Integration / I&C	Report	Real-Time Platform Validation Report (HIL/RT Tests, Integration with RPC&HF)	To be defined in TO
Integration / I&C	Parameter Baseline	“As-Tested” I&C Configuration & Parameter Baseline	To be defined in TO
Mechanical	Inspection Report	Mechanical Integration & Alignment Report (Busbars, Flexible Links, Supports)	To be defined in TO
Civil/ Mechanical	Report	Structural Analysis and Verification Report using Staad/ ANSYS	To be defined in TO
Civil/ Mechanical	Report/ Drawings	As-Built Civil/Mechanical Drawings & Red-Line Markups	To be defined in TO
Fabrication	Certificates	Material Certificates / Weld Documentation / Conformity Records	To be defined in TO
Implementation	Test preparation	Circuit-Level Implementation Report	To be defined in TO
Commissioning	Commissioning preparation	Circuit Commissioning preparations	To be defined in TO

Commissioning	Commissioning Procedure	Circuit Commissioning Procedures	To be defined in TO
Interface	IS/ ICD Mark-up	Updated ICD/IS Mark-ups (If Modified During Integration)	As Needed
Hardware Supply	Hardware Upgrade Register	Hardware upgradation proposed during the study outcomes	With IO approval, to be defined in TO
Spare Parts Supply	Register	Spare Parts Traceability & Usage Register	To be defined in TO
Logistics	Logistics File	Packing, Preservation & Shipping Documentation (If Applicable)	Upon Each Delivery
Project Management	Monthly Report	Monthly Progress Report (Activities, Issues, Next Steps)	Monthly
Project Management	Close-Out Report	Task-Order Close-Out Report	At TO closure

(*) T0 = Commencement Date of the contract; X in months.

Supplier shall prepare their document schedule based on the above and using the template available in the GM3S Ref [1] appendix II (click here to download).

ANNEX I

EXPRESSION OF INTEREST & PIN ACKNOWLEDGEMENT

To be returned by e-mail to: Virginie.Michel@iter.org with Andrew.Brown@iter.org in cc

Tender reference: **IO/26/OT/70001457/VML**
Description: **ECPS Integration and Circuit Commissioning**
Procurement Officer: **Virginie Michel - Procurement Division ITER Organization**

☐ WE ACKNOWLEDGE HAVING READ THE PIN NOTICE FOR THE ABOVE-MENTIONED TENDER

☐ WE INTEND TO SUBMIT A TENDER

Are you registered in Iproc (only entities registered in iPROC will be invited to tender):

☐ YES

Please indicate your registration number: ……

☐ NO, but we shall register ASAP and before the indicated tender launch date

Please list the users of ARIBA/IPROC that you wish to add as response team for this tender:

Name	E-mail
…	…

Signature:

COMPANY STAMP

Name: .....

Position: .....

Tel: .....

E-mail .....

Date: .....