UHV multipurpose test rig for the ITER Project

Summary Technical Specifications
1 Purpose

The purpose of the contract is the supply of a multipurpose, bake-able vacuum test rig for the ITER vacuum laboratory.

2 Background

ITER will be the largest and most complex vacuum system yet to be built. Situated in Southern France, adjacent to the French CEA Cadarache site, the ITER facility covers approximately 190 hectares and is designed to study the fusion reaction between the hydrogen isotopes and deuterium.

The test rig will be located in the vacuum laboratory and will be utilised for general vacuum qualification and specific tests performed to support ITER construction.

3 Scope

It is required to qualify vacuum system and components for use on the ITER vacuum systems. In order to qualify the systems and components it is necessary to operate them in vacuum conditions (pressure and temperature) close to the ITER operating condition for extended periods of time. The type of tests to be performed is outlined below.

3.1 Vacuum Instrumentation Qualification

Vacuum instrumentation (gauges, gas analysers) etc. shall be performance tested on the vacuum test tank. Instrumentation will be operated for long duration tests with the test tank at the ITER temperatures, pressures and relevant (non-nuclear gas) residual gas composition. Performance under simulated accidental venting of the test tanks shall also be assessed. Calibration of vacuum instrumentation (with respect to gas species), including residual gas analysers will be performed on the vacuum test tank.

3.2 Vacuum Pump Trials

Several candidate pumps have been identified for ITER vacuum service including pumps for type two diagnostics and Cryogenic Guard Vacuum Systems. It is envisaged that these pumps, and any other candidate pumps, will be performance tested under ITER relevant conditions on the vacuum test tanks. Performance tests will include tests under conditions of high gas (heavy and light) through put, and pump performance after simulated accidental vacuum tank vents.

3.3 Qualification of Vacuum Test Procedures

The vacuum test tank will be utilised in the qualification vacuum test procedures. Mock-ups representing specific components to be tested will be integrated with the vacuum test tank to qualify hands on and remote vacuum qualification procedures.

3.4 Outgassing Measurements of Components

Low accuracy outgassing measurements of vacuum components will be assessed on the vacuum test tank. Utilising the pressure rise method a rough (order of magnitude) assessment of outgassing rate can be made. In conjunction with residual gas analysis of outgassing species this measurement is extensively to be used to assess vacuum components performance in fusion plasma chamber vacuum.
3.5 Vacuum Conditioning of Components

Components of vacuum systems may require vacuum conditioning (for e.g. after re-work) prior to integration and installation. The Vacuum test tank will be utilised for this purpose.

4 Specification

To perform its duties, the test rig shall include, as a minimum, a 1 m3 (approximately) welded bakeable stainless steel vacuum vessel equipped with a set of CF flanged ports of standard sizes. The access to the vessel shall be by a door and the seals shall be all metallic. The system shall be fitted with a dry pumping system capable of achieving an ultimate vacuum in the chamber of 10⁻⁶ Pa. The vacuum vessel shall be instrumented for the measurement of total pressure and residual gas composition (full range gauging and RGA). The system shall be bakeable up to 200 °C and as such shall be fitted with electrical baking system including feedback temperature control and thermal insulation. The supply shall also extend to associated standard valves and standard ancillary vacuum components required to perform the tests outlined above.

5 Schedule

<table>
<thead>
<tr>
<th>Action</th>
<th>Tentative date(s)</th>
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<tbody>
<tr>
<td>Call for nomination</td>
<td>1 August 2012</td>
</tr>
<tr>
<td>Pre-Qualification</td>
<td>3 September 2012</td>
</tr>
<tr>
<td>Call for tender</td>
<td>15 September 2012</td>
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<tr>
<td>Tender submission</td>
<td>15 November 2012</td>
</tr>
<tr>
<td>Contract Award</td>
<td>15 December 2012</td>
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<tr>
<td>Delivery</td>
<td>4 April 2013</td>
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</tbody>
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6 Experience

The potential tenderers should have proven experience in the supply of UHV fully instrumented test rig for a vacuum laboratory.

7 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 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 prior 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 references and may exclude such legal entities from the pre-qualification procedure.