

Procurement of First Plasma Protection Components (FPPC)

Call for Nomination (CFN)

Summary of Technical Specifications

1 Purpose

The purpose of this contract is the procurement of First Plasma Protection Components (FPPC). The FPPC are used during the first operation phase (integrated commissioning and first plasma) to protect the Vacuum Vessel (VV) and other already-installed components (e.g. diagnostics cable looms) against possible damage during the first plasma discharge trial tests.

2 Background

ITER is 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. The ITER Members - China, the European Union, India, Japan, Korea, Russia and the United States - are now engaged in a 35-years collaboration to build and operate the ITER experimental device, and together bring fusion to the point where a demonstration fusion reactor can be designed. General information on the scope and design of the ITER machine is described in the www.iter.org website.

This supply contract will cover the fabrication of four systems, namely:

- 1) Temporary Limiters (TL)
- 2) Divertor Replacement Structures (DRS)
- 3) Electron Cyclotron Resonance Heating (ECRH) mirrors
- 4) ECRH beam dump

Working conditions inside the Vacuum Vessel of ITER combine ultra-high vacuum, high temperatures and demanding electromagnetic conditions.

3 Scope of Work

The Contractor shall:

- Procure raw production materials according to specified requirements;
- Manufacture all assemblies to the selected design and per the specified requirement for machining, welding and non-destructive examination;
- Inspect and report the dimensional accuracy to within specified manufacturing tolerance requirements.
- Clean all assemblies as per the specified procedures;
- Pack all assemblies to preserve their cleanliness and integrity and ship them to IO.

The overall quantities (excluding spares) within the scope of work contract are:

- 72 Temporary Limiter segments
- 3 Divertor Replacement Structures
- 3 ECRH mirrors
- 1 ECRH dump

Further detail of each assembly is described in the following sub-sections.

3.1 Temporary Limiters

The temporary limiters (TL) are the largest assembly of the FPPC. There are four TL in total, each consisting of 18 unconnected segments that are each roughly 1.0 m x 0.5 m x 0.4 m.

Each TL segment is a predominantly steel assembly, consisting of a curved steel tile that is connected to a supporting trestle via a bolted sub-assembly. Attached to the support trestle are four fastener sub-assemblies. Each threaded connection is coated with copper, and the entire product is thoroughly cleaned for its application in an ultra-high vacuum environment.

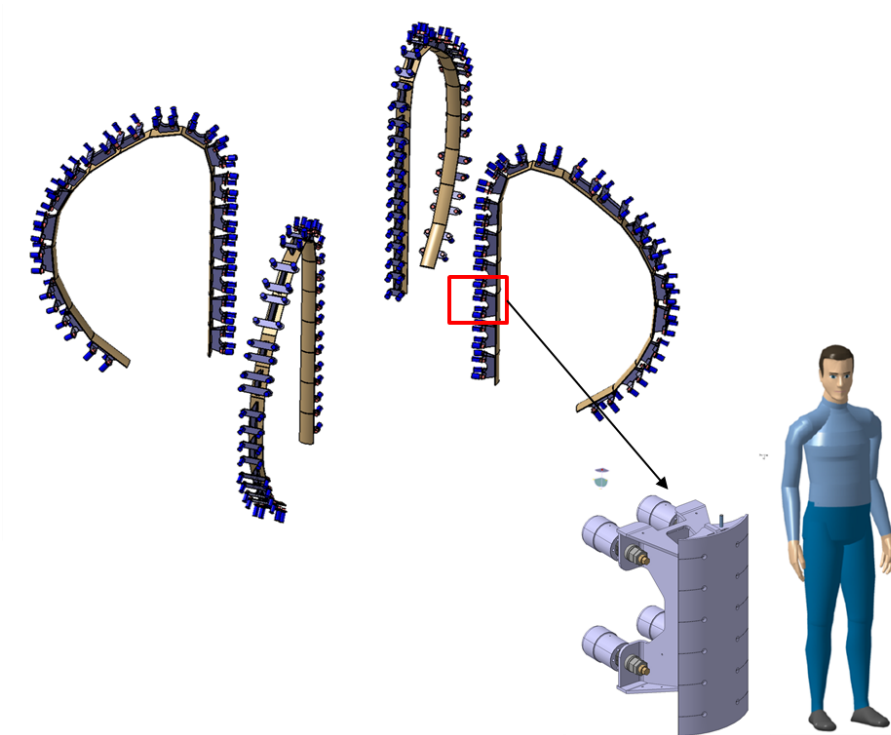


Figure 3-1. 72 Temporary Limiter segments are to be fabricated, each roughly 1m x 0.4m x 0.5m in size.

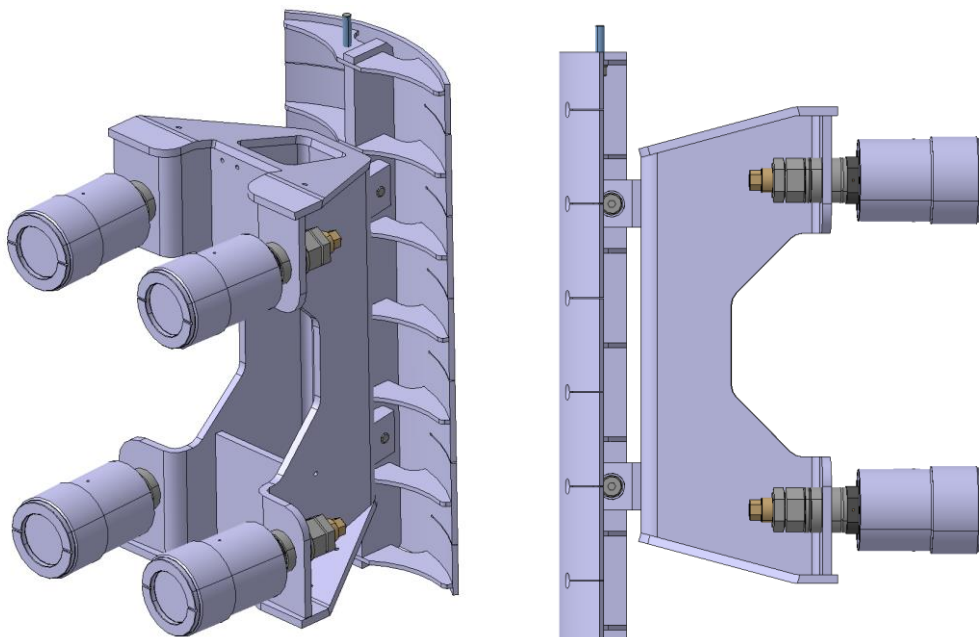


Figure 3-2. Fabrication of each TL segment includes machining, welding, coatings, and cleaning.

3.2 Divertor Replacement Structures

The DRS consists of three large assemblies. One of the three instances includes an additional feature with increased complexity. The length of the main upper part (instanced in all three assemblies) is roughly 3.5 m.

Apart from the global shape, the assembly is very similar to the TL assembly, with identical curved steel tiles, similar bolting connections, similar fastener assemblies, and similar cleaning and preparation requirements.



Figure 3-3. The three instances of the DRS, one of which includes a large additional feature.

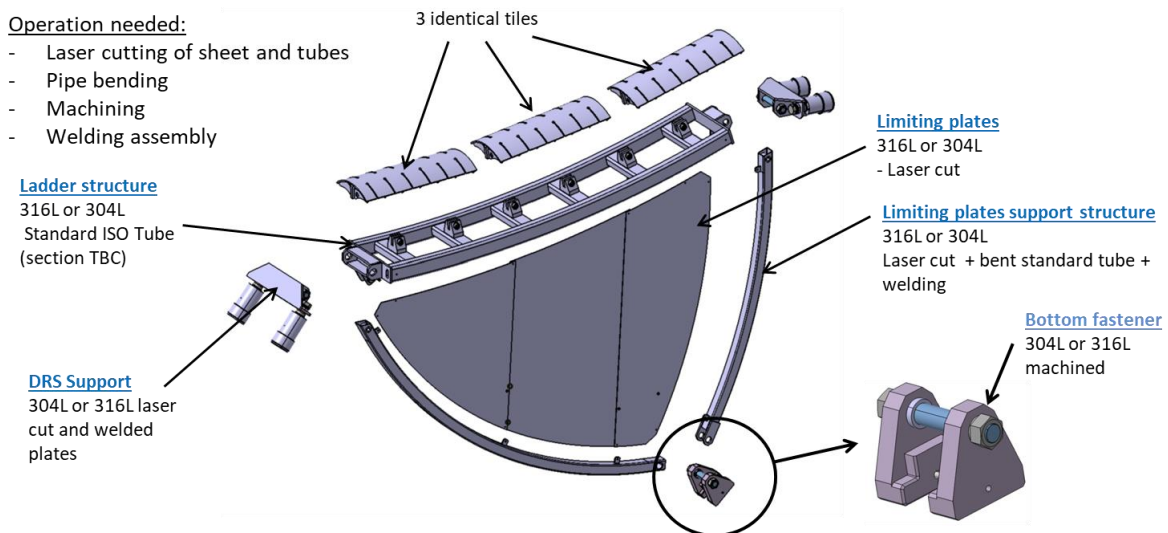


Figure 3-4. Exploded view of one DRS, with preliminary (indicative) fabrication details.

3.3 ECRH Mirrors

Three ECRH mirrors are to be fabricated, named LA, UA, and LB (see below). Each mirror includes fasteners identical to those used by the TL and DRS. Importantly, the mirrors are not of optical quality, as they reflect only microwave length and not visible wavelength. Each are attached to their supporting structure using a modified hexapod system, with six locking turnbuckles for adjustability.

All three mirror surfaces are coated with 5-10 μm of pure copper. Beneath this layer, the LA and LB mirrors are each machined with a concave surface curvature with either elliptical or hyperbolic shape. The UA mirror, in contrast, is flat but includes a grating surface.

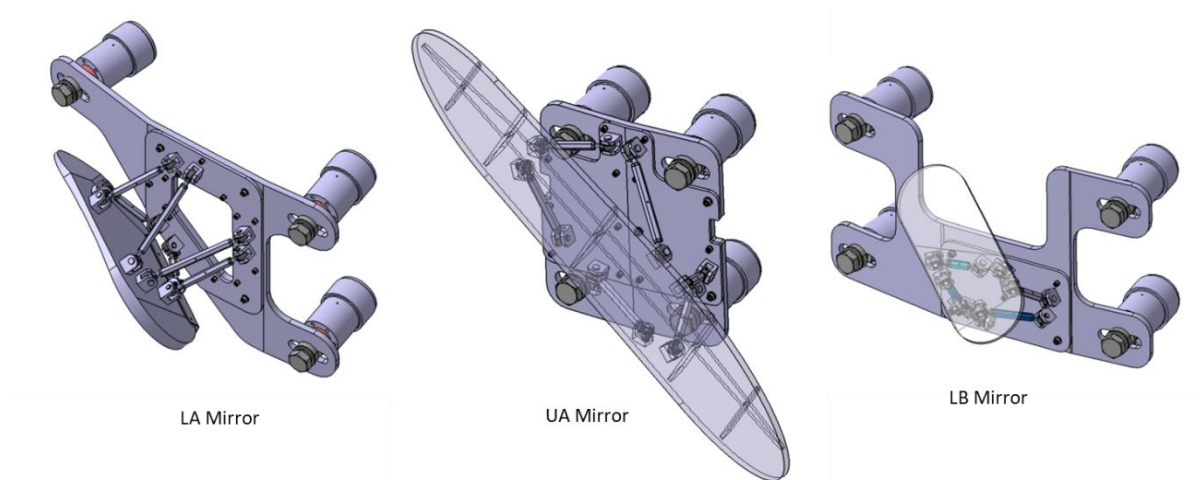


Figure 3-5. The three ECRH mirrors: LA, UA, and LB.

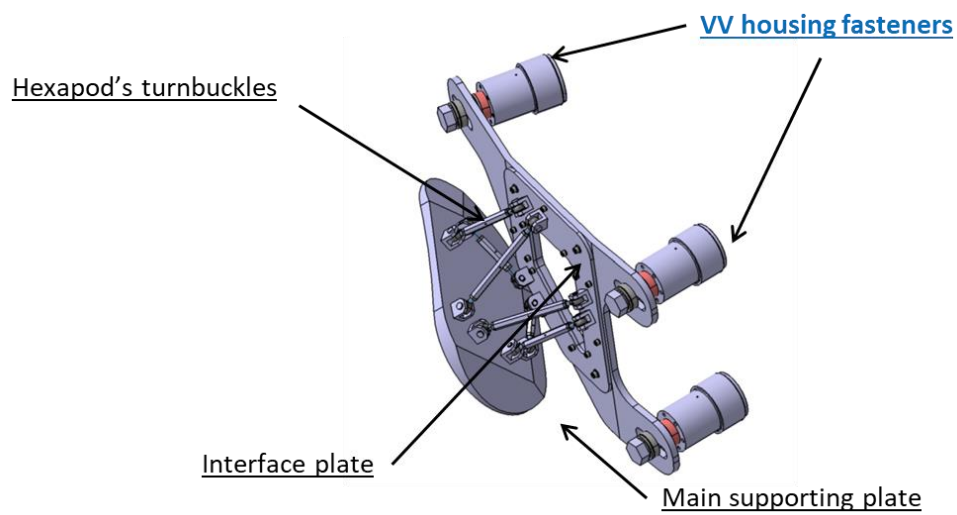


Figure 3-6. Identification of the main sub-assemblies supporting a mirror.

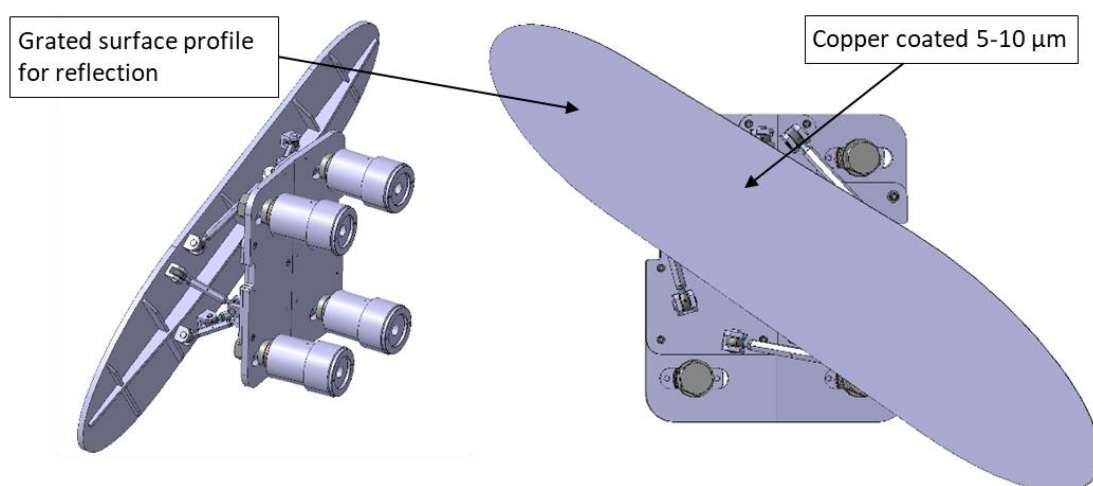


Figure 3-7. Grating profile of the UA mirror.

3.4 ECRH Dump

The ECRH dump is a single assembly consisting of six aluminum plates attached to a rigid steel support structure. The assembly forms a box that is roughly 1.5 m x 2.0 m x 2.0 m. The steel frame consists of standard C-beams, welded together.

The six plates each will include ceramic coating, one of which is pre-machined with a surface profile with required profile precision on the order of 5-20 μm (indicative).

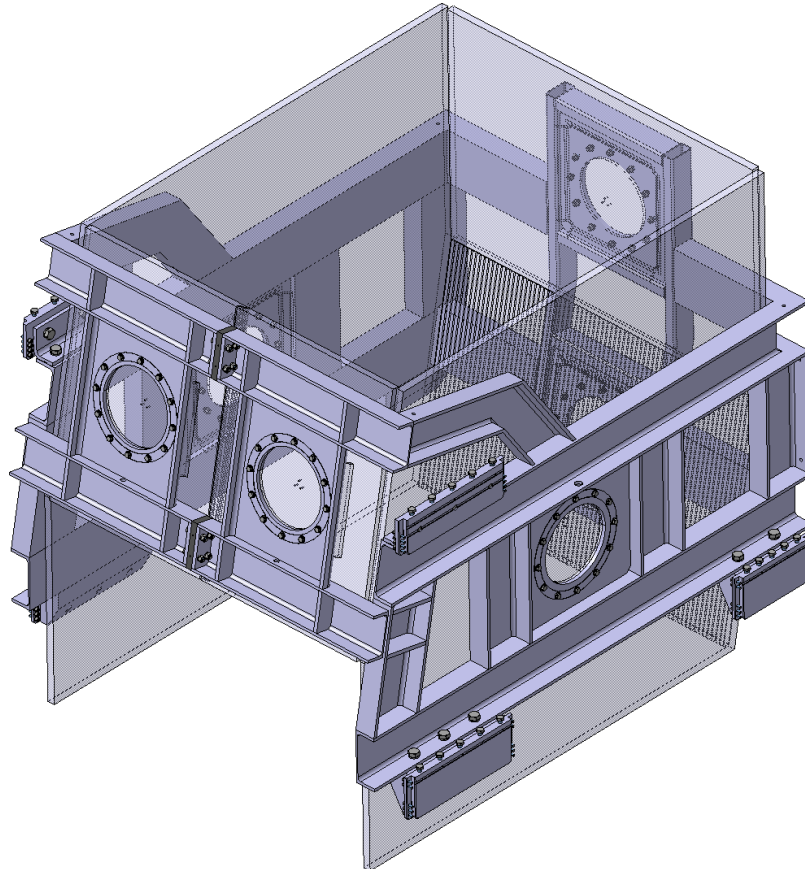


Figure 3-8. The ECRH dump include six aluminium plates attached inside a steel support structure.

4 Experience Requirements

The ITER Organization is looking for Suppliers with demonstrated experience delivering steel components for ultra-high vacuum applications, with manufacturing processes including:

- Machining,
- Welding,
- Copper and ceramic coating,
- Vibrational relaxation of weldments,
- Special treatments (baking, cleaning)
- Cleaning for ultra-high vacuum application.

The Supplier must prove its ability to provide in an organised way the competences specified in the Scope of Work above.

The Supplier should also have available a dedicated clean area, which shall only be operated by trained personnel to approved procedures.

The Tenderer shall have and maintain a valid ISO 9000 certification and shall have the duty to verify and document the equivalent quality level of all its subcontractors and consultants.

5 Award of the Contract

The ITER Organization reserves the right to award one Contract for the whole scope of work or to split the procurement of the different systems in separate contracts. Further details will be provided at the Call for Tender stage.

Suitable teaming arrangements for multiple companies are possible, where appropriate, to enhance the offering of the tenderer.

The language used at ITER is English. A fluent professional level is required (spoken and written English) with the Contractor staff liaising with ITER.

6 Candidature – Expression of Interest

Candidature is open to all companies participating either individually or in a grouping (consortium) which is established in an ITER Member State. A consortium may be a permanent, legally-established grouping or a grouping, which has been constituted informally -- but formalized with engagement letters -- 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 consortia will be assessed as a whole. Consortia cannot be modified later without the prior approval of the ITER Organization.

7 Withdrawal of the United Kingdom from the European Union (BREXIT)

The UK is not a party to the ITER Agreement but to EURATOM Treaty. The draft Withdrawal Agreement between the EU and the UK provides that the provisions of the EURATOM treaty continue to apply to and in the UK for a transition period following its withdrawal from the EU and EURATOM. If the Withdrawal Agreement is not ratified (a no-deal Brexit) the EURATOM Treaty ceases to apply to and in the UK on the withdrawal date.

Until the Withdrawal Date, the UK remains a full member of the EU and EURATOM and until that date UK entities retain the right to participate in IO procurement procedures. In case they are selected, a Brexit clause is included in the contract. Likewise, during the Transition period UK entities may participate in IO procurement procedures.

After the end of the Transition Period, when the Euratom Treaty ceases to apply to and in the UK, any UK entities bidding as a prime contractor or consortium partner will be rejected from the IO procurement procedures. UK entities will no longer be recognised as entities of an ITER Member and will no longer have the right to participate in IO procurement procedures, unless the UK has entered into an Agreement with Euratom. Where UK entities can demonstrate a

unique and specific competence in a certain field the IO, with approval of the ITER Council, may also allow them to participate in a procurement procedure.

The ITER Organization may decide to broaden the eligibility to other countries as deemed appropriate.

8 Timetable for the Tender Process

The tentative schedule for this tender process is as follows:

Call for Nomination (CFN)	<i>March 2020</i>
Pre-qualification	<i>April 2020</i>
Invitation for Call for Tender	<i>June 2020</i>
Tender Submission	<i>September 2020</i>
Contract signature	<i>November 2020</i>