



Contract for the Completion of the Final Design for TCWS

SUMMARY

Purpose

The purpose of this Contract is the Completion of the Final Design for TCWS and the relevant Final Design Review under the direct responsibility of IO CWS Section.

Background

The ITER Cooling Water System (CWS) consists of the Tokamak Cooling Water System (TCWS), the Component Cooling Water System (CCWS), the Chilled Water System (CHWS), and the Heat Rejection System (HRS)

The TCWS is designed to reject all the heat generated in the plasma and transmitted to the in-vessel components to the intermediate closed loop Component Cooling Water System (CCWS-1) and then to the environment via the open Heat Rejection System (HRS). In particular, during the D-T Plasma phase, the heat transmitted and generated in the in-vessel component (IVCs) will be transferred, through the Primary Heat Transfer Systems (PHTSs) to the intermediated closed Component Cooling Water System (CCWS-1) and then, via the open loop Heat Rejection System (HRS), to the environment.

The HRS also absorbs heats through the CCWS-2 from other non-nuclear systems like the Chilled Water System (CHWS), the Cryogenic System, the Steady State Electrical Power Network (SSEPN) and other auxiliary systems. The CCWS-2 is further divided in CCWS-2A, 2B, 2C, and 2D to provide separated chemical control and prevent galvanic corrosion among the different material (SS, Cu, Al) of the clients' components.

CHWS is divided in CHWS-H1 for SIC systems and CHWS-H2 for non-sic components. The HRS rejects all the heat from ITER components (nuclear and non-nuclear) to the environment.

The total heat load to be removed at reference plasma operation by the CWS is about 1200 MW with the following single design requirements (excluding contemporary operations but including margin):

- TCWS is designed for about 1100 MW – 6100 kg/s;
- CCWS-1 is designed for about 982 MW – 5800 kg/s;
- CCWS-2 is designed for about 164 MW – 4300 kg/s with the:
 - CCWS-2A is designed for about 40 MW – 900 kg/s;
 - CCWS-2B is designed for about 28 MW – 1100 kg/s;
 - CCWS-2C is designed for about 6 MW – 160 kg/s;
 - CCWS-2D is designed for about 90 MW – 2150 kg/s;
- CHWS-H1 is designed for about 2.2 MW – 90 kg/s;
- CHWS-H2 is designed for about 27.5 MW – 1100 kg/s;

- HRS is designed for about 500 MW – 10500 kg/s.

The TCWS serves the following clients via three PHTSs:

- Vacuum Vessel (VV-PHTS)
- Integrated Blanket / ELMs / Divertor (IBED-PHTS)
- Neutral Beam Injectors (NBI-PHTS)

The TCWS PHTSs perform the following functions:

- Provide cooling water to client systems for heat removal during plasma operations;
- Maintain coolant temperatures, pressures, and flow rates as required;
- Provide cooling water to client systems for decay heat removal following plasma operations;
- Provide baking for VV and in-vessel components (not for NBI);
- Provide the primary confinement for Activated Corrosion Products (ACPs) and tritium entrained in cooling water outside the VV and maintain leak-tight integrity during all system states;
- Transfer heat from client systems to the CCWS-1 or to the CHWS-H1 via the main heat exchangers;
- Measure heat removed from the main clients FW/BLK, DIV, ELMs, NBI and VV.

The supporting functions are provided by the Chemical and Volume Control System (CVCS), Draining and Refilling System (DRS) and Drying System (DYS).

The CVCSs perform the following functions:

- Control the chemistry of cooling water provided to client systems;
- Control the concentration of ACPs in the cooling water provided to client systems;
- Controls system volume for IBED and NBI PHTSs.

The DRS and DYS perform the following functions:

- Provide the capability to drain and refill TCWS components for maintenance, and leak detection and localization;
- Provide the capability to drain, refill, and dry, if necessary to meet the leak localization and maintenance requirements of client systems.

The TCWS is primarily located in the Tokamak Complex as shown in the Fig. 1.

TCWS in Tokamak complex

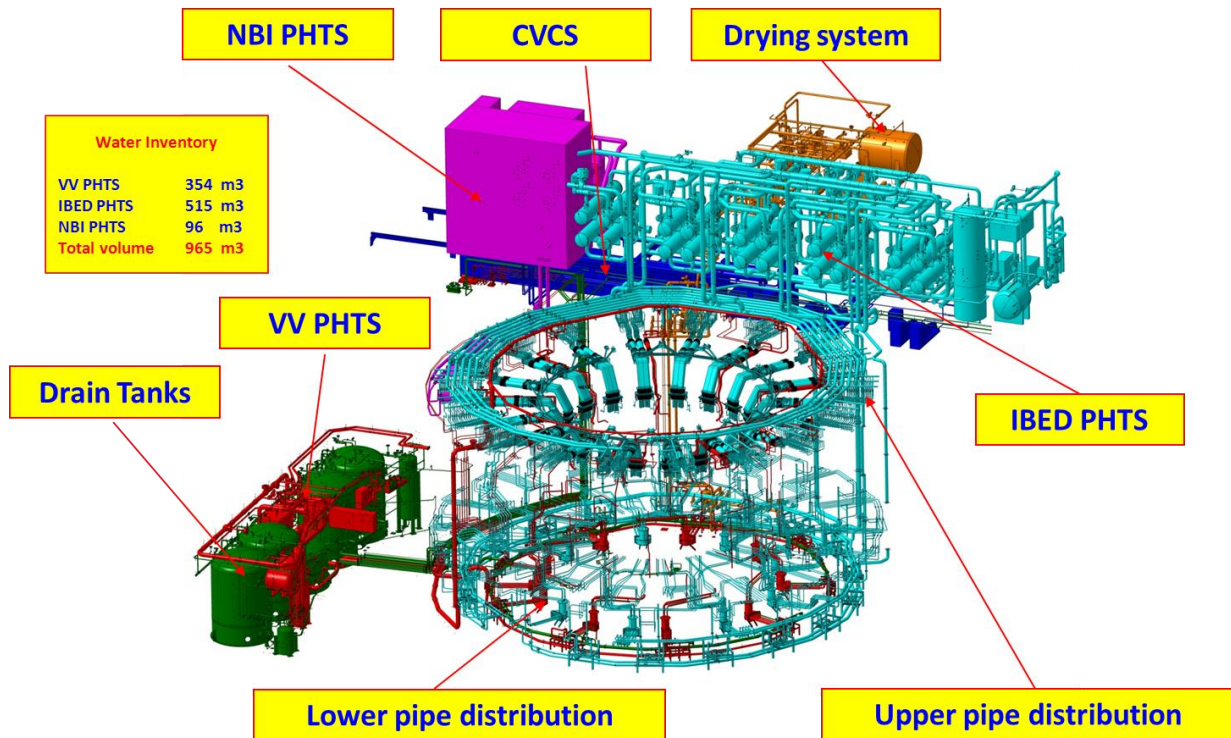


Figure 1 - TCWS arrangement in Tokamak Complex

Scope of work

The contractor shall execute the following activities:

- Perform and finalize analyses and calculations to demonstrate that the TCWS meets the design and safety requirements as stated in the reference documents issued by IO (e.g. SRD, DDD, ICDs and ISSs) and issued by US-ITER (e.g. DDD, PFDs, P&IDs, 3D models etc.) and relevant technical documents prepared by the sub-tiers contractors (i.e. AFS) for the Preliminary and following design phases;
- Prepare a proper schedule for the Final Design deliverables and Design Reviews, including all associated activities and all milestone tracking;
- Update all the relevant technical documents necessary to perform the TCWS Final Design Reviews (FDRs);
- Participate to the actions to solve the chits from the FDRs;
- Prepare the necessary documents and technical specifications for the Calls for Tender of the TCWS systems and components;
- Prepare the “built to print” drawings for the TCWS components and associated Data Sheets;
- Prepare a cost estimation for the TCWS manufacturing and deliveries;
- Prepare a proper schedule for the Components manufacturing and deliveries.

Estimated Duration and Timetable

The duration of the Contract will be approximately 5 years from the date of the signature.

The tentative timetable of the applicable Call for Tender procedure is as follows:

- Call for Pre-qualification Sept 2013
- Call for Tender Nov 2013
- Tender submission Dec 2013
- Contract placement Jan 2014

Experience

The potential tenderers shall have proven experience in the design of large and complex cooling systems for Nuclear Power Stations according to ASME codes & standards and in compliance with the French regulations (QO 1984, ESP/ESPN for Pressure Equipment).

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) are jointly and severally liable to the ITER Organization.

The consortium groupings shall be presented at the pre-qualification stage. The tenderer's composition cannot be modified without the approval of the ITER Organization after the pre-qualification.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Candidates (individual or consortium) must comply with the selection criteria. The IO reserves the right to disregard duplicated reference projects and may exclude such legal entities from the pre-qualification procedure.