Call for Nomination

Thermal Insulation for the Tokamak Cooling Water System - First Plasma Scope

Ref. ITER_D_5JNPLT

Purpose

In the frame of the Call for Nomination regarding the future contract / purchase order for the supply of Thermal Insulation dedicated to the Tokamak Cooling Water System (TCWS), this document summarizes the main requirements related to the design & qualification, manufacture and scope of supply and services required for the First Plasma operations.

Background

ITER ("The Way" in Latin) is one of the most ambitious energy projects in the world today. 35 nations are collaborating to build the world's largest tokamak, a magnetic fusion device that has been designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy based on the same principle that powers our Sun and stars.

For more information on the ITER project: http://www.iter.org.

The Tokamak Cooling Water System (TCWS) is the primary coolant system of ITER machine having the main aim to remove the heat generated by the plasma and transferred to dedicated components of the machine and to release it to the secondary coolant system.

The TCWS is based on three Primary Heat Transfer Systems (PHTSs): VV PHTS for cooling the Vacuum Vessel, IBED PHTS for cooling the in-vessel components and NBI PHTS for cooling the Neutral Beam Injectors.

The TCWS includes auxiliary systems as the Chemical and Volume Control System (CVCS), Draining and Refilling System (DRS), and Drying System (DYS). The Tokamak Cooling Water System (TCWS) has also the following functions:

- To provide the decay heat cooling,
- To provide hot water (up to 240 °C and 4.4 MPa) and hot nitrogen gas (up to 400 °C 2.0 MPa) for baking of Vacuum Vessel and In-Vessel Components,
- To confine the activated corrosion products and the tritium potentially contained in the water.

TCWS piping is located in the nuclear Building 11 at different levels and on the roof. The material used for the piping network (spools, flanges, valves, etc.) and equipment is nuclear grade stainless steel (SS304L, SS316L) with outer diameter varying from DN10 to DN600.

As an overall picture, for first plasma operations, the TCWS networks comprise approximately 23 km of insulated piping and 2000 valves. The insulation will protect all pipes, valves, fittings, equipment, interface with primary pipe supports and all piping specialities (such as flanges, filters etc). Pipe Support insulation is out of scope.

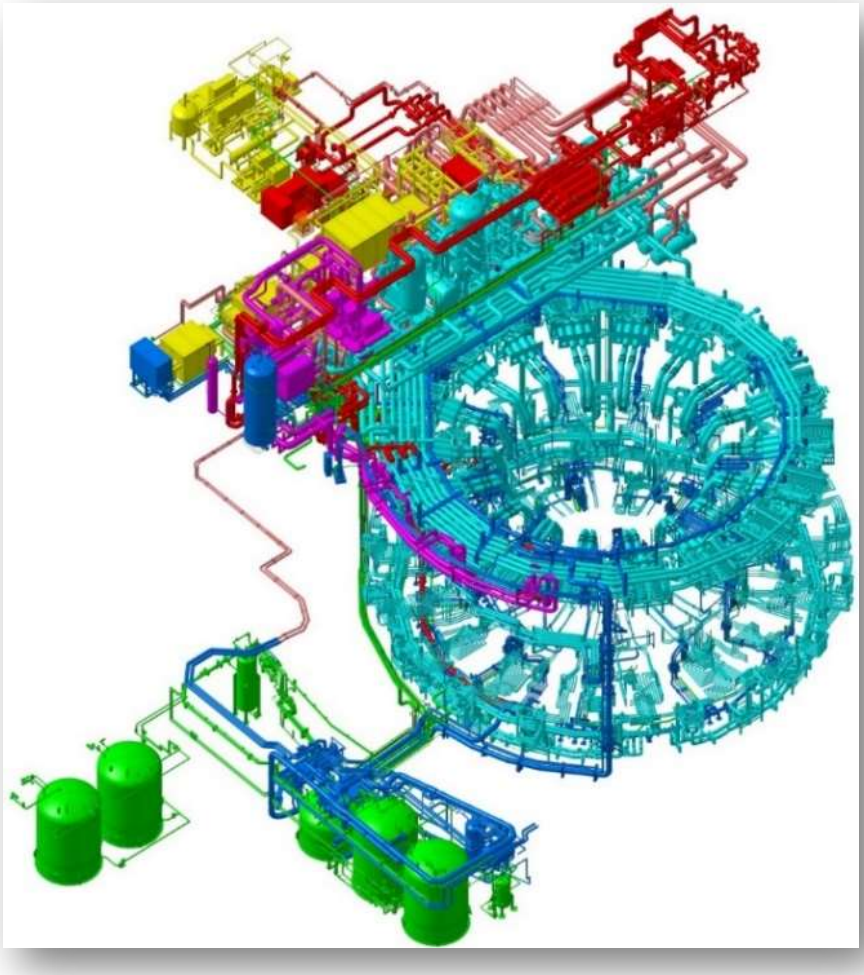

Figure 1 – Overall layout of the TCWS networks

Industrial Experience

The Supplier shall have experience for the development of high performance thermal insulation systems, preferably on Nuclear projects, particularly regarding:

- Development of reliable complete insulation solutions (insulation + jacketing + supports of insulation and/or finishing) compliant with nuclear project specificities (radiation exposure, design life, decontamination, congested areas, etc.)
- Engineering and field engineering capabilities, to perform thermal insulation design justification (basis of design, thickness definition, materials specification, etc.), installation procedures, typical and detail drawings, bill of quantity, materials take off, etc.
- Coordination and / or execution of qualification and testing campaign to demonstrate technical compliance with the project requirements such as fire, radiation ageing, seismic loading, halogen contents, etc.
- Manufacturing and supply of High Performance Thermal Insulation (HPTI) material for in-line components (mainly pipes, valves, orifices and flanges) and equipment capacities for large-scale projects.

Work Description & Procurement Process

As per industry practice, Supplier will be required to deliver project documentation to demonstrate the compliance with ITER project requirements.

The thermal insulation solution will require to comply with the functional and interface requirements. In particular, space constraint and congested environment in which the cooling water systems are implemented shall be carefully considered.

The thermal insulation design package (to be issued during contract / Purchase Order implementation) shall be self-supporting, such that at the end of Supplier activities, the outcome shall be detailed enough to be submitted to an installation Contractor for site implementation.

Interested companies shall demonstrate that they have all required quality certifications, and from financial point of view, that they are able to deal with large scale projects.

The procurement process intended to be put in place will contain the following steps:

- **Step 1 - Prequalification:**

Potential bidders will be required to provide as a minimum:

- Preliminary technical information, such as technical note with thickness validation for piping and equipment, materials specification, products data sheets (including jacketing, insulation material and supports of insulation and/or finishing),
- Administrative, Safety & Quality information,
- Projects experiences,
- Financial capabilities.

- **Step 2: Tender Process:**

Prequalified bidders will receive tender documents including but not limited to the Technical Specification, the conditions of contract and the instructions to bidders. Bidders will be required to provide in their offer (to be divided into a technical part and a financial part) the following non-exhaustive detailed information:

- Detail technical information such as installation manual with typical drawings, and material take offs, etc,
- Qualification process definition and strategy (laboratories, tests etc),
- Project time schedule and logistics details,
- Schedule of prices including breakdown of costs.

A two-step tender evaluation process will be conducted as further detailed below.

- **Step 3 - Contract / Purchase Order Signature:**

The contract / purchase order will be signed between the selected Supplier and META SNC, a consortium of three companies with whom the ITER Organization (IO) had signed the Tokamak Complex Contract – TCC2 in December 2020.

- **Step 4 - Contract / Purchase Order Implementation:**

1. Qualification

Thermal insulation system shall be verified against possible environmental conditions including fire, ageing, seismic loading, etc. Therefore, on top of the base case material properties, compatible with a long-term performance, the selected thermal insulation materials shall be qualified / tested in order to validate their compliance against project requirements such as:

- Fire (2 hours, ISO 834),
- Seismic loading,
- Radiation ageing,
- Thermal ageing,
- Halogen content,
- Capacity of being dismountable for regulatory in-service inspections,
- Decontaminability

Qualification against fire (reaction to fire and fire resistance behaviour) shall be performed under the French regulation (Order of 22 March 2004 related to the fire resistance of products, construction elements and works & Order of 21 November 2002 relating to the reaction to fire of construction and development products) and certified by a French agreed laboratory (Order of February 5, 1959, approving laboratories for testing the fire behaviour of materials).

Technical design justification and qualification shall be concluded by a final compliance dossier, submitted by the Supplier, which aims at demonstrating that all design requirements (regulatory if any, safety and functional & technical) have been considered and met.

2. Manufacture, Supply & Delivery

The manufacturing design and all the corresponding documentation (drawings, technical datasheets, manufacturing and shipping procedures, declaration of conformity, quality control procedures, Manufacturing Inspection Plans, release notes, etc.) shall be prepared. It shall be reviewed before the start of fabrication through a Manufacturing Readiness Review.

The fabrication shall be controlled and adequate quality assurance system and subsequent quality control activities shall be implemented. This manufacture activity can be subject to the IO or IO representative inspection/oversight.

Finally, material will be supplied and delivered to ITER site as DAP Cadarache FRANCE.

3. Support for onsite installation

Installation activities will not be part of the scope of this contract / purchase order. The installation activities will be performed by the Contractor META SNC.

Before the actual installation activities can start, detailed installation procedure documentation shall be submitted to META and to the IO for review and approval process.

However at the beginning of the site works, and as an option, some technical support could be required to brief, train and possibly perform ad-hoc inspections to confirm correct implementation of thermal insulation.

Technical assistance to reply to technical queries or deviation requests raised by installation Contractor can be therefore included as part of the design phase (field engineering).

Contractual Scheme

The overall responsibility of the design, qualification, procurement and supply of HPTI materials and the preparation/pre-fabrication of these HPTI materials for TCWS piping, in-line components and equipment is given to META SNC. Therefore, META SNC will be responsible for the procurement process described above under the supervision of the IO to ensure compliance with the IO procurement principles. IO is launching this Call for Nomination process and META SNC will include in their call for tender(s) the qualified bidders after a prequalification process carried out on potential bidders obtained through this CFN.

The Tender Evaluation Criteria will be agreed with the IO prior to call for tender launch and thereafter IO representatives will witness all the steps of the procurement process.

META SNC will conduct a two-step tender evaluation process, opening the Financial Offers only when Technical Evaluation has first been passed successfully.

The awarded Supplier for the supply of HPTI thermal insulation materials will sign a contract / purchase order with META SNC after consultation with the IO.

Timetable

The tentative timetable is as follow:

Call for Nomination	January 2023
Prequalification	March - May 2023
Tender submission date	July 2023
Award contract date	October 2023
Contract start date	November 2023
Contract end date	October 2027

Candidature

Participation is open to all legal persons participating either individually or in a grouping (consortium) which is established in an ITER Member State. A legal person cannot participate individually or as a consortium partner in more than one application or tender. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) shall be jointly and severally liable. The consortium cannot be modified later without the approval of META SNC and the ITER Organization.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Bidders' (individual or consortium) must comply with the selection criteria. META SNC and the ITER Organization reserves the right to disregard duplicated references and may exclude such legal entities form the tender procedure.