外部委託業者の募集

References: IO/24/OT/10028984/AJI

"55.NE.X0 Diagnostic electrical systems design completion and manufacturing"

（55.NE.X0 計測電気システム設計の完了と製造）

IO 締め切り 2024 年 9 月 3 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。

本文書の目的は作業範囲と入札プロセスに関する技術的な内容の基本的な要約を提供することです。

国内機関は、次回の入札に先立って、これらのサービス/工事を提供することができる企業、機関またはその他の団体が入札の詳細を事前に通知する前に、この情報を公表するよう求められます。

〇背景

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〇作業範囲

現在の入札プロセスは、55.NE.X0計測電気システム設計の完了と製造のサービス契約を締結することを目的としています。ITER機構において、計測プログラムは、この契約の実施を担当します。

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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、関心のある企業、機関又はその他の団体に事前に入札機会について通知するために、国内機関に対し、今後の入札に関する情

報を公表するよう正式に要請します。**関心のある入札者は、下記の調達スケジュールに示された日付までに、電子メールで関心表明書（付属書I）を返送してください。**

- ステップ2-入札への招待（ITT）

  事前指示通知（PIN）の公表から14日以内に、入札への招待（ITT）が公告されます。この段階では、PINを見た関心のある入札者が入札書類を入手し、入札説明書に従って提案書を作成して提出することができます。

- 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、入札への招待（ITT)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、公開されている入札への招待（ITT)に記載されている、コストに見合った最適な価格または技術的に準拠した最低価格に基づいて行われます。

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	2024年8月20日
関心表明フォームの提出	2024年9月3日
提案リクエスト（RFP）と入札への招待（ITT）の発行	2024年9月16日
明確化のための質問（もしあれば）	2024年10月14日
明確化のための質問回答	2024年10月18日
iProcで入札提出	2024年10月28日
入札評価と契約授与	2024年12月
契約調印	2024年12月

〇契約期間と実行

予想される契約期間は36か月の予定です。契約調印前の作業はありません。

〇経験

契約者は以下についての経験が期待されています：

- 融合プロジェクトやその他の厳しく規制された科学/工業プロジェクトにおける電気システムまたはサービスの開発経験、
- 真空フィードスルーや放射線区域での使用のための電気コネクタハーネス（コネクタおよび関連ケーブル）の設計開発経験、

- 電力分配、電力供給、および/または信号分配/配線を目的とした、原子力環境における電気キャビネットの設計開発経験、
- 原子力環境で使用される電気システム部品の製造フォローアップの実施/支援経験、関連する要求事項の確認および試験手順の準備を含む、
- 原子力環境における電気システムの広範な CAD 統合活動経験（設計統合レビューの準備、CAD モデルの作成、衝突の特定と解決、統合ソリューションの提案)、
- 核融合/核分裂における計装および制御（I&C）製品ライフサイクルへの関与経験、以下の参加を含む：
  1) I&C ソフトウェアの準備およびテスト；
  2) I&C ハードウェアの仕様および図面；
  3) 電気部品の設置準備；
  4) 設置後の調査およびトラブルシューティングの支援、
- インターフェースおよび要求工学の経験：要求の分析、遵守の確認および保証、インターフェース契約の草案作成、
- 契約者の職員は、IO の規則および手順に従ってサービスを遂行するための資格、専門的能力、および経験を有していること。

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。

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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「**55.NE.X0 Diagnostic electrical systems design completion and manufacturing**」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。

Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

PRIOR INDICATIVE NOTICE (PIN)

OPEN TENDER SUMMARY

IO/24/OT/10028984/AJI

for

55.NE.X0 Diagnostic electrical systems design completion and manufacturing

Abstract

The purpose of this summary is to provide prior notification of the IO intention to launch a competitive Open Tender process in the coming weeks. This summary provides some basic information about the ITER Organisation, the technical scope for this tender, and details of the tender process for 55.NE.X0 Diagnostic electrical systems design completion and manufacturing.

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 Service Contract.
The purpose of this document is to provide a basic summary of the technical content in terms of the scope of work, and the tendering process.
The Domestic Agencies are invited to publish this information in advance of the forth-coming tender giving companies, institutions or other entities that are capable of providing these supplies prior notice of the tender details.

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 Work

The present tender process aims to set up a Service Contract for 55.NE.X0 Diagnostic electrical systems design completion and manufacturing. Within the ITER Organization, The Diagnostic program will be in charge of implementing this Contract.
The Supplier is responsible for completing and manufacturing the 55.NE.X0 Diagnostic electrical systems design, its delivery to the ITER Site, and ensuring that the product meets the technical requirements defined in this Technical Specification.

This requirement is for specialist work relating to Diagnostic electrical systems design completion and manufacturing to the IO (ITER Organization) Site and for ensuring that the product meets the acceptance criteria defined in the Technical Specification.

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 called the Open Tender procedure.

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

- Step 1- Prior Indicative Notice (PIN) :
  The Prior Indicative Notice is the first stage of the Open Tender process. The IO formally invites the Domestic Agencies to publish information about the forth-coming tender in order to alert companies, institutions or other entities about the tender opportunity in advance. **Interested tenderers are kindly requested to return the expression of interest form (Annex I) by e-mail by the date indicated in the procurement timetable below.**

- Step 2 - Invitation to Tender (ITT) :

Within 14 days of publishing the Prior Indicative Notice (PIN), the Invitation to Tender (ITT) will be advertised. This stage allows interested bidders who have seen the PIN to obtain the tender documents and prepare and submit their proposals per the tender instructions.

- Step 3 – Tender Evaluation Process :
  Tenderers' proposals will be evaluated by an impartial, professionally competent technical evaluation committee of the ITER Organization. Tenderers must provide details demonstrating their technical compliance to perform the work in line with the technical scope and per the criteria listed in the invitation to tender (ITT).

- Step 4 – Contract award :
  A Supply contract will be awarded based on the best value for money according to the evaluation criteria and methodology described in the Invitation to tender (ITT).

5 Procurement Timetable

The tentative timetable is as follows:

Milestone	Date
Publication of the Prior Indicative Notice (PIN)	20-Aug-24
Deadline for Submission of Expression of Interest Form	3-Sept-24
Request for Proposals (RFP)- Invitation to Tender (ITT) advertisement	16-Sept-24
Clarification Questions (if any) and Answers deadline	14-Oct-24
Answers to Clarifications	18-OCt-24
Tender Submission in IPROC	28-Oct-24
Tender Evaluation & Contract Award	Dec-24
Contract Signature	Dec-24

6 Quality Assurance Requirements

Prior to the commencement of any work under this Contract, the selected Contractor shall produce a "Quality Plan" and submit it to the IO for approval, describing how they will implement the ITER Procurement Quality Requirements.

7 Contract Duration and Execution

The duration shall be for 36 months. No work shall commence before the date of final signature of the Contract.

8 Experience

The Contractor is expected to provide in the following:

- Experience in the development of electrical systems or services in fusion projects or other highly regulated scientific/industrial projects,
- Experience in design development of Electrical Connectors harnesses (i.e. connectors and related cablings) in a nuclear environment, for use with vacuum feedthroughs and/or in radiation areas with restricted access for maintenance,

- Experience in design development of electrical cubicles/cabinets in a nuclear environment, dedicated to power distribution, power supply, and/or signal distribution/wiring,
- Experience in performing/assisting manufacturing follow-up of electrical systems components to be used in nuclear environment, verifying relevant requirements and preparing test procedures,
- Experience in extensive CAD integration activities (preparation of design integration reviews, preparing CAD models, identifying and resolve clashes, propose integration solutions) of electrical systems in a nuclear environment,
- Experience in involvement in Instrumentation & Control (I&C) product lifecycle in nuclear fusion/fission, by participation in:
  1) I&C software preparation and testing;
  2) I&C hardware specification and drawings;
  3) preparation of electrical components installation;
  4) assistance on post-installation surveys and troubleshooting,
- Experience in interface and requirement engineering: analysing requirements, checking and assuring compliance, drafting interface agreements,
- Contractor's personnel shall possess the qualifications, professional competence and experience to carry out services in accordance with IO rules and procedures.

9 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 with legal rights and obligations established within an ITER Member State.

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 constituted informally for a specific tender procedure. All consortium members (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.

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 lead will explain the composition of the consortium members in a covering letter at the tendering stage. Following this, the Candidate's composition must not be modified without notifying the ITER Organization 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.

10 Sub-contracting Rules

All sub-contractors who will be taken on by the Contractor shall be declared with the tender submission in IPROC. 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.
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.

ANNEX I

EXPRESSION OF INTEREST & PIN ACKNOWLEDGEMENT

To be returned by e-mail to: amankumar.joshi@iter.org

TENDER No.	**IO/24/OT/10028984/AJI**
DESIGNATION of SERVICES:	**55.NE.X0 Diagnostic electrical systems design completion and manufacturing**
OFFICER IN CHARGE:	**Aman Kumar Joshi – Procurement Division ITER Organization**

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

☐ WE INTEND TO SUBMIT A TENDERs

☐ WE WILL NOT TENDER FOR THE FOLLOWING REASONS:

……

Signature: COMPANY STAMP

Name: ....

Position: ....

Tel: ....

E-mail...

Date: ....

IDM UID
BBN6PR

VERSION CREATED ON / VERSION / STATUS
02 Jul 2024 / 1.1 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

55.NE.X0 Diagnostic electrical systems design completion and manufacturing

This document describes technical needs for specialist work relating to Diagnostic electrical systems design completion and manufacturing. The system concerning this contract has the Plant Breakdown Structure (PBS) code 55.NE.X0.

Table of Contents

1 Preamble

This Technical Specification 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

This document describes technical needs for specialist work relating to Diagnostic electrical systems design completion and manufacturing. The system concerning this contract has the Plant Breakdown Structure (PBS) code 55.NE.X0.

3 Acronyms & Definitions

3.1 Acronyms

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

Abbreviation	Description
CAD	Computer-Aided Design
CM	Configuration Model
CRO	Contract Responsible Officer
DCM	Design Compliance Matrix
DIN	Design INtegration
DM	Detailed Model
DR	Design Review
DWS	Detailed Work Schedule
EWP	Engineering Work Package
FAT	Factory Acceptance Test
GM3S	General Management Specification for Service and Supply
HMI	Human-Machine Interface
IO	ITER Organization
KOM	Kick-Off Meeting
PBS	Plant Breakdown Structure
PRO	Procurement Responsible Officer
RAMI	Reliability, Availability, Maintainability and Inspectability
SAT	Site Acceptance Test
SLS	System Load Specifications
SRD	System Requirements Document
TRO	Technical Responsible Officer

3.2 Definitions

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

Connector Harness: shall mean the assembly of a connector/group of connectors and the related cable tails at the back of the connector/group of connectors.

Feedthrough: electromechanical device used to bridge electrical signals from in-vessel vacuum to ex-vessel atmospheric pressure.

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 4 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	Version
1	General Management Specification for Service and Supply (GM3S)	82MXQK	1.4
2	55NEX0 - 55NEV0 EFT connectors Technical description	5W8DG6	1.6
3	55NEX0- 55NEC0 EFT connectors Technical description	63E6L6	2.0
4	55.NE.X0 - Technical Description for the Looms	X45ZMM	2.0
5	System Design Description (DDD) 55.NE.X0 Electrical Systems	UVMNDM	1.3
6	55.NE.X0 - Technical Description for the Extra Low Voltage Power Supply Units	X56STK	1.0
7	55.NE.X0 - Technical Description for the Magnetic Cabinets	VVTMNX	1.6
8	55.NE.X0 - Technical Description for the Port Cell Connectors	X56WGD	2.0
9	55.NE.X0 - Technical Description for the Sub-Distribution Panels	X56JDU	1.4
10	55.NE.X0 - Technical Description for the Wiring Cubicles	X567TY	3.2
11	55.NE.X0 - I&C System Design Specification (I&C SDS)	36RE9E	1.3

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	Version
CS1	IPC/WHMA-A-620	Latest
CS2	IEC 61000 family	Latest
CS3	Eurocode 2h	Latest
CS4	RCC-MR	Latest
CS5	NF C 15-100	Latest
CS6	NF C 13-200	Latest

5 Scope of Work

This section defines the specific scope of work for the service, in addition to the contract execution requirement as defined in Ref [1].

5.1 Overview

The main purpose of the 55.NE.X0 Ex-Vessel Electrical Services is to transmit signals from the in-vessel and in-port plug diagnostic sensors to the cubicles containing the back-end electronics for each diagnostic. The system comprises power and instrumentation and control (I&C) cabling, power distribution boards, and cubicles for power and signals located in the ITER Tokamak Building (Bld. 11) and the Diagnostics Building (Bld. 74), as per Refs [2]-[11].

55.NE.X0 is a complex system with a large number of interfaces. It is present in every Upper Port Cell, eight Equatorial Port Cells and 18 Lower Port Cells, in addition to the Diagnostic and Tritium Buildings, and Assembly Hall.

An overview of the expertise requested within the scope of these specifications can be done by dividing the scope into 7 different and relatively independent areas. Each area is detailed by individuating the main tasks associated to it, as it follows:

1. <u>Electro-mechanical engineering for Connectors</u>
    - develop the design of the 55.NE.X0 electrical connectors system from its current status, especially related to feedthrough connectors and port-cell connectors (described in Section 6 and Refs [2], [3], [8]);
    - this area has the most technically substantial design work in the scope of this contract and entails the production, update, approval and maintenance of around 20 design documents, including design justification and description documents, and about 100 CAD drawings, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 18-24, 31, 33-38, 45-47, 49).
    - The expertise required for this area is related to electromechanical engineering, with special reference to electrical connectors: signal segregation, connectors requirement flow-down, market survey, connectors and sub-connectors design and test specifications.
2. <u>Engineering of electrical components for power boards and power supplies</u>
    - track the variation of the design and related on-site intervention for components already installed (power boards), provide technical support for change requests

  - (e.g. power change requests for power boards which are already manufactured), and develop the extra-low voltage power supply units design from its current status;
  - this area entails the production, update, approval and maintenance of around 20 design documents, including design justification and description documents, the analysis and technical evaluation of about 20 deviation request documents, and the evaluation and maintenance of about 40 calculation notes and drawings, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 18-20, 22-24, 31, 47, 49).
  - The expertise required for this area is mainly related to electrical engineering, with special reference to low-voltage power distribution, extra-low-voltage power supplies, electrical maintenance, compliance with national and international electrical standards.
3. <u>Engineering of electrical components for cubicles</u>
  - track the variation of the design and related on-site intervention for components already installed (wiring cubicles), provide technical support for change requests (e.g. cabling change requests for cubicles already delivered), and develop the shared cubicles design from its current status;
  - this area entails the production, update, approval and maintenance of around 20 design documents, including design justification and description documents, analysis of about 20 deviation request documents, maintenance and survey of about 40 drawings, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 18-20, 22-24, 31, 47, 49).
  - The expertise required for this area is related to electrical and/or electronics engineering, with special reference to cabling design, cubicle configuration design, cabling rules, earthing and grounding principles, signal segregation and terminal block selection.
4. <u>Integration of components in port-cells and buildings</u>
  - perform integration trials in CAD, agree on integration limits, design cable routing, follow integration meetings, and troubleshoot integration problems for 55.NE.X0 components;
  - follow integration and post-manufacturing activities for the 55.NE.X0 cabinets for magnetics;
  - this area entails the production, update, approval and maintenance of around 20 design documents, including design justification and description documents, and about 100 3D CAD drawings, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 13-15, 18-19, 21, 22, 24, 31, 33, 34, 36-41, 43, 49).
  - The expertise required for this area is related to mechanical engineering, with special reference to integration engineering in nuclear environments, troubleshooting of building integration problems, manufacturing follow-up of passive electrical enclosures, mechanical support design against applicable loads and codes.
5. <u>Instrumentation and Control (I&C) engineering of the 55.NE.X0 system</u>
  - implement the 55.NE.X0 I&C design, including the architecture post-MRR development to manufacturing,
  - advance the 55.NE.X0 I&C design to include extra-low voltage units, design the I&C cubicle;
  - this area entails the production, update, approval and maintenance of around 20 design documents, including design justification and description documents,

production of computer code with thousands of lines, and about 10 drawings, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 9, 18, 19, 22, 24-26, 36, 46-48).

- this area also entails the delivery of a product, i.e. the I&C software and related final human-machine interface for the extra-low-voltage unit monitoring and control;
- The expertise required for this area is related to electronics and/or instrumentation engineering, with special reference to instrumentation and control design for nuclear plants, HMI design, cubicle internal configuration, coding using Enterprise Architect and related software, implementing sensible alarm/alert systems to monitor electrical variables, communication protocols.

6. <u>Interface & Requirements Engineering of 55.NE.X0</u>
    - identify, maintain, correct and update the interface drafts of 55.NE.X0, taking care of implementing and tracking the related requirements.
    - Properly track the requirements through maintenance and update of the main requirements document drafts, e.g. sub-System Requirements Document (sub-SRD) and Design Compliance Matrix (DCM);
    - this area entails the production, update, approval and maintenance of around 10 design documents, including design justification and description documents, and about 120 interface drafts, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 1-2, 5, 6-9, 24).
    - The expertise required for this area is related to system engineering, with special reference to requirements engineering, physical and functional interfaces, drafting of requirement documents, understanding of implication of requirement compliance, interface engineering, preparation, coding and maintenance of automatization tools (e.g. using Excel and/or Python) to be used for technical evaluations on 55.NE.X0 components.
7. <u>Mechanical Engineering for Design, Assembly, Test and Installation of 55.NE.X0 components</u>
    - Provide mechanical engineering expertise to the preparation of load specifications, follow-up of analysis work, liaison with colleagues dealing with components installation to prevent, mitigate or pre-emptively identify and correct issues and requests related to 55.NE.X0 components;
    - this area entails communication and follow-up, as well as the production, update, approval and maintenance of around 20 design documents, including design justification and description documents, and about 20 drawings, for the total duration of the contract. Examples of such documents are in Appendix 1 (particularly applicable examples are items 1-2, 19, 24, 43-45).
    - The expertise required for this area is related to mechanical and electromechanical engineering, with special reference to assembly, test, maintenance, installation and troubleshooting of electromechanical components like connectors, cable harnesses, complex electromechanical structures, electrical connectors design and testing.

In addition, common activities, i.e. horizontal to the above-mentioned work areas and to be considered as evenly distributed among them, are

- Participate in Design Reviews (DR), in accordance with the relevant ITER procedures;
- successfully contribute in closing all of the Design Reviews by adequately responding to all chits received at the reviews;

- provide expertise during tendering and manufacturing activities of 55.NE.X0 components, including participation at Manufacturing Readiness Reviews (MRR);
- provide expertise during Factory Acceptance Tests and Site Acceptance Tests;
- provide support in construction-related activities, like EWP production, delivery and installation organization, and related follow-up.
- Review of documents requiring related expertise.

A more detailed work description is presented in Section 6.

5.2 Duration

The duration of the contract shall be 3 years from the date of the Kick-Off meeting (T0). The kick-off meeting date shall be after the contract signature date, and normally no more than 30 days after the latter.

6 Detailed Work Description

6.1 Current Status

The Final Design Review (FDR) for 55.NE.X0 critical components (Wiring Cubicles, I&C Cubicle, Distribution Boards, Cabinets for Magnetics, Ex-vessel cable looms) was held in April 2020 and many of these components have been already manufactured, in some cases even installed in the ITER buildings.

The 55.NE.X0 connectors are in post-PDR phase, with the PDR dating back to November 2021. Several FDRs are planned for the connectors, according to the nature of these connectors, and their dates span between 2025 and 2028.

The 55.NE.X0 extra-low voltage power supply designs are at post-CDR status instead, with the CDR dating back to September 2018, and a PDR planned for 2024.

In principle, all these components are within the scope of this Task Order. However, the activities required for each of them will be different, and are broken down as in Section 5.1. Further details, both on common activities and on activities related to each of the items of Section 5.1, will be given in Section 6 and related subsections.

For information, the following figures show the development plans and these activities are elaborated in the following sections.

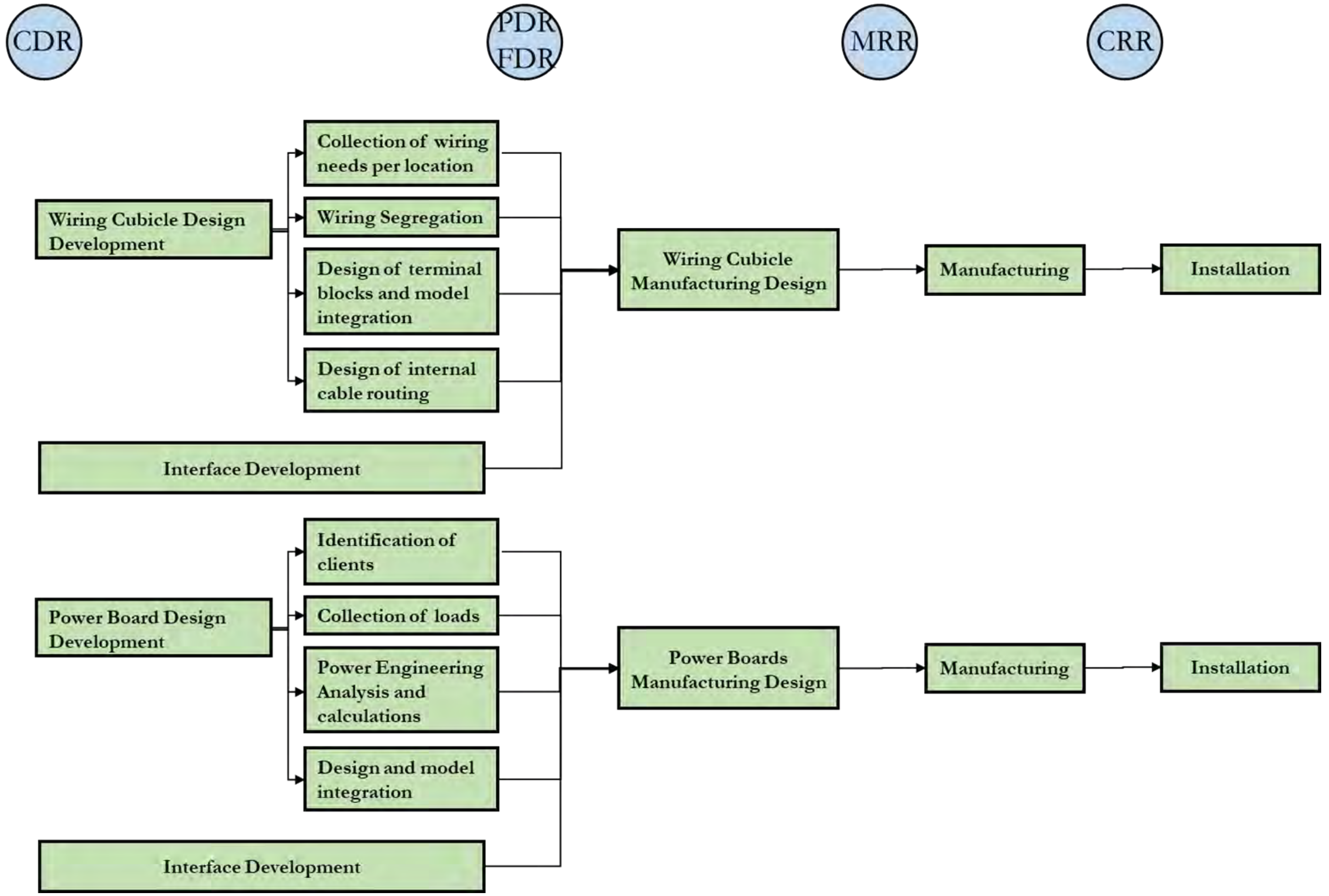

Figure 1 Design Development for wiring cubicles, electrical sub-distribution panels. These components are currently in post-installation or in installation phase.

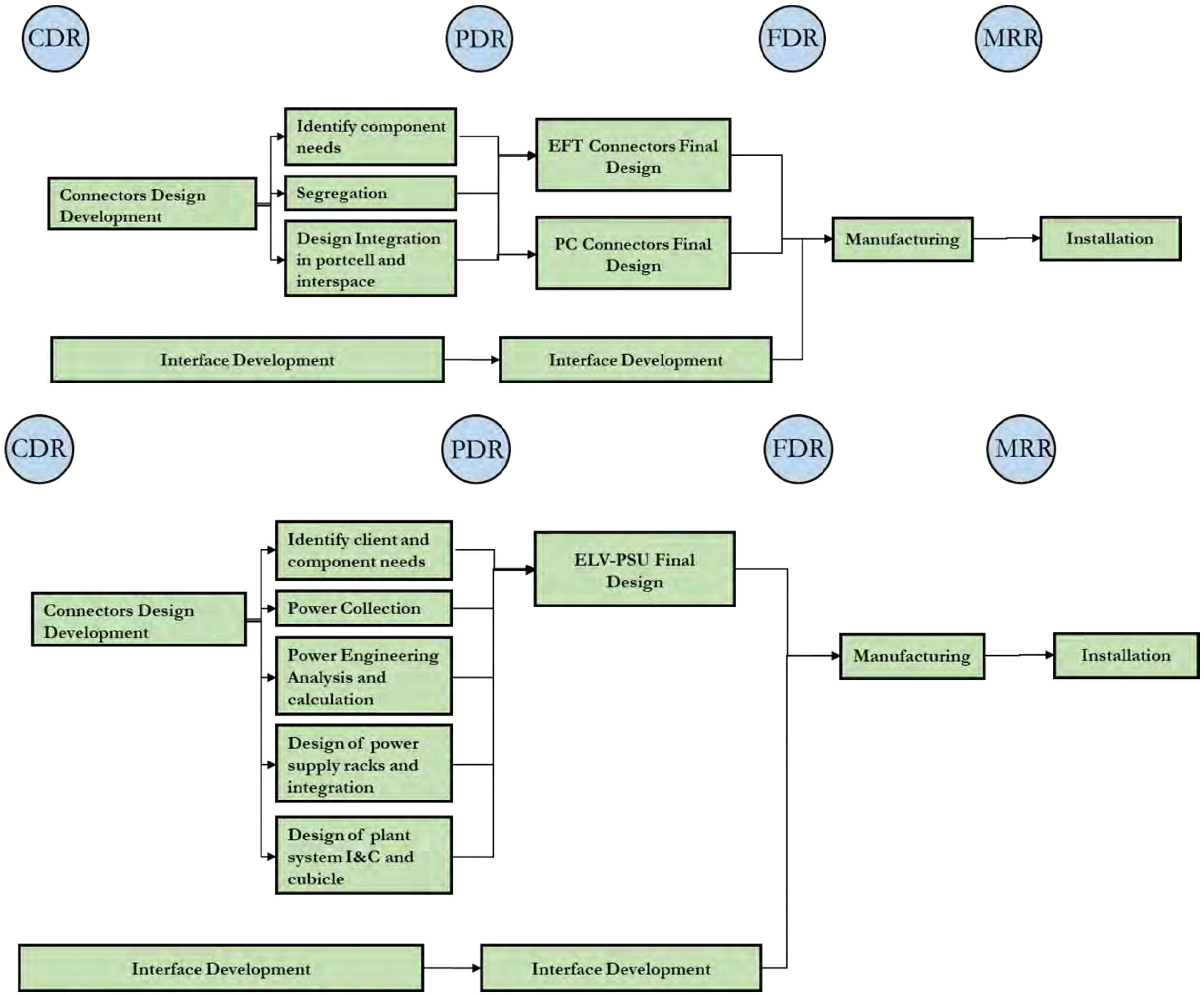

Figure 2 Design Development Plan for connectors and ELV-PSUs. The former components are currently in post-PDR phase, whereas the latter are in post-CDR phase.

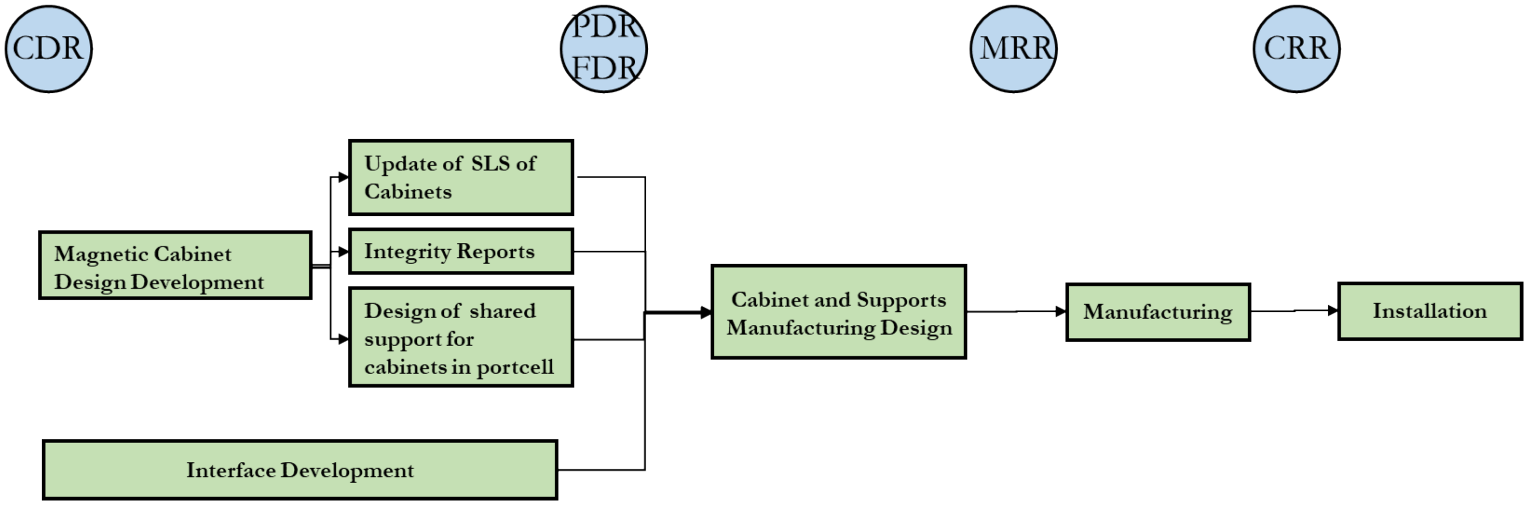

Figure 3 Design Development Plan for magnetics cabinets. These components are currently manufacturing phase.

SERVICE

6.2 Task Descriptions – Common Activities

Given the possibility of having inter-dependencies between the areas identified in Section 5, the following tasks and activities are described to be in common to all such areas. Their global technical effort is estimated to constitute between 20% and 25% of the global effort related to the more specific identified areas listed in Section 5 and expanded from Section 6.3 onwards. The effort of these common activities is also expected to be uniformly distributed along the contract duration.

6.2.1 Project and Effort Management

The Contractor shall produce documents to describe the organisation of the project under the scope of this contract, a plan of how the work shall be performed regularly including document update plan, effort management among the areas identified in Section 5, identification and logging of key issues, risks and appropriate mitigation actions to be performed.

The Supplier shall also provide input data for the update of the Detailed Work Schedule (DWS) to accurately cover the full scope of this contract.

6.2.2 Requirements Management

A sub-System Requirements Document (sub-SRD) for 55.NE.X0 [ITER_D_WYWGUE] and its associated Design Compliance Matrix (DCM) are already produced for the 55.NE.X0 system, but will need to be maintained and updated when necessary.

The inputs for DCM updates shall be provided by the Contractor when required (e.g. at least in advance of each design review) in order to demonstrate how the design complies with each identified requirement or how the performance of the system will be validated against the requirements in a future design stage (if applicable). If any missing requirements are identified, the Supplier shall also contribute in identifying them and provide inputs for updating the sub-SRD.

The Contractor shall produce a Design Justification Plan as part of the DCM to describe how the proposed design will be validated against the identified loads and operating conditions. This plan shall describe the different analyses, R&D, tests and other justification activities to be performed or to be used in order to demonstrate a satisfactory design.

6.2.3 Interface Development

The Contractor shall update and finalise Interface drafts (example can be found in ITER_D_W35MRP), under the direction of the TRO and interfacing parties and in accordance with the ITER procedures. Updates and/or preparation of interface drafts are expected to be done for Design Reviews or whenever needed, asynchronously.

6.2.4 2D Diagrams and Drawings

The Contractor shall input, inform and follow-up the production and update of 2D diagrams (Single Line Diagrams, Cabling Diagrams, Wiring Diagrams) produced by other resources (the provision of these resources is not within the scope of this Technical Specification).

In addition, the Contractor shall review the Cabling Diagrams produced by the systems which have interfaces with 55.NE.X0, in order to ensure consistency all along the signal and power distribution chain, to effectively check and possibly highlight issues in case of interface problems, especially related to installed components. The review of such diagrams is performed following an existing checklist. About 100 diagrams are expected to undergo a detailed check.

SERVICE

To ensure the correct identification and tagging of components within this scope of work, the Contractor shall follow the ITER Procedure for Identification and Controls of Items [ITER_D_U344WG] and the ITER Numbering System for Components and Parts [ITER_D_28QDBS].

6.2.5 Automatization Tools

The Contractor shall contribute in the development of semi-automatic tools for technical component integration inside wiring cubicles, distribution boards. Examples are semi-automatic tools developed in Microsoft Excel and/or Python to track quantities of terminal blocks, breakers, allocate cables to terminal blocks, patch panels etc. It is expected that 3 tools of this type will be needed.

The Contractor shall contribute in the development of semi-automatic tools for analysis of client system's requests that could lead to addition/modification of 55.NE.X0 installed components. Examples are semi-automatic tools developed in Microsoft Excel and/or Python to establish whether the current installed quantity of terminal blocks is sufficient to accommodate a system requesting space for additional amounts of cables. It is expected that 3 tools of this type will be needed.

6.2.6 Design Description

For the components described in Section 6.1, the Contractor shall develop the design of the system, building on the existing design, refining the details of each component to provide designs which satisfy the various requirements.

A summary document to describe the design of the system shall also be produced and updated in advance of each Design Review or whenever needed, asynchronously (example of such document can be found in ITER_D_5W8DG6).

6.2.7 Input for System Load Specification and Design Justification

The Contractor shall contribute to the update of the System Load Specification (SLS, example can be found in ITER_D_VVU6WA) produced previously to include new components not considered previously, to refine the applicable load cases and combinations to be considered in the design of the components, including seismic, fire and nuclear loads. Existing analyses can be used in order to specify the relevant loads.

The Supplier shall arrange and supervise the analysis of the components when subjected to each of the applicable load cases identified in the System Load Specification, ensuring that the resulting analyses are satisfactorily documented in accordance with IO procedures. This includes, for example, calculation of loads applied by the 55.NE.X0 supports to interfacing components such as the Vacuum Vessel, Torus Cryopump Housing and building embedded plates. Note that the analysis itself will be performed by resources outside the scope of this present Task Order (i.e. it will be performed by either IO resources or under the scope of an additional different contract).

The Reliability, Availability, Maintainability and Inspectability (RAMI) analysis of the system produced in previous contracts shall be updated in advance of each Design Review, based on the increased maturity of the system design. Example of guidelines to follow in the production of this type of document is found in ITER_D_Y2LYQA.

6.2.8 Installation/assembly and Commissioning Documents

A number of documents to describe the assembly/installation activities to be performed on-site were already produced. These documents are to be reviewed and updated as required as the design develops, as well as inputs for Engineering Work Packages (EWPs) are required, and shall be supplemented by documents to describe the testing or commissioning activities to be performed after installation (such as end to end testing, verification of signal parameters along the full transmission line, etc.).

6.2.9 Response to DR chits

The Contractor shall investigate the chits given in previous DRs, propose a strategy to address them and modify the design/documentation as required.

6.2.10 Input for Design Integration Review

A key milestone in the preparation of each Design Review is the Design Integration Review, conducted in accordance with the Design Integration Review Procedure [ITER_D_3CNWMT]. The purpose of this review is to assess the status of the functional and physical interfaces in advance of the Design Review – for 55.NE.X0, the Contractor is expected to contribute to the preparation of such meetings.

6.2.11 Specific documents related to the Design Review Meetings

The Contractor shall produce a number of specific documents in order to prepare, undertake and close the Design Reviews, closely supporting the Design Developer (refer to ITER_D_2832CF for further information). These documents include reports of any Project Change Requests (PCRs), Deviation Requests and Non-Conformities relating to the 55.NE.X0 project; an assessment of the readiness to perform the review and the list of input documents to be reviewed by the Design Review Panel.

The Contractor will be supported by IO in the organisation of the Design Reviews, including appointment of the Chair and Panel, and shall closely follow the production of the Design Review Minutes and Panel Report in a timely manner.

6.2.12 Final Design Review (FDR)

A FDR is defined in the Design Review Procedure [ITER_D_2832CF] as follows:

> *"A formal design review meeting conducted to assure that the detailed design solution is complete, verified and properly documented in lower level requirement specifications, according to the planned maturity."*

Examples of documents which must be submitted to the FDR are listed in Appendix 1, together with the expected status or maturity at the time of the review.

6.2.13 Inputs for Procurement, Manufacturing and Delivery

Based on the Technical Specifications produced for the different Final Design Reviews, the various components will be procured. Although the procurement process is managed by IO, the Contractor shall contribute in responding to technical questions and clarifications during the tendering process.

Once the tender(s) have been awarded, the Contractor shall continue to contribute in responding to questions from the manufacturers, shall collaborate in assessing any Deviation Requests or Non-Conformity Reports and shall review the results of the Factory Acceptance Tests (FAT).

Prior to delivery of the components to the IO site, the Contractor shall define the objectives of the Site Acceptance Tests (SAT) and shall organise and perform these tests, under the direction of the IO TRO. Following successful completion of the tests, the Supplier shall produce SAT reports detailing the test results.

SERVICE

6.3 Specific activities related to Electro-mechanical engineering for Connectors.

- These activities are related to point 1 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 30%.
- The Contractor shall organize tests and act as main technical reference for the design and development of the (roughly 220) connector harnesses to be integrated in the port-cell environment and (roughly 200) feedthrough connector harnesses. Description of these connector concept is made in Refs [2], [3], [8]. Electrical and mechanical tests are foreseen for these connectors.
- For port-cell connectors (Ref [8]), the Contractor shall collect cables and electrical characteristics to properly arrange them on connectors modules (or sub-connectors), taking into account segregation according to electrical characteristics, proper grounding schemes, management of individual and overall cable screens, etc. As an information, port-cell connector harnesses contain an average of 50 connector modules (or sub-connectors), each of them with potentially tens of pins carrying several types of signals (DC, low-frequency, high-frequency, power, thermocouples, etc.).
- The Contractor shall organize and select the sub-connectors according to the ITER requirements for use inside port-cell and port-cell interspace, e.g. radiation resistance, low-smoke and zero halogen content, etc, considering the integration and mating types (automatic, manual) while maximizing the use of COTS modules as much as possible.
- For feedthrough connectors, the Contractor shall assure mating feasibility of the connectors with the electrical feedthrough counterparts, which are developed by separate teams outside 55.NE.X0 scope. As an information, electrical feedthroughs contain an average of 70-80 pins carrying several types of signals (DC, low-frequency, high-frequency, thermocouples etc.).
- Together with the TRO, the Contractor shall collaborate with PBS55 port integrators in defining connectors position, identifying bottlenecks, and collaborate in resolving issues.
- As mentioned above, commercially available connectors shall be used wherever possible but the Contractor shall discuss with feedthrough manufacturers to develop bespoke connectors if needed. This is the case, for example, of vacuum vessel feedthrough connectors (Ref [2]).
- For those connectors being in manufacturing, the Contractor shall assist in following up the manufacturing activities, including organizing and assisting visits to suppliers;
- For those connectors being under test and prototyping, the Contractor shall actively participate in the definition, follow up and closure of the tests and prototyping activities, including related troubleshooting.
- Some of the connectors need to be Remote Handling compatible and will therefore require development of Remote-Handling-compatible features. The Contractor shall liaise with Remote Handling experts and develop a suitable design.
- It is expected that there will be 4 FDRs related to connectors within the scope of this contract, three of them related to feedthrough connector harnesses and 1 related to port-cell connector harnesses.
- Although the FDR for port-cell connector harnesses within the duration of this contract is expected to be for the 1st priority connectors only (roughly 40 connector harnesses), the Contractor is expected to contribute to the development of the whole port-cell connector harnesses scope, involving (as mentioned) roughly 200 connector harnesses.

SERVICE

6.4 Specific activities related to Engineering of electrical components for power boards and power supplies

- These activities are related to point 2 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 10%.
- 72 power boards have been manufactured and the majority of them is currently installed in the Tokamak Complex. The Contractor shall be responsible for the maintenance of the related documentation, including but not limited to: CANECO calculation notes, procedures, load lists, wiring diagrams, layouts and plans.
- The Contractor shall be responsible for the agreement, preparation, processing, technical analysis and post-processing of the deviation requests coming from tenants, asking for power changes. These requests shall be discussed fruitfully with the tenant system's representatives, and impact analysis (both technical and financial, based on engineering judgement) shall be prepared. Related impacted documentation (e.g. calculation notes and diagrams) shall be updated and maintained. As an info, each power board supplies power to an average of 8 loads (mainly system cubicles).
- The contractor shall follow up any intervention activity to be done by third-party personnel on the 55.NE.X0 installed power boards, including energization or inspections.
- The Contractor shall contribute to the design of ELV-PSUs, in terms of architecture, calculations, and electrical engineering, as needed.
- A part of these power boards (around 15) are to be installed in Shielded Corners. The Contractor shall act as technical reference in troubleshooting construction and installation queries and issues. It is expected that issue like minor relocation, partial re-calculation of power board breakers' rating, load change could occur.
- The Contractor shall investigate on possible tests to investigate electrical breakers compatibility with external magnetic fields, by organizing preparing internal test procedures and organizing tests (test facilities and equipment are to be considered outside the scope of this contract).
- The Contractor shall prepare a full technical impact of the processed Deviation Requests, highlighting the hardware changes needed for each power board, preparing the technical instructions to perform these changes, and update the 2D diagrams related to them. As of today, it is expected to consider an update of 30 power boards related to 20 deviation requests.

6.5 Specific activities related to Engineering of electrical components for cubicles.

- These activities are related to point 3 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 10%.
- 40 wiring cubicles have been manufactured and are currently installed in the Tokamak Complex. The Contractor shall be responsible for the maintenance of the related documentation, including but not limited to: wiring diagrams, procedures, layouts, plans.
- The Contractor shall be responsible for the agreement, preparation, processing, analysis and post-processing of the deviation requests coming from tenants, asking for cabling changes. These requests shall be discussed fruitfully with the tenant system's representatives, and impact analysis (both technical and financial) shall be prepared. Related impacted documentation (e.g. cable pulling cards and diagrams) shall be updated and maintained.

SERVICE

- The Contractor shall develop the design and follow-up the manufacturing of the Shared Cubicles, with respect to e.g. requirements, space and power allocation, shielding, grounding, compliance to ITER standards.
- The Contractor shall develop the design and follow-up the manufacturing of the port-cell junction boxes, including collection of requirements, electrical design, drafting of related documentation, preparation of layouts and electrical schemes.
- The Contractor shall prepare a full technical impact of the processed Deviation Requests, highlighting the hardware changes needed for each wiring cubicle, preparing the technical instructions to perform these changes, and update the 2D diagrams related to them. As of today, it is expected to consider an update of 20 wiring cubicles related to 15 deviation requests.

6.6 Specific activities related to Integration of components in port-cells and buildings.

- These activities are related to point 4 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 10%.
- The Contractor is expected to familiarize quickly with the 55.NE.X0 system's integration in terms of i) components and their location; ii) proximity to other systems and requirements or consequence thereof; iii) integration strategies and moves such as relocation, support sharing, derogations, etc.
- The Contractor shall participate to ITER integration meetings, design meetings and Design Integration Reviews involving 55.NE.X0 components.
- The Contractor shall actively participate in the effort of CAD-integration of 55.NE.X0 components in the crowded interspace and port cells environment (e.g. connectors, junction boxes), as well as in the installation-ready areas of the Tokamak Building Shielded Corners and the ITER Diagnostics Building (I&C Cubicle(s), Shared Cubicles, remaining Power Boards).
- The Contractor shall propose and participate in on-site surveys and inspections, in order to anticipate possible integration issues which might arise for components to be installed, but also to assist in closing open installation issues.
- The Contractor shall perform integration trials in CAD, agree on integration limits with relevant colleagues.
- The Contractor shall design cable routing in CAD following integration agreements;
- The Contractor shall perform quality checks of the 55.NE.X0 3D models to assure consistency with the design, even when (or if) these models are modified by other parties for small tasks like analysis, adjustments, re-routing etc.

6.7 Specific activities related to Instrumentation and Control (I&C) engineering of the 55.NE.X0 system.

- These activities are related to point 5 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 8%.
- The Contractor shall implement the 55.NE.X0 I&C design in the 55.NE.X0 I&C cubicle, including the architecture post-MRR development to manufacturing.
- The Contractor shall advance the 55.NE.X0 I&C design to include portions related to the extra-low voltage units, and consequently update the design of the I&C cubicle.

SERVICE

- The Contractor shall deliver the I&C software related to the extra-low-voltage power supplies monitoring.
- The Contractor shall maintain, correct and possibly update the information interfaced with the ITER CODAC system, according to design and manufacturing evolution.
- The Contractor shall perform software tests, coding, debugging, and deployment in the ITER Diagnostics Corbieres lab, situated 20 minutes from the main ITER site.
- The Contractor shall assure adherence of the I&C design and tests with the related descriptive documentation and test plans.

6.8 Specific activities related to Interface & Requirements Engineering of 55.NE.X0.

- These activities are related to point 6 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 16%.
- The Contractor shall identify, maintain, correct and update the multiple interface drafts of 55.NE.X0, interfacing with several systems in ITER. 55.NE.X0 is one of the systems with the most interfaces which have been identified (i.e. around 120).
- The Contractor shall proactively identify, resolve and/or mitigate potential interface issues with counterparts related to all of the 55.NE.X0 components.
- The Contractor shall develop a thorough knowledge of the 55.NE.X0 architecture and component design, through collaborations with relevant parties, deep discussion with the Responsible Officer and careful analysis of available documentation.
- The Contractor shall properly track the requirements through maintenance and update of the input to main requirements documents, e.g. sub-System Requirements Document (sub-SRD) and Design Compliance Matrix (DCM).
- The Contractor shall collaborate in updates of relevant interface information, sub-SRD and DCM whenever required and at least prior to any design review, and assure document approval in due time, according to ITER guidelines.
- The Contractor shall produce, correct and/or update the 55.NE.X0 RAMI Analysis.

6.9 Specific activities related to Mechanical Engineering for Design, Assembly, Test and Installation .

- These activities are related to point 7 of Section 5.1. With respect to the whole scope of the specific activities, this particular area is estimated to cover a relative technical effort of about 16%.
- The Contractor shall collaborate in the preparation of system load specifications for 55.NE.X0 components.
- The Contractor shall perform mechanical design related to the multiple supports of 55.NE.X0 components (e.g. brackets, anchors, cable ties, fixations).
- The Contractor shall follow up mechanical analysis activities carried out by Third Parties, and perform limited mechanical analysis, e.g. verifications of studs, anchors, etc.
- The Contractor shall collaborate with the Responsible Officer and the ITER Construction in the preparation and follow-up of installation activities and related tasks, e.g. inspections, analyses, on-site investigations, meetings, document production.
- The Contractor shall collaborate with the Responsible Officer and other PBS colleagues for the preparation of or support to EWPs which, though not directly related to 55.NE.X0, entails 55.NE.X0 contributions, e.g. cable pulling preparation.

SERVICE

- The Contractor shall organize and keep track of possible site interventions needed for power change requests and/or cabling change request, related to 55.NE.X0 components.

7 Location for Scope of Work Execution

Contractor can perform the work at their own location. Weekly meetings are planned to be carried out by remote video-conference, or when requested due to business needs, in-person. Visits to the IO site are envisaged, e.g. for site surveys, participation to workshops or needed in-person meetings, installation and post-installation troubleshooting etc.

The Contractor is required to use ITER IT equipment (i.e. laptop) to perform the work.

8 IO Documents

No document input is expected from IO.

9 List of deliverables and due dates

The Supplier 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.

A list of deliverables is available hereafter with associated due dates (next page):

D#	Deliverable Name	Description	Main involved task areas[1]	Expected date (T0+x) *
D1	System Description Complete Update	Update of all technical descriptions Progress on common activities	Sections 6.3-6.9 All in Section 6.2	3
D2	Sub-SRD and DCM update	Requirements engineering completed Progress on common activities	Sections 6.8, 6.3 All in Section 6.2	5
D3	Shared Cubicle design and procurement update	Technical description of shared cubicle completed Progress on common activities	Sections 6.5, 6.6, 6.9 All in Section 6.2	9
D4	Feedthrough Connectors Design Completion	Feedthrough connector harnesses design technical description and main ancillary documents completed. Progress on common activities	Sections 6.3, 6.9, 6.6 All in Section 6.2	14
D5	ELV-PSU FDR package	Documents ready for the Extra-Low-Voltage Power Supply Units FDR (including I&C documents) Progress on common activities	Sections 6.4, 6.7, 6.8 All in Section 6.2	18
D6	Installation and capacity Status	Status on wiring cubicle capacity, shared cubicle loads, power board modifications, integration of cabinets Progress on common activities	Sections 6.4, 6.5 All in Section 6.2	21
D7	Feedthrough Connectors Design Closure	Response to chits with status, completion of design docs after FDR Progress on common activities	Sections 6.3, 6.9 All in Section 6.2	24

[1] All the common task areas defined in Section 6.2 participate in each of the deliverables. For the specific areas identified in Sections 6.3-6.9, in this column the first few task areas that contribute the most to each deliverable, are listed. Given the wide breadth of the 55.NE.X0 project and interlink between its components, it is anticipated that all the specific areas will also contribute to a certain extent to each of the deliverable. However, the ratio between their contributions will heavily vary according to the deliverable.

D#	Deliverable Name	Description	Main involved task areas[1]	Expected date (T0+x) *
D8	I&C Status report	Software for the ELV-PSU monitoring/control with related HMI and I&C documents ready Progress on common activities	Sections 6.7, 6.8 All in Section 6.2	26
D9	Port-cell connectors design advance	Port-cell connector harnesses design technical description and main ancillary documents completed, with design of 1st priority connectors ready for FDR. Progress on common activities	Sections 6.3, 6.9, 6.8 All in Section 6.2	30
D10	NE.X0 integration status	Integration and interface status of installed and designed components with related documentation Progress on common activities	Sections 6.3, 6.5, 6.8, 6.9 All in Section 6.2	33
D11	Interface and Compliance completed in port-cells	For connectors, interface points are completed and design compliance is demonstrated through DCM input Progress on common activities	Sections 6.3, 6.8 All in Section 6.2	36

(*) T0 = Kick-Off meeting (KOM) date; X in months.

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

10 Quality Assurance requirements

The Quality class under this contract is a range covering QC1, QC2 and QC3, [Ref 1] GM3S section 7 applies in line with the defined Quality Class.

11 Safety requirements

The scope under this contract covers for PIC and/or PIA and/or PE/NPE components, [Ref 1] GM3S section 5.3 applies.

11.1 Nuclear class Safety

The scope under this contract covers for PIC and/or PIA and/or PE/NPE components, [Ref 1] GM3S section 5.3 applies.

12 Specific General Management requirements

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

12.1 Contract Gates

The contract gates are defined in [Ref 1] section 6.1.5, this scope of service call for the following technical gates: FDR, assistance to MRRs.

12.2 Work Monitoring

Work is monitored through the deliverables defined in the technical specifications of the related task orders and, otherwise there specified, at recurrent project meetings at least every week.

12.3 CAD design requirements

This contract requires for CAD activities, [Ref 1] GM3S section 6.2.2.2 applies.

13 Appendix 1

#	Document	Status for FDR	Comments / Templates
1	Project Work Breakdown Structure (WBS)	Updated	Top level diagram providing the Work Breakdown of the project: Main tasks and who's responsible for them (IO, contractor …). An example can be found in: ITER_D_VVTZRH
2	System level Risk Register table	Updated	(Automatic) Extract from the Project Risk Register at each Design Review stage, to allow review of the risk status by the Design Review Panel. However, the risks in the Project Risk Register should be reviewed and updated as required.
3	Design Development Plan	Updated	Development plan for the design of the diagnostic or for the port integration a.k.a. "Work plan". Indicates the main and critical tasks of the next design phase (at PDR a plan up to FDR is given etc.). The development plan is a top-level overview; the detailed schedule should be in the Primavera DWS. An example can be found in: ITER_D_VVU3PP
5	SRD-55.NE.X0 (sub-SRD)	Complete	A document presenting all of the requirements relevant to the system, derived from the main SRD for Diagnostics in addition to project handbooks and Interface Sheets. An example may be found in: ITER_D_WYWGUE

#	Document	Status for FDR	Comments / Templates
6	Design Compliance Matrix (including Design Justification Plan)	Complete	The DCM is used to support the evidence that all requirements in the sub-SRD are addressed by the available design solution. Applicable Design Compliance Matrix procedure: ITER_D_473LQM The Design Justification Plan describes the strategy to provide evidence of the fulfilment of Design Input Requirements: Alternate calculation, Test (on mock-up, prototype, factory, etc.), Simulation, Expert advice, Comparison with similar system.
7	Interfaces Overview Report	Complete	A document listing all interfaces and interface sheets (ISs) and giving the status of the associated ICD and IS(s). Example of an interface sheet may be found in: ITER_D_W35MRP
8	Interface Control Documents (ICD)	Updated	Document identifying the presence of an interface between two systems at high level and listing the required Interface Sheets.
9	Interface Sheets (IS)	Complete	Document giving the details of an interface between two systems. Example of an interface sheet may be found in: ITER_D_W35MRP
10	Design Integration Review – Agenda	Complete	-
11	Design Integration Review – Minutes & Actions	Complete	-
12	CAD Model Approval Form(s) (CMAF)	Complete	Created by Design Integration after CAD model is updated.
13	CMs in ENOVIA	Complete	Configuration Model in 3D showing the space reservation for the modelled component/subsystem. -
14	DM in ENOVIA	Complete	Detailed Model in 3D showing the fine details of the modelled component/subsystem.

#	Document	Status for FDR	Comments / Templates
15	Engineering models, outside of ENOVIA (if required)	Complete	Only to be created if required – the preference is to create models in Enovia/Catia whenever possible
16	Single Line Diagram (SLD)	Complete	-
17	Cabling Diagrams	Complete	Prepared by other resources using See System Design
18	Drawings	Update	Update of the drawings produced and production of new drawings when required. Example may be found in: ITER_D_54LRQ2
19	Baseline System Design Description (DD) and Component Technical Description	Complete	Cover document that gives a general overview of the system with per section a high-level description and link(s) to (approved) technical documents on the IO-IDM for details. Examples can be found in:
20	Functional Analysis Report	Update (if needed)	The Functional Analysis of a system is a top-down description of the system as a hierarchy of functions on multiple levels, from the main functions fulfilled by the system to the basic functions performed by the components. To be used as input to the RAMI analysis. See page 16 of the Working Instruction: ITER_D_4CK4MT
21	System Load Specification(s) (SLS)	Update (if needed)	Specification of the loads for in-vessel/in-port components including closure plate and vacuum extensions. At each stage compatible with the design and approved 6 months before the Review. This is a required input document to the Structural Integrity Report (SIR) and only approved SLS are allowed as input to the SIR. Guideline to be used: ITER_D_33TTPJ

#	Document	Status for FDR	Comments / Templates
22	Bill of Materials (BOM) and System Components Classification	Complete	A full bill of materials including identification (Function Part No.), location (room) and PIC/SIC, Seismic, Quality, Vacuum, Tritium and RH classification of all components (i.e. sub-assemblies: the BOM does not identify parts). See page 24 of the ITER SDP Working Instruction: ITER_D_4CK4MT Use procedure for Diagnostic Identification of SIC Components as starting point for creating the BOM: ITER_D_TMSTZE. Example of BOM and Classification determination are in ITER_D_VVTD75 and ITER_D_VJX5F5
23	Plant Breakdown Structure	Complete	Plant Breakdown Structure for level 4 and further.
24	Technical Specifications	Consolidated	Technical specification report for each component or sub-assembly. Specifies the Design components solutions which meet the requirements. See page also item 19 and additional example in: ITER_D_VVTMNX
25	I&C System Requirement Specification (I&C SRS)	Consolidated	Guideline to be followed: ITER_D_JQLRRK
26	I&C System Design Specification (I&C SDS)	Consolidated	Guideline to be followed: ITER_D_JQLRRK
27	EM Loads calculations and analyses (as required)	Complete	Reports on all EM calculations and analyses that are referred to in Load Specifications, Structural Analysis report etc. Could also be shortcuts to generic EM calculations and analyses.
28	Thermal loads and thermo-mechanical calculations and analyses (as required)	Complete	Reports on all thermal and thermo-mechanical calculations and analyses that are referred to in Load Specifications, Structural Analysis report etc.

#	Document	Status for FDR	Comments / Templates
29	Neutron shielding, nuclear loads (heating, …) and radiation damage (DPA, RIA …) calculations and analyses (as required)	Complete	Reports on all nuclear calculations and analyses (heat loads, activation, SDDR, DPA, radiation induced damage ...) that are referred to in Load Specifications, Structural Analysis report etc.
30	Structural calculations and analyses (as required)	Complete	Reports on all structural calculations and analyses that are referred to in Load Specifications, Structural Analysis report etc.
31	Any other calculations and analyses in support of the design	Complete	Reports on all other calculations and analyses that are referred to in Load Specifications, Structural Analysis report etc.
32	Structural Integrity Report	Complete	Report summarising the different analyses that have been undertaken to demonstrate the performance of the designed system under all relevant load conditions and combinations identified in the SLS.
33	R&D and justification reports	Update (if needed)	R&D results and justifications, coming from completed studies, that support the system design. Example may be
34	Reports on existing experiences with similar systems	Update	Reports from previous experience (e.g. literature …) that support the system design justification. Note that all references should be in the public domain (i.e. journal publications that are freely available or that the ITER Organization has a subscription to).
35	RAMI Analysis Report	Update (if needed)	FMECA (Failure Mode Events and Criticality Analysis) and RBD (Reliability Block Diagrams) models and analyses used as input for the RAMI analysis should also be provided.

#	Document	Status for FDR	Comments / Templates
36	Manufacturability Assessment	Complete	A manufacturability assessment is required at FDR (to avoid that a MRR it is shown the FDR design cannot be made and the whole design has to be redone). For the same reason a preliminary assessment is requested of the manufacturability of critical parts at PDR. If only conventional manufacturing techniques are envisaged, the preliminary assessment can be a simple checklist, stating the activities foreseen for manufacturing (welding, bolting, etc.) and a statement that conventional techniques for these activities are likely to be compatible
37	Factory Qualification Test Plan	Complete	Report describing Strategy for System Qualification Testing: - Main phases of the qualification testing (description, schedule, etc.) - Specific means and Qualification tools This plan needs to identify which tests, why and when; not the details of each test (this will be recorded in the Factory Acceptance Test (FAT) procedures). See page 35 of the ITER SDP Working Instruction: ITER_D_4CK4MT
38	System Detailed Performance Definition	Complete	Full system performance description. The feasibility of main performances required for each Operating State of the System (during normal operation or incident/accident events) shall be justified. Multiple reports on each sub-item could be added to this folder, with the System Detailed Performance report giving the total overview and referring to the sub-reports. See page 35 of the ITER SDP Working Instruction: ITER_D_4CK4MT
39	Remote Handling Compatibility Assessment (RHCA)	Update	A first version of this document was produced

#	Document	Status for FDR	Comments / Templates
40	Remote Handling Plant Definition Form(s) (RH-PDF)	Complete	A first version of these documents was produced
41	Remote Handling Task Definition Form(s) (RH-TDF)	Complete	A first version of these documents was produced
42	System Integrated Logistic Support Plan (ILS)	Complete	Describes: PHST (Packaging Handling Storage Transport), Spare supply and inventory, Facilities Management, required Tools and testing equipment, Staff support for maintenance (training, qualification) … See page 26 of the ITER SDP Working Instruction: ITER_D_4CK4MT
43	On site Assembly Plan(s)	Update (if needed)	The objective of this document is to describe the step-wise assembly operations to be done on-site. See page 38 of the ITER SDP Working Instruction: ITER_D_4CK4MT
44	Assembly Procedures and Specifications specific to the system (a.k.a. Engineering requirements for installation)	Update	Updates of the documents like assembly procedures related to on-site assembly/installation; not assembly procedures that form part of the manufacturing
45	On site Testing and Commissioning Plan	Update (if needed)	The objective of this document is to describe the testing and commissioning operations to be done on-site. Top level document with a general overview of different tests and then links to more detailed test plans if required (see below). See page 39 of the ITER SDP Working Instruction: ITER_D_4CK4MT

#	Document	Status for FDR	Comments / Templates
46	Site Incoming Inspection templates	Complete	These documents describe the inspection activities to be performed on the components upon their delivery to the IO site. They comprise both a step-by-step description of how the tests are to be performed and a template on which the results are recorded (the filled-in template is called a “Site Incoming Inspection form”).
47	Site Acceptance Test templates	Complete	These documents detail the Site Acceptance Tests to be performed on the components following their delivery to the IO site. They comprise both a step-by-step description of how the tests are to be performed and a template on which the results are recorded (the filled-in template is called a “Site Acceptance Test form”). Example may be found in: ITER_D_652YW2
48	System Concept of Operation	Complete	Describes operating states and operation of the system, regarding the common framework defined in "Operations Handbook - 2 Operational States". See page 27 of the ITER SDP Working Instruction: ITER_D_4CK4MT
49	Maintenance, Test & Inspection Plan	Complete	Defines: List and description of (periodic) test and inspections (preventive and linked with Safety studies...), list and description of maintenance activities (periodic/preventive and curative), Maintenance and inspection time, dose & manpower (& periodicity), specific means and maintenance/inspection tools, ... See pages 28 and 29 of the ITER SDP Working Instruction: ITER_D_4CK4MT

#	Document	Status for FDR	Comments / Templates
50	List of Spare parts	Complete	At PDR, based on the output of the RAMI analysis and component lifecycle estimation, those components that are likely to require spare parts need to be identified. A final list of spare parts (with quantities and requirements) needs to be provided at FDR.
51	On-Site utilities Requirements	Complete	At PDR, based on the output of the RAMI analysis, critical on-site utilities needed for maintenance need to be identified. A list of required on-site utilities needs to be provided at FDR.
52	Decommissioning Plan	Complete	Describe the decommissioning operations if the system specificities require additional information besides the ITER overall decommissioning strategy. OR Justification that the system does not require any specific decommissioning requirements. See page 40 of the ITER SDP Working Instruction: ITER_D_4CK4MT
53	Checklist for Radwaste Inventories	Complete	Checklist of the radwaste (and waste classification). Used as input to the decommissioning plan and to be reported to PBS 66 - Radwaste treatment and storage.

#	Document	Status for FDR	Comments / Templates
54	Readiness Assessment	Complete	Short report/checklist on Readiness that includes: (A) Link to report on status of PCRs that affect the system. (B) Link to report on status of all Deviation Requests and Non-Conformity Reports that affect(ed) the system. (C) Link to the Interfaces Overview Report and to the actions/minutes of the (most recent) Interface Review meeting (D) Link to the Design Compliance Matrix (DCM) (E) Link to the (draft) agenda of the Design Review (F) Link to the Design Review Input Package list
55	PCR status report	Complete	Report on Project Change Requests (PCR) resolution showing which PCRs from the former design review (or the beginning of the phase) are impacting the design, which ones have been implemented in the design to be reviewed (i.e. closed PCRs); and which ones have not yet been implemented (i.e. open PCR) with justification and
56	Status report Deviation Requests and Non-Conformities	Complete	Report on Deviation Requests (DR) or Non-Conformance Reports (NCR) resolution showing which DR/NCRs are impacting the design, which ones have been implemented in the design to be reviewed (i.e. closed DR and NCR); and which ones have not yet been implemented (i.e. open DR and NCR) with justification and risk
57	Notification Document	Complete	
58	Agenda	Complete	
59	Input Data Package List	Complete	List of documents - with document versions - that are applicable to the design review.

#	Document	Status for FDR	Comments / Templates
60	Chit Close Out Action plan	Complete	List of at least all cat. 1 and safety related chits. Lists for each chit the associated action in the ITER Action database, the action RO, the competent stakeholder(s) for reviewing the action, the criteria for closure of the action and the due date for completion approval.
61	Cat 1 Chit Resolution Report(s)	Complete	Completed after the Review, but before Review close-out. Note: each chit will be assigned an action. The answer to that action can be a very short (1 line/paragraph) summary and a link to this Cat 1 Chit Resolution Report(s) for the detailed resolution.
62	Close Out report	Complete	Report shall: - show that all Cat. 1 chits have been resolved or approved for later resolution - propose the closure of the Design Review - describe the status of remaining cat. 2 chits and a plan for their resolution - include the list of design documents submitted to the DR, with their approved or accepted versions.
63	Signatures of Participants	Complete	-
64	Final panel report	Complete	Produced by the Design Review Chair but may require support for IDM uploading, allocation of reviewers etc.
65	Design Review Minutes	Complete	Produced by the Design Review Secretary but may require support for review/clarification.

#	Document	Status for FDR	Comments / Templates
66	Manufacturing and Inspection Plans	N/A	Produced by Manufacturer but may require support for review/clarifications
67	Detailed Manufacturing Schedule	N/A	Produced by Manufacturer but may require support for review/clarifications
68	Test Plans	N/A	Produced by Manufacturer but may require support for review/clarifications
69	MRR Plan	N/A	Produced by Manufacturer but may require support for review/clarifications