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EXTERNAL REFERENCE

Technical Specifications (In-Cash Procurement)

BRN I-15-749 Project Engineering Support x 4

The objective of this Call for Expertise is to provide the IO Technical Responsible Officer or deputy (hereafter known as the IO-TRO) with specialist project engineering support, in the form of four appropriately qualified and experienced Project Engineers (hereafter known as the Engineers).

The scope of work to be performed by the Engineers will be carried out in close liaison with the TRO, engineers and planners of the AOP Division and will include, but shall not necessarily be limited to ...

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1 Purpose

The objective of this Contract (to be awarded in four lots) is to provide the IO Technical Responsible Officer or deputy (hereafter known as the IO-TRO) with specialist project engineering support, in the form of four appropriately qualified and experienced Project Engineers (hereafter known as the Engineers).

Within the context of this contract:

> *"Project engineering support is the function of compiling, and/or organising, and coordinating activities and deliverables with other specialists to successfully deliver the scope of work of each project (Lot) within the specified quality and schedule requirements".*

The scope of work to be performed by the Engineers will be carried out in close liaison with the IO-TRO, engineers and planners of the AOP Division and will include, but shall not necessarily be limited to four Lots:

A. Support to the preparation and execution of 'early' mechanical and piping, and electrical installation works at the ITER site.

B. Support to technical studies and reviews during implementation of the site construction contracts strategy.

C. Support to the preparation of the site construction baseline prior to Construction Readiness Review (CRR).

D. Support to the implementation of Site Construction Management Systems, Processes, and Procedures.

2 Scope

2.1 The ITER Project

The ITER project aims to demonstrate the scientific and technological feasibility of fusion power for peaceful purposes and to gain the knowledge necessary for the design of the next-stage device, DEMO, or the DEMOnstration fusion power plant.

Receiving 50MW of input power, the ITER Machine is designed to produce 500 MW of fusion power for extended periods of time. This represents ten times more than the input power needed to keep the plasma at temperature. It will therefore be the first fusion experiment to produce net energy. It will also test a number of key technologies, including heating, control, and the diagnostics and remote maintenance that will be needed for DEMO.

The main regulatory documents pertaining to the mechanical components for ITER are:

- The Quality Order dated 7 February 2012 relating to the general technical regulations applicable to INB – EN updating:
  - Order of 10 August 1984 relating to the quality of design, construction, operation and decommissioning of nuclear installations (so called quality order);
  - Order of 26 November 1999 setting general technical stipulations concerning limits and modalities of the samples and releases subject to authorization, carried out by the INB; and

- Order of 31 December 1999 setting the general technical regulatory controls intended to prevent and limit external nuisances and risks resulting from the operating of INB.

- Decree No. 99-1046 dated 13th December 1999 concerning pressure equipment – Introduction of the pressure Equipment Directive in France (French acronym ESP/PED)

Further information can be found on the ITER website (http://www.iter.org) and also at the web pages of the ITER Parties that can be accessed via the ITER website.

2.2 The ITER Organization

ITER is a joint international research and development project for which initial construction activities have recently started.

The seven Members of the ITER Organization are 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 will be constructed in Europe, at Cadarache, in southern France, where the ITER Organization (IO) has its headquarters.

The Members of the ITER Organization will bear the cost of the project through its 10-year construction phase, and its 20-year operational phase before decommissioning. With respect to the construction of the ITER machine, most of the components will be contributed by the Members as in-kind contributions. The remaining investment will be via cash contributions from the members.

2.3 Assembly and Operations – The Mission

The scope of the Assembly and Operations (AOP) Division is to provide construction support for:

- The assembly of the ITER machine;
- The installation and functional testing of IO Plant Systems in Buildings and Areas on the ITER Site.

Specify requirements for special (custom) tools used in assembly and installation of the Machine and IO Plant Systems. Tools are defined and approved by PBS 22 Machine Assembly and Tooling Section and are supplied either by DA or from IO Fund.

Undertake role and responsibilities of the **Construction Manager** (1) during assembly, installation and testing at the ITER site. Specific site construction activities include materials management (site reception, offloading, unpacking, storage, handover to Constructor), execution of works (assembly, handling, installation) and testing (installation, component, performance).

Undertake role and responsibilities of the **Start-up and Testing,** and **Integrated Commissioning Manager** (2) subsequent to assembly, installation and testing at the ITER site.

Undertake role and responsibilities of the Operator, following the Handover of Structures, Systems and Components (SSCs) for the ITER Facility.

Provide support to Transport and Logistics associated with the delivery of components to the ITER Site.

(1) **Construction Manager** is the unit within the Operator for the oversight, planning and coordination of all Assembly and Installation activities. The Construction Manager takes overall responsibility for the coordination of safety of assembly and installation activities and

reports to the IO Site Safety Coordinator. The Construction Manager is responsible for issuing work permits on the worksite.

(2) **Start-up and Testing** and **Integrated Commissioning Manager** is the unit within the Operator for the oversight, planning and coordination of all testing and commissioning activities. The Start-up and Testing and Integrated Commissioning Manager is responsible for ensuring that the overall sequence of commissioning activities is planned, prepared and performed.

3 Definitions

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

Acronym	Description
AACE	American Association of Cost Engineers
AOP	Assembly and Operations Division
APM	Association of Project Management
BoE	Basis of Estimate
CPD	Construction Process Description
CWP	Construction Work Package
DA	Domestic Agency
EVM	Earned Value Management
IO	ITER Organization
IO-TRO	IO Technical Responsible Officer
INB	Basic Nuclear Installation
KPI	Key Performance Indicator
PBS	Plant Breakdown Structure
PMI	Project Management Institute
RFI	Requests for Information
SSC	Structures, Systems and Components

4 References

[1] ITER Policy on Authority and Responsibilities during Assembly, Installation and Testing at the ITER Site (A5TUQN)

[2] ITER Site Construction Project Management Plan (ECBZWE)

[3] ITER Site Construction Requirements Management Plan (DZHMAK)

[4] ITER Site Construction Scope Management Plan (DZL8VL)

[5] ITER Site Construction Engineering Management Plan (EH5ET3)

[6] ITER Site Construction Schedule Management Plan (E38VRM)

[7] ITER Site Construction Cost Management Plan (EBUTK5)

[8] ITER Site Construction Field Quality Management Plan (FCYR7F)

[9] ITER Site Construction Field Configuration Management Plan (EBUK3B)

[10] ITER Site Construction Resource Management Plan (ECEFE6)

[11] ITER Site Construction Communication Management Plan (EBQA66)

[12] ITER Site Construction Risk and Opportunity Management Plan (ECH4AK)

[13] ITER Site Construction Materials Management Plan (92VZ3G)

[14] ITER Site Construction Works Management Plan (ECCBR2)

[15] ITER Site Construction Health, Safety and Environmental Management Plan (EC8ALD)
[16] ITER Site Construction Procurement and Contracts Management Plan (JPDBFC)
[17] ITER Site Construction Documentation and Data Management Plan (JQGTVR)
[18] ITER Site Construction Start up, Testing and Turnover Management Plan (LX96CK)

5 Estimated Duration

The duration of this Contract shall be 12 months.

6 Overview and Work Description

1. During 2013-2014 a comprehensive **contracts strategy** has been prepared comprising the following Site Construction contracts:

   - Construction Management Services Contract
   - Machine Assembly Works Contract
   - Mechanical & Piping Works Contract
   - Electrical, Cabling, Instrumentation & Control Works Contract
   - Specialised Works Contract
   - Field Quality, Testing & Surveillance Support Contract
   - Welfare Premises Support Contract
   - Finishing/Civil Works Support Contract
   - Site Materials & Logistics Support Contract
   - Scaffolding and Access Equipment Support Contract
   - Tools and Plant Hire Support Contract

   Preparation of specifications for the above contracts commenced in Q4 2014 and contract tenders, evaluations, and award are anticipated to continue into Q2-Q3 2016.

2. During 2014-2015 a comprehensive **Site Construction Project Management Plan** is being developed and 'implemented' defining how the construction phase of the ITER project (including the preparation for construction and machine operations) will be initiated, planned, executed, monitored, controlled, and closed:

   - How management process will be developed, used and integrated
   - How work will be executed
   - How changes will be controlled
   - How communication will be managed
   - How assembly baselines, procedures and instruction documents will be managed

   Each plan identifies the basic principles and conventions for the subject matter

   Deliverables are identified within project lifecycle phases i.e. during preparation, mobilisation, execution etc..,

   Introduce new terminology not commonly used in the project up to now

   The Site Construction Project Management Plan volumes are listed below and these will be 'underpinned' by more detailed Working Instructions and templates covering the following areas:

   0. Project Management
   1. Requirements Management
   2. Scope Management

3. Engineering Management
4. Schedule Management
5. Cost Management
6. Field Quality Management
7. Field Configuration Management
8. Resource Management
9. Communication Management
10. Risk Management
11. Site Materials Management
12. Site Construction Works Management
13. Health, Safety and Environment Management
14. Procurement & Contracts Management
15. Documentation & Data Management
16. Start-up, Testing, and Turnover Management

3. During 2014-2015 a comprehensive **performance baseline** for Site Construction is being developed, comprising:
    - **Primavera schedule** including contracts preparation, engineering, project management, materials management, works, testing and commissioning related tasks, this is used for managing the performance of work and for forward planning:
        - Preparation for Construction
        - Site Materials
        - Construction (Assembly and Installation works)
        - Start-up and Testing
        - Integrated Commissioning
    - **Statements of the work scope** consistent with the approved ITER detailed WBS using a web based application:
        - Description of the scope
        - Technical Pre-Conditions
        - Exclusions
        - Process for execution
        - Completions and Acceptance Criteria
    - **Cost Estimate** for the Site Construction scope of work to include all IO scope including Management, Surveillance, and Assembly, and Testing activities on the ITER platform.
        - The Cost Estimate is being prepared at an overall Class 3[1] (budgetary) level and is being produced in the Cleopatra Enterprise Cost Estimating software with deviations in the estimate quality for discrete work packages i.e. to Class 2 or Class 4 level.
        - The Cost Estimate is being prepared using European industrial Labor rates contained within the IO Cleopatra Enterprise software and using industry best practices for Cost Estimation.
        - The Basis of Estimate (BoE) is being prepared in Microsoft Office software.

[1] American Association of Cost Engineers (AACE) 17R-97: Cost Estimate Classification System

4. During 2014-2015 a comprehensive **constructability/engineering study** is being documented for the site construction scope comprising:
    - Construction Process Descriptions (CPD), a non-contractual description of the assembly and installation of components within a Construction Work Package (CWP)[2] containing information sufficient to describe and demonstrate a feasible methodology for Assembly and Installation purposes. The CPD will be developed as the system design matures and technical details are finalised:
        - Configuration of SSC upon Delivery to Worksite
        - Assumptions
        - Exclusions
        - Technical and Schedule Constraints
        - Planning Basis
        - Sequence Diagram
        - Preparation
        - Construction
        - In-Process Verifications and Inspections
        - Completion and Final Inspections
        - Identification of risks and opportunities in the design
        - Tooling and Equipment
5. During 2015 **preparations for installation** at the ITER site of a limited scope of Mechanical and Piping systems including the underground Cooling Water systems will commence. This will include the critical review of specifications, designs, procedures, and schedules prior to monitoring and surveillance of the works (works performed by a third party contractor).

Project Engineering is thus a critical activity in the area of Site Construction and four [4] full-time Engineers are required to support the activities in this area.

Lot A: Support to the preparation and execution of 'early' mechanical and piping, and electrical installation works at the ITER site:

Task	Description
A-1	Project planning and integration ▪ Site Construction Requirements ▪ Scopes of work ▪ Project schedules ▪ Cost estimates
A-2	Reviews of contractor documents ▪ Drawings ▪ Models ▪ Specifications ▪ Procedures ▪ Plans ▪ Schedules

[2] A Construction Work Package (CWP) is an executable construction deliverable that defines in detail a specific scope of authorised work and which includes a budget and schedule that can be compared with actual performance. The scope of work in a CWP is such that it does not overlap another CWP. Nominally a CWP is therefore a discrete element of the ITER Plant Breakdown Structure (PBS) or other significant work scope such as the preparation of a facility or area.

A-3	Identification and logging of issues requiring IO intervention
A-4	Responses to Technical queries and Requests for Information (RFI)
A-5	Monitoring and surveillance of Installation Works

Table 6.1: Tasks within Lot A

Lot B: Support to implementation of the site construction contracts strategy:

Task	Description
B-1	Installation scope studies
B-2	Contract boundaries and interfaces
B-3	Installation volumes and quantities studies
B-4	Equipment and Tooling studies
B-5	Installation resource studies
B-6	Reviews of Site Construction Specifications
B-7	Technical studies for specific systems

Table 6.2: Tasks within Lot B

Lot C: Support to the preparation and implementation of:

Task	Description
C-1	WBS Dictionaries
C-2	Scope statements
C-3	Schedules
C-4	Site Construction Requirements
C-5	Specific and Generic Procedures
C-6	Interfaces
C-7	Change control support
C-8	Installation processes and sequences
C-9	Mechanical and Electrical Completions processes and sequences
C-10	In-systems and Inter-system Connections processes and sequences
C-11	Lifting and handling studies for specific systems
C-12	Kinematic studies for specific systems
C-13	Equipment and Tooling studies for specific systems
C-14	Identification of configuration items forming the technical baseline
C-15	Construction Readiness Review Lot preparation
C-16	Implementation of the Site Construction Baseline

Table 3.3: Tasks within Lot C

Lot D: Support to the implementation and integration of Site Construction Management systems:

Task	Description

D-1	Support development of interfaces to, and reporting from, the SmartPlant suite: ▪ SmartPlant Construction ▪ SmartPlant Materials ▪ SmartPlant for Owner Operators
D-2	Support development and full implementation by IO users of the Suppliers database including data verifications and development of processes for data reconciliation with schedule interfaces, and reporting
D-3	Support development of interfaces between Primavera P6 and other CM applications including data verifications, reports, and quality checks
D-4	Support development of Scope database and its interface with Primavera including management processes
D-5	Support preparation of system specifications and enhancements to the systems required by IO users
D-6	Support development of user processes and flow charts
D-7	Support development of procedures and guidance notes for the above applications and databases
D-8	Development of communication packages for users and stakeholders
D-9	Development of training materials for users

Table 6.4: Tasks within Lot D

7 List of Deliverables and Due Dates

The tables below identify the preliminary timetable for completions of deliverables.

1. Intermediate deliverables within each of the four Lots will be discussed with the Engineers before their commencement and their scope and due dates agreed each month.
2. Finish dates indicate when the final in a series of deliverables are expected to be completed.

List of Deliverables and their Schedule			
Del.	**Description**	**Due Date**	**Acceptance criteria**
Lot A : Support to the preparation and execution of 'early' mechanical and piping, and electrical installation works at the ITER site			
A-1	Project planning and integration	As required Finish T+6m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
A-2	Reviews of contractor documents	As required Finish T+6m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
A-3	Identification and logging of issues requiring IO intervention	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
A-4	Responses to Technical Queries and Requests for Information (RFI)	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
A-5	Monitoring and surveillance of Installation Works	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
Lot B : Support to implementation of the site construction contracts strategy			
B-1	Installation scope studies	As required Finish T+8m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy

B-2	Contract boundaries and interfaces	T+4m	Deliverables accepted by AOP/PCD Division Heads Bi-weekly reports accepted by IO-TRO
B-3	Installation volumes and quantities studies	As required Finish T+8m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
B-4	Equipment and Tooling studies	As required Finish T+8m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
B-5	Resource studies	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
B-6	Reviews of Site Construction Specifications	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
B-7	Technical studies for specific systems	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy

Lot C: Support to the preparation and implementation of the Site Construction Baseline

C-1	WBS Dictionaries	Finish T+6m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-2	Scope statements	Finish T+8m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-3	Schedules	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-4	Site Construction Requirements	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-5	Specific and Generic Procedures	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-6	Interfaces	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-7	Change control support	As required	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-8	Installation processes and sequences	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-9	Mechanical and Electrical Completions processes and sequences	Finish T+9m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-10	In-systems and Inter-system Connections processes and sequences	Finish T+10m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-11	Lifting and handling studies for specific systems	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-12	Kinematic studies for specific systems	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-13	Equipment and Tooling studies for specific systems	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-14	Identification of configuration items forming the technical baseline	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-15	Construction Readiness Review package preparation	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
C-16	Implementation of the Site Construction Baseline	Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy

Lot D: Support to the implementation and integration of Site Construction Management systems

D-1	SmartPlant suite	Finish T+6m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-2	Suppliers database	Finish T+3m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-3	Primavera P6	Finish T+2m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-4	Scope database	Finish T+5m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-5	System specifications	Finish T+6m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-6	User processes and flow charts	Finish T+7m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-7	Procedures and guidance notes	Finish T+7m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-8	Communication packages	As required Finish T+12m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy
D-9	Training materials	Finish T+9m	Deliverables and Bi-weekly reports accepted by IO-TRO or deputy

T0 = date of the kick-off meeting

8 Acceptance Criteria

All deliverables and bi-weekly reports will be subject to the approval of the IO-TRO mentioned in the Contract or his authorized deputy.

9 Specific requirements and conditions

The contractor shall use the ITER software's, aided by plans and procedures that are being implemented by the IO:

- Reports, analysis, and simulations shall be prepared consistently with the IO Cost Breakdown Structures and the IO Site Construction contracts structure.
- Studies and Cost Estimates for Project Change Requests shall be prepared consistently with the ITER Project Change procedures.
- Performance reports shall be prepared using ITER standards and templates.
- Scheduling shall be performed in the ITER Construction Primavera database

ITER has chosen:

- *Primavera* as its scheduling tool.
- *Intergraph SmartPlant Materials, SmartPlant Construction, and SmartPlant for Owner Operators* as the system to support the execution phases of the work.
- *Cleopatra* for Site Construction cost estimating

The work will require detailed investigation and review of existing documentation, industry standards and best practices.

Briefing materials will be prepared as necessary to explain results of analysis, progress etc., to the IO-TRO.

The IO-TRO will provide necessary support to the Contractor in the form of input materials, access to existing documentation, and access to subject matter experts. The Engineers' full-time presence at the ITER site is necessary for the effective performance of the duties.

Each work task will be individually discussed in consultation with the IO-TRO and a deliverable date will be agreed.

10 Work Monitoring / Meeting Schedule

Completion of work items will be confirmed by the IO-TRO or his authorized deputy. For longer tasks an interim monitoring point may be defined.

The work shall require the permanent presence of the Engineers at the site of the ITER Organization.

Bi-weekly progress meetings shall be held between the Engineers and the IO-TRO, or his deputy, along with other relevant staff. The experts shall be responsible for producing minutes of these meetings and tracking actions and for preparing a report including the status of specified deliverables and the actual number of days worked.

The official language of the ITER project is English.

11 Required Qualifications and Experience

- For Lots A-D the Engineers shall have the following qualifications and experience:
  - **Lot A** - minimum of 5 years proven experience in a Construction Project Engineering role performing the collection and coordination of mechanical and piping systems. Including critical reviews of design information, technical specifications, contractor documents, project planning and scheduling (prepared by others), and the associated issues management and resolutions.
  - **Lot B** – minimum of of 5 years proven experience in a role associated with the preparation of site construction contracts including technical specifications, studies, optimisation of contractor interfaces and scopes of work.
  - **Lot C** – minimum of of 5 years proven experience in a role associated with the preparation and control of project planning and project management documents. These documents include studies, scope statements, schedule, and support to reviews for the assembly and installation of integrated systems. Accreditation with Project Management Institute (PMI), Association of Project Management (APM), or similar is preferable.
  - **Lot D** – minimum of of 5 years proven experience in a role associated with the implementation of management systems including the preparation of user guidance, process charts, and training materials.
- Fluent in the English language, written and spoken;
- Experience of working within a team;
- Ability to work in an international environment;