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SUMMARY

Call For Nomination IO/19/CFT/1-16910/LLJ

IC RF Window Design, Prototype, testing and Manufacturing

Background

The ITER Organization (IO) is bringing together people from all over the world to be part of this unique project and to contribute to building the ITER device which requires the best people from many disciplines. Its aim is to confine and study the behaviour of plasma in conditions and dimensions approaching those required for a fusion reactor.

The Ion Cyclotron Resonance Heating (ICRH) Antenna proposed for ITER is designed to launch 20 MW of Radio Frequency (RF) power to the plasma of the ITER machine at frequencies in the range of 40 to 55MHz. The antenna includes RF windows used to feed RF power to the antenna in a manner that separates the vacuum inside the main ITER vessel from the pressurised incoming RF transmission lines. This RF window concept requires designing, prototyping and testing.

Scope of work

The ITER Organization Heating and Current Drive Division require the design, the manufacturing and testing of prototypes and the series production of the full set of IC RF Windows required for assembly within the two ICRH Antennas. Eight RF power coaxial lines are used to feed one ICRH antenna with 20 MW of RF power, and each power line includes two RF windows in series. A window is a combination of metallic components assembled together and an assembly of ceramic insulators joined by vacuum brazing.

The scope of work is split in several Phases:

- **Phase 1**: corresponds to the design phase of a test article of the RF Window and validates the interfaces of the proposed design with the IC Antenna layout.
- **Phase 2**: corresponds to the test article manufacturing, in order to demonstrate the design manufacturability and to perform manufacturing tests.
- **Phase 3**: corresponds to the functional prototype manufacturing in order to be qualified for a nuclear utilization, on the basis of the RF Window load specification. This phase will imply a strict application of the ITER quality assurance program as well as application of nuclear code and standards.
- **Phase 4**: corresponds to the RF window series production, based on the successful completion of the phase 3. This phase covers the manufacturing of the full set of RF window required for the two ICRH Antennas, plus spares.

The windows are part of the tritium confinement system and therefore all related activities will be subject to strict Quality Assurance processes. The QA program will be progressively implemented over the three first phases and fully applied in phase 3 and phase 4.

The work requires the services of experienced manufacturers in vacuum brazing of ceramic/metal joints and metal joining techniques. The supplier will provide evidence of its ability to tackle technical challenges such as design, fabrication and assembly of complex features (especially brazed joints between ceramic and metal…). The scope of work includes the methods and testing capabilities listed in the following fields:

- Designing (3D CAD model and 2D drawings) using CATIA V5
- Structural & thermal assessment of 3D model based on Load specification inputs using ANSYS
- High temperature vacuum brazing between metal and ceramic
- Welding / E-beam Welding / copper coating
- Machining (Milling, Cutting, Drilling, Spark erosion…) Austenitic Stainless Steel (304 or 316L(N)), copper and other metallic alloys.
- Material qualification and tests (filler material for welding/brazing, ceramic…)
- Permanent or temporary assembly of mechanical components
- Producing 2D Drawing according the ISO GPS norms, and technical documentation required such as manufacturing sequences, WPS, WPQR…
- Non-destructive tests (NDT) and examination such as vacuum leak tests (hot/cold leak rate in the range of $10^{-10} Pa.m^3.s^{-1}$), volumetric examination, pressure testing, dye penetrant testing…
- Implementation of series manufacturing method and processes

Duration of services

The Contract is scheduled to come into force in the 3rd quarter of 2019 for an estimated duration of:

- 12 months for phase 1
- 12 months for phase 2
- 12 months for phase 3
- 12 months for phase 4

Procurement Time table

A tentative time table is outlined as follows:

Call for Nomination release	Mid February 2019
Receipt of nominations	Mid March 2019
Issuance of Pre-qualification Application	**March 2019**
Submission of Prequalification Application	April 2019
Notification of Prequalification results	April 2019
Launch of Call for Tender	May 2019
Clarification questions related to this Call for Tender	May 2019
Response to Questions from ITER Organization	June 2019

Tender Submission Date:	**July 2019**
Estimated Contract Award Date:	August 2019
Estimated Contract Start Date:	September 2019

Experience

The following experience or capability are expected:

- Past experience in design of complex component requiring various engineering expertize
- Past experience in the assessment of design using FE analyses.
- Past experience in high temperature vacuum brazing of ceramic / metal assemblies with diameters up to 250mm
- Expertise in the machining of mechanical components
- Expertise in the metallic assemblies and joining techniques
- Machining facilities
- Test facilities
- Experience in manufacture and testing of nuclear components
- Quality Management
- Radio frequency transmission line equipment design and manufacturing experience is an advantage

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 cannot be modified later without the approval of 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. IO reserves the right to disregard duplicated references and may exclude such legal entities form the tender procedure.

Reference

Further information on the ITER organisation procurement can be found at:
http://www.iter.org/org/team/adm/proc/generalinfo