

**Technical Specifications (In-Cash Procurement)**

**Technical Summary Call for Nomination Design,  
Prototype, Qualification, Manufacture and Supply of  
integrated vacuum extensions (bellows, tooling, flanges  
etc)**

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## Technical Summary

### Call for Nomination

# Design, Prototype, Qualification, Manufacture and Supply of integrated vacuum extensions (bellows, tooling, flanges)

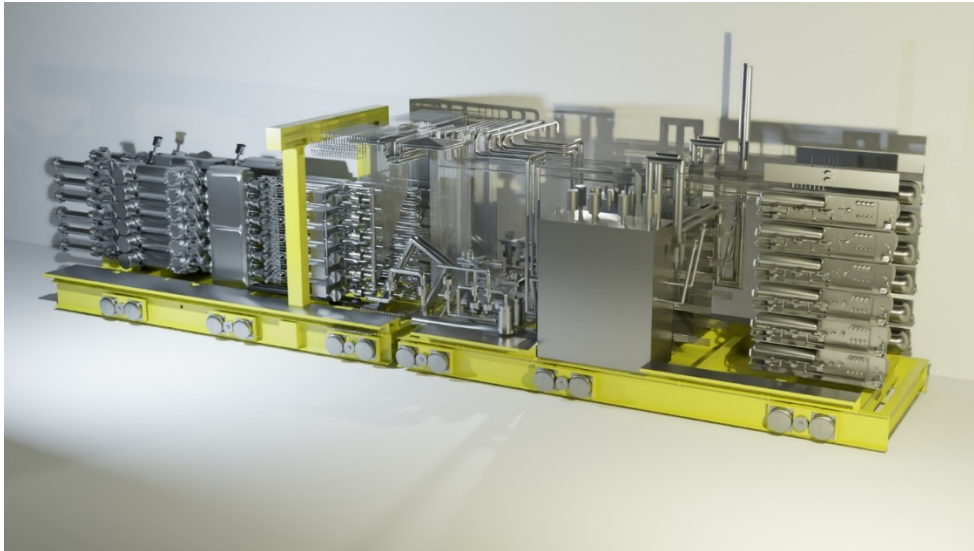
## 1. Purpose

The purpose of this Contract is to design, prototype, qualify, manufacture and supply integrated vacuum extensions for the ITER Disruption Mitigation System (DMS) and potentially other systems.

## 2. Background

ITER is the next generation fusion experiment and is presently being constructed at Cadarache, in southern France. This experiment will study the potential of controlled nuclear fusion to provide safe, clean and virtually limitless energy for humankind. In order to protect the machine from the consequences of uncontrolled plasma disruptions during high power operation, a Disruption Mitigation System (DMS) is being designed, a rendition of the DMS is shown in Figure 1. The DMS is a protection of investment component with the purpose to reduce the thermal and electromagnetic loads and to dissipate the energy of runaway electrons. The current DMS is based on Shattered Pellet Injector (SPI) technology.

It is essential that the DMS under the systems are mechanically decoupled from the ITER Vacuum Vessel. These flexible connections need to be removed and replaced during maintenance activities. There is therefore a need to supply qualified integrated bellows, flange, seal, tooling and heating solutions.



*Figure 1: Rendition of the ITER DMS*

### **3. Scope of work**

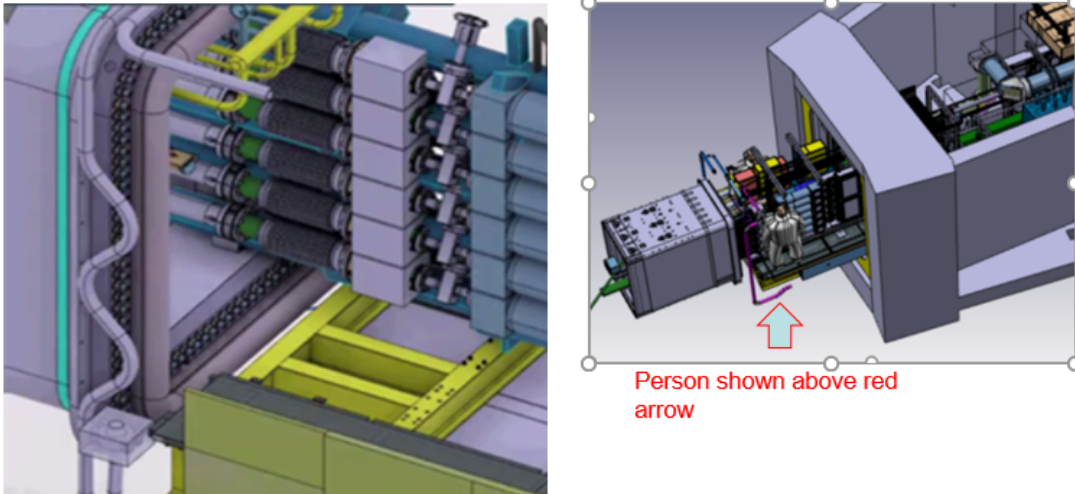
The ITER DMS (and other systems) Vacuum extensions will require expertise in the following fields:

- Bellows implementation
- Bellows compression and alignment tooling
- Testing of pre defined flange and sealing solutions
- Vacuum Technology and associated cleanliness
- As Low As Reasonably Achievable Occupational Radiation Exposure for design solution implementation
- Bellows in service baking solutions
- Maintenance associated with confinement of hazardous materials
- Qualification activities

The scope of work includes the design, prototype, qualification, manufacture and supply of the integrated vacuum extensions.

Note: The flange and seal technology to be used shall be defined by the IO.

The maintenance activities are with human access in a radiation environment; hence it is essential that the maintenance durations are at a minimum to be in compliance with the ALARA ORE principles.



Figures 2: ITER DMS bellows located in port cell

For all tasks ITER Organization (IO) will write technical specifications listing the work required and other requirements.

For a typical task IO would create a technical specification for the prototype to be developed. This technical specification is likely to include:

- Functional requirements
- Preliminary Design Data
  - Drawings/CAD model
    - Including a space reservation for future changes
  - Underlying Calculations supporting the design and the function
  - Component selection or suggestions
    - Certain components have already been qualified for use at ITER and their use may be mandatory.
  - Assumptions

The contractor would then develop the design further the typical stages would be:

- Prototyping and testing
  - Iteration of design, production and test.
- Final design
  - Check supplied assumptions and calculations are appropriate and update if required.
  - Confirm component selection
    - Market surveys of existing components, single options selection etc.
  - Update to the design.
- Testing and Qualification
  - Create plan that shows how functional requirements will be tested.
  - Test component

- Issue report showing functional requirements have been met or if not suggested changes for an iteration of the design.
  
- Manufacturing
  - Create manufacturing drawings
  - Manufacture prototype
  - Manufacturing dossier
  - Create lessons learned document including changes that could be made to aid manufacturing/inspection etc.

Candidates are expected to have the experience in the expertise areas i.e. Bellows implementation; Bellows compression and alignment tooling; Testing of pre defined flange and sealing solutions; Vacuum; As Low As Reasonably Achievable Occupational Radiation Expose bellows radiation and thermal shielding; Bellows in service baking solutions; Maintenance studies with associated with confinement of hazardous materials; Qualification activities

Candidates are invited to submit offers as a single entity or as a grouping/consortium.

## 4. Timetable

The tentative timetable is as follows:

| Item   | Tentative date(s)     |
|--|-----------------------|
| Call for nomination (CFN) issued   | T0                    |
| Call for nomination submission   | T0+1 month            |
| *Pre-Qualification (PQ) issued   | T0+2 months           |
| *Pre-Qualification (PQ) Application submission   | T0+3 months           |
| Call for tender (CFT) issued   | T0+5 months           |
| Call for tender submission   | T0+7 months           |
| Framework Contracts Award  | T0+10 months          |
| Framework Contract Signature   | T0+11 months<br>(=T1) |
| Start of Framework Contracts and 1 <sup>st</sup> Task Order                            | T1+1 month            |
| Completion of first task order   | T1+7 months           |
| Completion of Framework Contract   | T1+48 months          |
| (In case of extension option with another 2 years)<br>Completion of Framework Contract | T1+72 months          |

## 5. Experience

The acceptance criteria for the selection of the tender cover a broad range of technical capabilities as mentioned in Section 3, and the Contractor and its personnel shall have adequate experience in the areas as listed below:

- Bellows implementation; Bellows compression and alignment tooling; Testing of pre defined flange and sealing solutions; Vacuum; As Low As Reasonably Achievable Occupational Radiation Expose bellows radiation and thermal shielding; Bellows in service baking solutions; Maintenance studies with associated with confinement of hazardous materials; Qualification activities ability to manufacture/assemble the required components;
- ability to control the quality by implementing a quality plan;
- capable of handling regulatory requirements

## 6. 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.