

Engineering support to design the Ion Cyclotron Antenna.

Technical Specifications

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1 Abstract

This document describes technical needs of the Ion Cyclotron Heating and Current Drive (IC H&CD) section in engineering support to design the antenna.

2 Background and Objectives

ITER is a major new device that is under construction at Cadarache, near Aix-en-Provence, France. This device will study the potential of controlled nuclear fusion to provide energy for mankind. To reach the target performances of this device, a set of plasma heating systems are required. These systems will deliver power to the plasma to sustain and control the performance of the device.

The work described below is related to the hardware required to physically transmit radio-frequency power into ITER, and is more specifically focused on the coupling structure, called an Ion Cyclotron Heating and Current Drive antenna, and illustrated Figure 1.

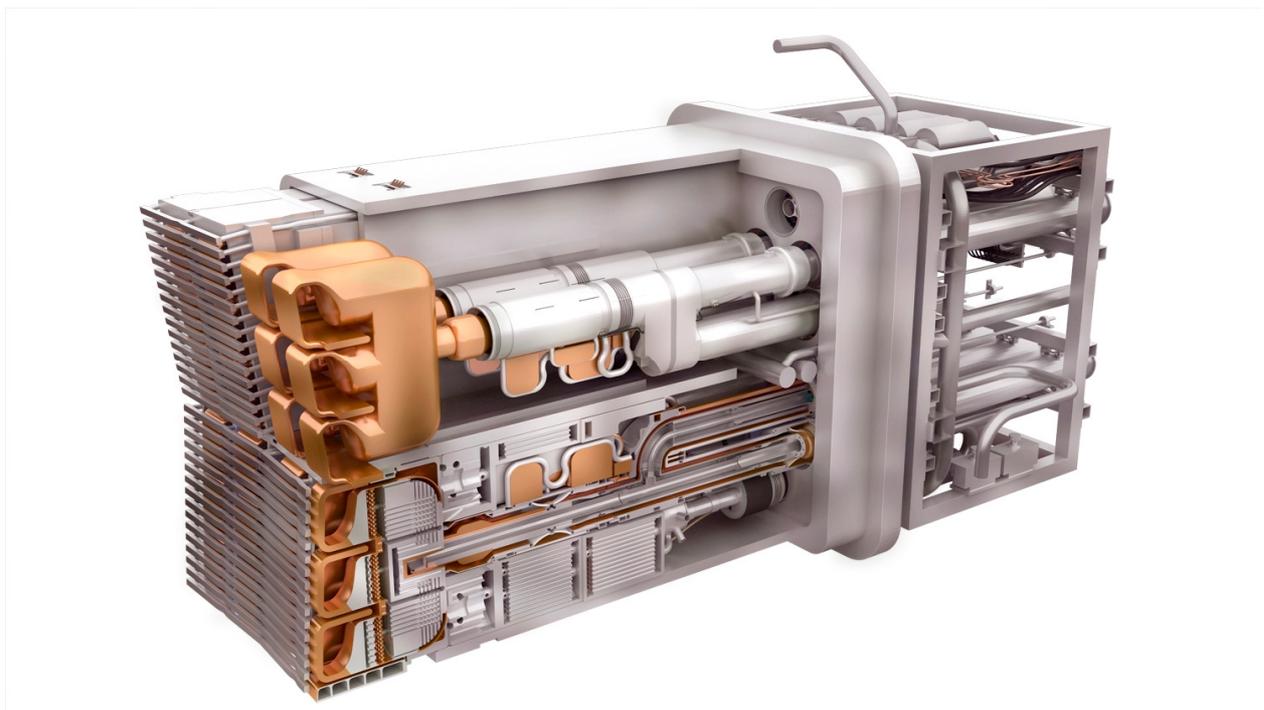


Fig.1 - Equatorial Port Plug Antenna for IC H&CD power coupling to plasma: 3.5 x 2.5 x 1.9m, 45 tons

3 Scope of Work

The scope of this contract includes the supply of specialised services to perform the following activities:

- Support the IC H&CD team in the design of the IC antenna and its ancillaries, with emphasis on the mechanical aspects.
- Support the IC H&CD team in the follow-up and assessment of the progress of the externally contracted design activities.
- Follow the design progress of the antenna and contribute to the detailed development of the IC antenna subsystems, with emphasis on the mechanical aspects and fabrication issues
- Assess and perform mechanical analysis on the proposed design to verify its compliance with ITER requirements.
- Write technical specifications covering forthcoming design or R&D activities.
- As the final design will approach completion, the work will involve a strong contribution to the preparation of the technical specifications for a call for tender for the fabrication of the antenna. This will include overseeing the production of tendering drawings.
- Report activities progress to section leader and interact with IC team.
- Oversee the design exchange between partners.

Some interactions with other ITER teams and participations to meetings will be part of the task.

4 Estimated Duration

The contract will have an initial firm period of 2 years (440 working days) with option to extend the contract for one further period of one year.

The work will be fully based at the ITER Organization Worksite.

5 Work Description

Description of the tasks to be performed:

- Prepare appropriate design outputs in key areas such as outlined in the above Scope of Work.
- Review technical designs, created by others, and agree/implement required changes, in collaboration with the relevant ITER staff.
- Check design interfaces
- Draft and report the performed work in the required format, primarily in the form of design notes, analysis and structural integrity reports.
- Provide analytical and additional appropriate assessment with the aim of justifying the feasibility of the proposed designs, including assessment of manufacturability and inspectability.
- Carry out additional design work as may arise during the course of the contract.
- Write technical specifications for design or R&D activities.
- Near completion of the final design, contribute to the preparation of technical specifications for a call for tender for the fabrication of the antenna.
- Promote safety and quality at all times in all job activities.

Missions may be necessary during this contract to attend design review meetings of ITER task(s), coordinate and follow up the design activities in Europe or visit companies or institutes which have relations to the ITER IC H&CD activities.

6 List of deliverables and due dates (proposed or required by ITER)

Milestone No:	Deliverables	Due date of the last deliverable
1	1 st Intermediate report	TO + 3 months
2	2 nd Intermediate report	TO + 6 months
3	3 rd Intermediate report	TO + 9 months
4	4 th Intermediate report & Report on first year	TO + 12 months
5	5 th Intermediate report	TO + 15 months
6	6 th Intermediate report	TO + 18 months
7	7 th Intermediate report	TO + 21 months
8	Final report	TO + 24 months

7 Acceptance Criteria (including rules and criteria)

Reports as deliverables shall be stored in the ITER Organization's document management system (IDM) by the Contractor for acceptance. A named ITER Organization's Contract Technical Responsible Officer is the Approver of the delivered documents. The Approver can name one or more Reviewers(s) in the area of the report's expertise. The Reviewer(s) can ask modifications to the report in which case the Contractor must submit a new version.

The acceptance of the document by the Approver is the acceptance criterion.

8 Specific requirements and conditions

The required resource is a mechanical engineer (master degree) with at least 5 years of working experience in mechanical design.

The successful candidate shall be fluent in English (both written and spoken) and shall have experience in the following fields:

- Experience in design of components used in vacuum environment,
- Experience in manufacturing processes (deep drilling, forging, machining, EB-TIG welding, hiping, diffusion bonding, technique of inspections, leak detection, etc ...).
- Experience of working with CAD Designers
- Experience in writing of technical specification and documentation and quality follow up,
- Experience in design activities follow up and project lead,
- Knowledge of international and French industrial codes and standards (RCC-MR, ASME 8, SDC-IC, etc...),
- Ability to work in multidisciplinary, international team environment.
- Experience in the fusion field is an advantage

Up to five missions per year are planned which will be reimbursed under ITER Organization conditions.

9 Work Monitoring / Meeting Schedule

The work will be managed by means of Progress Meetings and/or formal exchange of documents transmitted by emails which provide detailed progress. Progress Meetings will be called by the ITER Organization, to review the progress of the work, the technical problems, the interfaces and the planning.

A progress meeting is organized by IC H&CD section each week. The engineer will have to report every two weeks in the progress meeting dedicated to mechanical activities.

The main purpose of the Progress Meetings is to allow the ITER Organization/IC H&CD section and the Contractor Technical Responsible Officers to:

- a) Allow early detection and correction of issues that may cause delays;
- b) Review the completed and planned activities and asses the progress made;
- c) Permit fast and consensual resolution of unexpected problems;
- d) Clarify doubts and prevent misinterpretations of the specifications.

In addition to the Progress Meetings, if necessary, the ITER Organization and/or the Contractor may request additional meetings to address specific issues to be resolved.

For all Progress Meetings, a document describing tasks done, results obtained, blocking points must be written by the engineer. Each report will be stored in the ITER IDM in order to ensure traceability of the work performed.

Every 3 months, the Contractor shall submit to ITER Organization a Progress Report to be issued five working days before each Progress Meeting so that the report can be reviewed prior to, and discussed during that Meeting.

The quarterly Progress Report shall illustrate the progress against the baseline work plan and indicate variances that should be used for trending. Performance indicators suitable to measure the progress of the work as compared to the approved work plan shall also be reported in the quarterly Progress Report.

On request and by agreement, meetings will be organised by videoconference. The Contractor shall facilitate proper tools for the videoconference in accordance with the Associated Framework Contract.

Experts from the Domestic Agencies may be invited by ITER Organization to participate in the meetings or other involved parties.

10 Payment schedule / Cost and delivery time breakdown

Interim monthly payments.

At the end of each month, the Contractor shall submit an invoice for the services rendered. This invoice will be accompanied with a duly signed time sheet. This time sheet will clearly indicate the contract reference number, the name of the assigned person, the dates and the total of the working days and the number of hours worked per day.

11 Quality Assurance (QA) requirement

The organisation conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system.

The general requirements are detailed in ITER document [ITER Procurement Quality Requirements \(22MFG4\)](#)

Prior to commencement of the task, a Quality Plan [Quality Plan \(22MFMW\)](#) must be submitted for IO approval giving evidence of the above and describing the organisation for this task; the skill of workers involved in the study; any anticipated sub-contractors; and giving details of who will be the independent checker of the activities.

Prior to commencement of any manufacturing, a Manufacturing & Inspection Plan [Manufacturing and Inspection Plan \(22MDZD\)](#) must be approved by ITER who will mark up any planned interventions.

Deviations and Non-conformities will follow the procedure detailed in IO document [MQP Deviations and Non Conformities \(22F53X\)](#)

Prior to delivery of any manufactured items to the IO Site, a Release Note must be signed [MQP Contractors Release Note \(22F52F\)](#).

Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc shall be reviewed and approved by the IO prior to its use, it should fulfil IO document on Quality Assurance for ITER Safety Codes [Quality Assurance for ITER Safety Codes \(258LKL\)](#).

12 References / Terminology and Acronyms

N/A

Acronyms are defined within the text.