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**NOTICE FOR EXPRESSION OF INTEREST AND
SELECTION OF CONTRACTOR FOR DESIGN, FABRICATION,
SUPPLY AND INSTALLATION OF “MATERIAL
CHARACTERIZATION (MECHANICAL) FACILITY AT LOW
TEMPERATURE (MCFLT)”**

(EOI No. EOI/IPR/001/11-12 DATED 22-12-2011)

Expression of Interest (EOI) is invited from reputed parties for Fabrication, Supply and Installation Of Material Characterization (Mechanical) Facility at Low Temperature (MCFLT) at Institute for Plasma Research, Bhat, Gandhinagar.

The EOI document containing eligibility requirements, technical description, scope of work and commercial terms and conditions kept in the official website of IPR, i.e. www.ipr.res.in/purchasetenders.html. The interested parties can download the EOI document from IPR Website. Alternatively, parties can obtain the EOI document from the Purchase Officer, IPR, Bhat, Gandhinagar up to **21-01-2012**.

The parties who are satisfying the eligibility criteria as mentioned in the EOI document (Sr.No.3 - page No.8 & 9) may submit their EOI proposal to the Purchase Officer, Institute for Plasma Research at the above address latest by **3rd February, 2012** superscribing the envelope with EOI No. EOI/IPR/001/11-12 dated 22-12-2011 for **Fabrication, Supply and Installation Of “Material Characterization (Mechanical) Facility at Low Temperature (MCFLT)”**.

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**NEAR INDIRA BRIDGE, BHAT, GANDHINAGAR 382 428
GUJARAT STATE
INDIA**

NOTICE FOR EXPRESSION OF INTEREST AND

**SELECTION OF CONTRACTOR FOR DESIGN, FABRICATION,
SUPPLY AND INSTALLATION OF “MATERIAL
CHARACTERIZATION (MECHANICAL) FACILITY AT LOW
TEMPERATURE (MCFLT)”**

LAST DATE FOR ISSUE OF EOI DOCUMENTS	21st JANUARY, 2012
DUE DATE FOR SUBMISSION OF EOI PROPOSAL	3rd FEBRUARY, 2012

Content:

1. Instructions to Parties and Terms and Conditions.
2. Roadmap from obtaining EOI proposals to finalize the Contract.
3. Essential Eligibility Criteria to submit EOI proposal.
4. Technical & Functional requirements of a ÷Material characterization (mechanical) facility at low temperature (MCFLT)ö
5. Over-view of Scope of Work for final tender.

1. Instructions to Parties and Terms and Conditions:

This is an invitation for the "Expression of Interest" (EOI) for DESIGN, FABRICATION and SUPPLY AND INSTALLATION OF "Material characterization (mechanical) facility at low temperature (MCFLT)". This characterization facility will be used for mechanical characterization of various material used in fabrication of superconducting magnet under the XI plan activities of IPR. They are categorized as

- (a) Structural Materials such as SS 316, SS 316 LN, Mod SS 316 LN, Inconel etc
- (b) Superconducting Materials such as Nb₃Sn, Nb₃Al, NbTi, BSCCO, YBCO, MGB₂ (coated conductor having layers of different materials) etc
- (c) Insulation Materials such as Epoxy, Fibre Glass etc

These materials are required to be mechanically characterized at (a) Room Temperature

(b) 80 K Nitrogen Temperature (c) 5 K, at Helium Temperature in various shapes such as wire, plates and round bars.

Following are general instructions to parties and terms and conditions.

- (a) This invitation of EOI is for the design, fabrication, supply and installation of "Material characterization (mechanical) facility at low temperature (MCFLT)" at IPR.
- (b) This is a request for EOI and this is not a tender notice.
- (c) EOI is invited from Engineering Industries (Parties) registered in India since last 5 years.
- (d) The EOI document containing eligibility requirements, technical description, specification and application of various material used in Prototype Magnets and its associated components can be obtained from the Purchase Officer, Institute for Plasma Research, Near Indira Bridge, Bhat, Gandhinagar:382428, Gujarat, India. While requesting for the EOI documents, such request shall indicate the "**REQUEST FOR THE EOI DOCUMENTS AGAINST EOI No.IPR/EOI/11-12/1 DATED 22-12-2011 for "Material characterization (mechanical) facility at low temperature (MCFLT)".**" The request for EOI documents by post/courier should reach to Purchase Officer, IPR latest by 21/01/2012.
- (e) The EOI documents can also be downloaded from IPR Website www.ipr.res.in/purchasetenders.html.
- (f) Parties who have responded to this EOI notice and selected as per terms and conditions given in the EOI document, will only be eligible to participate in tendering process.
- (g) **Last date to submit the EOI:** The EOI should be submitted to the Purchase Officer, Institute for Plasma Research, at the above address on or before **3rd February, 2012.**
- (h) No request for the extension of due date will be considered.
- (i) Late and delayed received EOI will not be considered. IPR will not be responsible for postal / courier delays or any other delays in receipt of the EOI. EOI notice number and date, due date and title of EOI should be mentioned on envelop, without which EOI may be rejected.
- (j) The EOI proposal should be valid for a period of 120 days from the due date.

- (k) Party submitting the EOI against this notice shall be deemed to have read and understood EOI documents in complete.
- (l) Where counter terms and conditions have been offered by the party, the same shall not be deemed to have been accepted by IPR, unless our specific written acceptance thereof is obtained.
- (m) Clarification, if any, can be obtained from the following office provided such request is received at least 10 working days prior to the last date of submission of proposal for EOI.

Purchase Officer-I
Institute for Plasma Research,
Near Indira Bridge,
Bhat, Gandhinagar: 382428, Gujarat State
India
e-mail: ramesh@ipr.res.in,pradhan@ipr.res.in
Web site: <http://www.ipr.res.in>

- (n) IPR reserves the right to accept or reject any or all the EOI received from the parties without assigning any reasons. Mere submission of proposal for EOI will not entitle a party to get selected to obtain final tender documents.
- (o) IPR reserves the right to incorporate the suggestions made by the party during the meeting held at IPR at its sole discretion in final tender document.
- (p) EOI proposal submitted by the party shall be complete in all respects and shall include all details asked for in this notice. The following documents will be submitted along with EOI proposal. Party will submit EOI proposal and all supporting documents in duplicate.

Document set – 1 (in duplicate):

- (i) Organizational Structure
- (ii) Name and address of contact person of party.
- (iii) Core competence of the party.
- (iv) Qualification & relevant experience of the key personnel (s) of the Party.
- (v) Details of (a) party's Design Capabilities (b) party's Quality Policy and Program, (c) Quality Audit program, (d) non-conformity control and reporting and (e) testing and inspection facilities. f) previous working experience on similar system
- (vi) Annual Report indicating Balance sheet and Profit and Loss account statement for the last 3 years.

Document set – 2 (in duplicate):

Document as per point ó (h) of section -2.

Document set – 3 (in duplicate):

Documents as per section -3.

2. Roadmap from obtaining EOI to finalize the Contract:

Following roadmap will be followed from obtaining proposals for EOI to finalize the contract.

- (a) This is the invitation of EOI is for the design, fabrication, supply and installation of ` Material characterization (mechanical) facility at low temperature (MCFLT)ø at IPR and this is not the tender.
- (b) The EOI document contains Essential Eligibility Criteria (Refer Section-3). EOI received from the parties satisfying these Essential Eligibility Criteria will only be considered for further evaluation.
- (c) Description of the materials and their form/shapes and the functional requirements is given in Section-4.
- (d) Overview of technical specifications, requirements, scope of supply and delivery schedule for design, fabrication, supply and installation of ` Material characterization (mechanical) facility at low temperature (MCFLT)ø at IPR to be included in final tender document is given in Section-5.
- (e) Party will submit EOI proposal with all necessary supporting documents as mentioned in point ó (q) of section -1.
- (f) A meeting will be held with eligible parties at IPR to explain the scope of work to be carried out for this package.
- (g) A Committee for Selection of Parties (CSP) will be constituted by a competent authority of IPR to select the parties for issuing final tender document.
- (h) Party will make presentation to the CSP which will cover following points. A document covering of all the following points will be submitted by the party along with EOI proposal.
 - (i) Partyø's overall profile.
 - (ii) Partyø's strengths in design, mechanical fabrication areas, automation and controls areas fabrication facilities, cryogenic facilities and their fabrication, mechanical characterization etc.
 - (iii) Partyø's experience in design and manufacturing of vacuum chambers, cryogenic facility, material characterization systems etc. List of projects executed to be presented and few will be discussed in detail.
 - (iv) Party will discuss few challenging cases where it made specific efforts to manufacture special purpose facility for mechanical characterization of material / **testing of products** at low temperatures using cryogenic fluids, non-

conventional and innovative techniques and approach for schedule and cost control.

- (v) Party's experience to meet job specific requirements, like (a) low temperature mechanical characterization of materials/ **testing of products** (b) Sophisticated control and actuating systems and their automation c) Multi Head Sample Holders and Extensometers etc d) Design and Fabrication of Vacuum chamber and cryogenic facilities
 - (vi) Party's understanding on overall scope of work and responsibility for this project. Identification of all activities involved in this job and their discussion in detail.
 - (vii) Critical areas identified by the party having serious impact on the precession of the job to be carried out. Party's proposed solutions for these problems.
 - (viii) Any special packing and shipment requirements foreseen by the party.
 - (ix) Party will justify his design, manufacturing and financial capabilities to manufacture "Material characterization (mechanical) facility at low temperature (MCFLT)" in given time schedule.
 - (vii) Codes and standards regularly followed by the party both in mechanical fabrication and automation controls.
 - (viii) Details of party's Quality Policy and Program and testing and inspection facilities. Party will discuss QC strategy for the job under this EOI.
 - (ix) If some design, manufacturing, testing and inspection facilities are not available with the party, it should mention about their access to such required facilities at other places.
 - (x) Project planning and Execution methodology followed by the Party, with specific emphasis on schedule and cost control. Use of specific project planning software.
 - (xi) Party's views on need to form consortium to meet quality, cost and time schedule.
 - (xii) Last three years track record of the party in terms of projected and actual delivery schedule and cost for projects above Rs. 50 lakhs.
 - (xiii) Commitment from Party's highest authority for complete and credible involvement of the party till completion of the deliveries.
- (i) CSP will select the parties based on submitted documents, presentations and discussions. During the assessment for this selection CSP will give specific weightage to the party for innovative suggestions on design and fabrication feasibility, cost optimization and control and schedule control. Selection of the parties will be mainly based on design capabilities, fabrication and automation from an integrated point of view, involving optimization of manufacturing, shipping, assembly, schedule and cost.
 - (j) IPR will prepare final tender document in two parts, Part-A will contain detailed scope of work, deliverables, and project execution plan, rules for consortium (if required) and technical bid format. Part-B will contain commercial terms and conditions and commercial bid format.
 - (k) Final tender documents (Part- A and Part-B) will be given to only parties selected by CSP as per above point (2-h).

- (l) Party will submit the offer against final tender document in two parts. Detail procedure about submitting final technical (Part-A) and Commercial (Part-B) will be given in final tender document.
- (m) First only technical offers (Part A) will be opened.
- (n) Tender Award Committee (TAC) will be constituted by a competent authority of IPR to evaluate technical offers of the vendors.
- (o) TAC will hold technical discussions with vendors for Part-(A) of the offer.
- (p) TAC will shortlist the vendors technically competent for the design, fabrication, supply and installation of ` Material characterization (mechanical) facility at low temperature (MCFLT) at IPR as per drawings, technical specifications and delivery schedule given in the tender document.
- (q) Commercial Offers (Part-B) of only short listed vendors (ref. above point p) will be opened.
- (r) TAC will hold techno-commercial discussion with short listed vendors (ref. above point-p) and select the vendor or consortium capable of the design, fabrication, supply and installation of ` Material characterization (mechanical) facility at low temperature (MCFLT) at IPR as per drawings, technical specifications and delivery schedule given in the tender document.
- (s) TAC will give its recommendations to a competent authority of IPR for awarding the contract.
- (t) IPR reserves the right to place the order for with one party or more than one vendor.

3. Essential Eligibility Criteria:

Party must satisfy following eligibility criteria to get his EOI offer selected for the further evaluation. The party is required to submit the following elaborations/ details along with the EOI to get qualified for the bid.

1. A schematic of the proposed `Material characterization (mechanical) facility at low temperature (MCFLT) considering the attached figure as the baseline geometry.
2. Brief description of the various units of the `Material characterization (mechanical) facility at low temperature (MCFLT).
3. Functional description of various units of the `Material characterization (mechanical) facility at low temperature (MCFLT)
4. Listing of the design(CAD and FEA) and engineering calculations involved

Further, the Party must be a company registered in India for minimum five years.

Additionally,

- (a) Party must have designed and manufactured similar facility or system like `Material characterization/ **product testing** (mechanical) facility at low temperature (MCFLT) costing more than Rs.50 lakhs for institutions and/or industries.

- (b) Party must have well defined Quality Policy and Program.
- (c) Party must have well defined organizational set-up for Quality Surveillance, Quality Assurance, Quality Audit, non-conformity control and reporting.
- (d) Party must have sound financial status. Average yearly turnover of the party for last three years should be more than Rs. 500 lakhs.

4. Technical & Functional requirements for Design, fabrication, Supply and Installation of “ material Characterisation (Mechanical) facility at low Temperature (MCFLT)

Following are some of the basic primary requirements/specifications of the Material characterization (mechanical) facility at low temperature (MCFLT) However, the scope is not limited to these requirements only and serves only the purpose of understanding on the part of the vendor. The vendor can only treat these as the baseline guidelines and is required to propose a detailed conceptual design of the machine to be able to qualify for the bid. Vendors are encouraged to discuss with IPR personals for understanding/clarifications.

Requirements of MCFLT

- 1) It is intended to be used for mechanical characterization (Tensile testing, Bending, Tensile fatigue testing ,) of material specified in **Section-1 above** at low temperature such as 77 K and 5-10 K .It should have following capabilities at 77 K and 5-10 K
 - a) Experimental investigation of `Ultimate Tensile Strength` as per ASTM/ASME/applicable standards.
 - b) Experimental Investigation of `Bending Strength` as per ASTM/ASME/applicable standards.
 - c) Experimental Investigation of ` Tensile Fatigue characteristics/strength` as per ASTM/ASME/applicable standards.
 - d) Up gradation of MCFLT to accommodate following
 - i) Experimental Investigation of `Shear Strength in Torsion and Bending` at 77 K and 5-10 K as per ASTM/ASME/applicable standards.

ii) Experimental Investigation of Impact Strength at 77 K and 5-10 K as per ASTM/ASME/applicable standards.

2) The material used in superconducting magnets and its associated components are categorized as a) Structural materials b) Superconducting materials c) Insulating Materials. They are used in various forms/shape such as plates, bars, tapes, wire etc. The sample size may vary as per material and requirement. Following are sizes and forms to be consider while designing of sample holders

a) Plates/Sheets of structural materials

Length	Width	Thickness
100 mm to 450 mm	5 mm to 45 mm	5 mm to 20 mm

b) Coated conductor of Superconducting material

Length	Width	Thickness
100 mm to 450 mm	3 mm to 12 mm	0.2 mm to 1 mm

c) Wires of superconducting Material :

Strand configuration	Diameter	length
Single strand	0.6 mm to 0.81 mm	50 mm to 100 mm
Twisted Multi-strand	3 mm to 15 mm	100 mm to 400 mm

d) Insulating Material :

Length	Width	Thickness
100 mm to 450 mm	5 mm to 45 mm	2 mm to 25 mm

e) Round bars of structural materials

Length	Dia
100 mm to 450 mm	10 mm to 40 mm

f) **Tubes of CICC**

Length	Dia
100 mm to 450 mm	10 mm to 40 mm

- 3) Special sample holders capable of holding ~5 samples simultaneously (Multi holder type) and **single specimen holders** should be developed to operate at cryogenic temperatures (5-10 K-77 K). It should be able to hold sample of various sizes and must be equipped with temperature sensors/controllers. The sample holder should not slip more than 10 microns during testing of materials and should be designed for minimum heat load. It will be treated as critical parameter.
- 4) MCFLT must have Vacuum chamber design as per applicable ASME standard. It should be sealed in such a way that vacuum level should not deplete below 10^{-4} mbar for static operation for 6 hours continuously. Its walls should be polished for low out gassing and must be equipped with radiation guard against radiation. It should be ergonomically designed and should be easily
- 5) Actuating systems should have capacity of 50 KN and should **have min 5mm stroke length at full load capacity and maximum 25mm stroke length at 0.3KN load capacity**. They should be designed to operate at low temperature (5-10 K and 77 K) and should **not** affect vacuum level in chamber. It should be suitable for static as well as cyclic loading (fatigue). At low force loading the stroke should be
- 6) Utility systems should be selected in such a way that they will be able to perform minimum 30 hrs of fatigue test campaign without any breakdown.
- 7) LN2 Tank/Dewar will be selected in such a way that it will support 30 Hrs continuous operation of system and should have minimum pressure drop (value?)
- 8) LHe Tank/Dewar (applicable for LHe based system) will be selected in such a way that it will support 30 Hrs continuous operation of MCFLT
- 9) Cold heads if used will be such that it would work trouble free for repeated working of the system during the working life of the system.**
- 10) MCFLT must have water chiller unit and suitable vacuum pumps such as TMP/RVP to maintain high vacuum 10^{-5} mbar or below for continuous operation of 30 hrs or more in one run.

- 11) MCFLT should be provided with vacuum insulated transfer lines having minimum heat loss. All the coupling should be ISO KF type for quick operation is required.
- 12) MCFLT should be equipped with suitable control panel working on principle of master and slave with its associated instruments/devices. It should be portable and easy to maneuver. It should be provided with adequate protection against noise from other instruments for signal processing and isolation
- 13) MCFLT must be equipped with computer and related software for its control and operation. Computer software should able to give details of all operation, results and its associated parameters.
- 14) MCFLT will require power cable and control cable with suitable length for safe operation and control
- 15) All the required pneumatic system to satisfy expected operation/application from MCFLT should be provided.
- 16) MCFLT should be design by taking all ergonomic consideration. All the subsystems should be design in such a way that they should be easily handled by single operator.

5. Scope of Supply

- Design of the MCFLT with all necessary sub-systems with all applicable calculations and analyses.
- Fabrication of the various subsystems of the MCFLT.
- Integration of the various subsystems of MCFLT.
- Assembly and Integration of the various subsystems of MCFLT.
- Testing of IPR samples on the MCFLT at IPR (IPR will provide helium but the interfaces will have to be designed and fabricated by the vendor as per the system interfaces and design of the MCFLT)

It is the vendor's responsibility to go through the applicable standards as mentioned above. The overall MCFLT would be a set up as shown in fig below. This is a reference schematic figure only. The vendor is free to make its own design and alter into this scheme but with the approval of IPR. The helium facility shown in the set-up can be interfaced with IPR cryogenic facility.

5. Completion period:

With in one year from the date receiving clear PO and technical inputs from IPR

