



**Expression of Interest (EOI)** for Consultancy for Review & design updations and Analysis of Turbine admission valves (HP, IP & Overload valves) for 800 MW rating Advance Ultra Super Critical Steam Turbine

Expression of Interest

for

**Consultancy for Review & design updations and Analysis of Turbine admission valves (HP, IP & Overload valves) for 800 MW rating Advance Ultra Super Critical Steam Turbine**

**Document No. BHEL/HWR/AUSC/STE/TG/EOI/P2/01**

BHARAT HEAVY ELECTRICALS LIMITED  
HEAVY ELECTRICAL EQUIPMENT PLANT  
HARIDWAR-249403, INDIA



## **Expression of Interest (EOI) for Consultancy for Review & design updations and Analysis of Turbine admission valves (HP, IP & Overload valves) for 800 MW rating Advance Ultra Super Critical Steam Turbine**

### **1) Introduction:**

Bharat Heavy Electricals Limited (BHEL), a Government of India undertaking, is the largest Engineering and Manufacturing organization in India and is one of the leading international companies for providing total business solutions in the field of Power Generation & Transmission, Defense, Transportation, Oil & Gas, Telecommunication etc. The company has 17 manufacturing units, 4 power sector regions, 8 service centers, 4 overseas offices and 15 regional offices, besides host of project sites spread all over India and abroad. The company's global installed power generating capacity is approx. 178 GW. Notably, enhanced focus on project execution has resulted in BHEL achieving a capacity addition of 45,274 MW during the 12th Five Year Plan period (2012-17), surpassing the target of 41,661 MW set by the government for BHEL. With this, BHEL continues to remain the single largest contributor to the country's power generation capacity addition. With the current order book exceeding Rs. 100000.00 crore, BHEL is poised for excellent future growth. Entire range of BHEL's products and operations can be obtained by visiting our web site [www.bhel.com](http://www.bhel.com).

In the field of Power Generation, the organization is involved in Design, Manufacturing, Erection and Commissioning of Power Plant Equipment with state of the art production facilities. We have more than 50 years' experience in this field and capacity ranging up to 1000 MW.

BHEL is currently developing an AUSC Steam Turbine set for 800 MW rating with steam parameters of 310 kg/cm<sup>2</sup> / 710 °C / 720 °C. BHEL has developed a preliminary design of Turbine admission valves (HP, IP & Overload valves) of 800 MW AUSC turbine. Preliminary Analysis of Turbine valves (HP, IP & Overload valves) have also been completed by BHEL Analysis team.

### **2) Present Expression of Interest**

For the purpose of review of existing design & design updations and Analysis for steam turbine admission valves of AUSC set, BHEL intends to technically shortlist Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary (Lead Consultant having the prime responsibility of coordination with other experts as needed), who have experience in this area, based on this EOI.



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BHEL shall receive applications pursuant to this EOI in accordance with the terms set forth herein, as modified, altered, amended and clarified from time to time by BHEL, and all applications shall be prepared and submitted in accordance with such terms on or before the date specified in this EOI.

**3) Scope of Work for Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary:**

Scope of work for design has been described in **Annexure-A**.

**4) Selection of Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary:**

Based on the information provided under this EOI (ref. **Annexure-C**), the Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary, shall be technically shortlisted. The short listed Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary will further be evaluated on the basis of terms and conditions of scope and confidentiality defined in the enquiry.

Pre-bid clarification meeting shall be held with the short listed parties regarding scope, confidentiality requirements and deliverables before subsequent evaluation.

**5) Brief Description of EOI Process**

The interested Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary shall ensure that its response in the form of a signed letter comprising the application as per format enclosed at Annexure-B and details requested as per Annexures-A & C of this EOI along with the information and data required as per attachments and supporting documents thereof, is received by BHEL on or before **11 Sep 2019**. Alternatively, a scanned signed copy of the



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EOI may be sent by e-mail as advance copy by **11 Sep 2019**, to be followed by original signed copy which should reach BHEL within 7 days of e-mail communication.

The response shall necessarily be accompanied with details of Institution or Consultancy Organization of International Repute or independent consultant or team of independent consultants background, along with information required as per Annexure-A&C. The responding Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary, on submission of their response can be contacted / invited for further discussions.

The response may be sent at the following address:

Dy. General Manager

Steam Turbine Engineering (STE-TG)

Bharat Heavy Electricals Limited

HEEP, Ranipur, Haridwar-249403

Uttarakhand, India

Phone: +91-1334-284590; Fax: +91-1334-223954

Email: rrawat@bhel.in

Any request for further information or clarification on the EOI document may be sent by mail to the address mentioned above. BHEL may respond to the queries raised/clarifications sought to the best of its ability. BHEL at its discretion may extend the due date for submission of EOI and the decision of BHEL in this respect would be final and binding on the respondents.

EOI submittals should be in English. Duly authorized representative shall sign on each page of the documents. EOI should be prepared in such a way so as to provide a straight forward, concise description of applicant's capabilities.

If at any time during the evaluation of EOI, BHEL requires any clarification on the documents submitted by the prospective parties, it reserves the right to request a clarification so as to complete the evaluation.



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**6) Miscellaneous**

**Right to accept or reject any or all applications**

Notwithstanding anything contained in this EOI, BHEL reserves the right to accept or reject any application and to annul the EOI process and reject all applications, at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons therefore.

In the event that BHEL rejects or annuls all the applications, it may, at its discretion, invite all eligible for Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary to submit fresh applications, if required.

BHEL reserves the right to disqualify any applicant during or after completion of EOI process, if it is found there was a material misrepresentation by any such applicant or the applicant fails to provide, within the specified time, supplemental information sought by BHEL.

BHEL reserves the right to verify all statements, information and documents submitted by the applicant in response to the EOI. Any such verification or lack of such verification by BHEL shall not relieve the applicant of his obligations or liabilities hereunder nor will it affect any rights of BHEL.

**Governing Laws & Jurisdiction**

The EOI process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the EOI process.

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**Annexure-A**

**Scope of work**

The Turbine valve design shall cater to 800 MW AUSC power plants with steam parameters of 310 kg/cm<sup>2</sup> / 710 °C / 720 °C.

For the purpose of review of existing design and Analysis for steam turbine admission valves (HP, IP & Overload valves) for 800 MW rating AUSC Steam Turbine, BHEL intends to engage Prospective Institution or Consultancy Organization of International Repute or independent consultant or a team led by a Lead Consultant in collaboration with suitable partners as deemed necessary (Lead Consultant having the prime responsibility of coordination with other experts as needed), in line with the broad scope detailed below, which is a preliminary outline of the work envisaged, and shall be finalized after detailed discussions further on.

**1- Review & design updations of Turbine admission valves (HP, IP & Overload valves):**

- a. Review of design of complete valve internals (viz. Valve cover, Valve cone, Valve spindle, Steam strainer, Guide bushes, Threaded ring, Valve seat, Diffuser, Angle ring etc.) for turbine valves and design updations (if required);
- b. Review of design of Valve casing assembly and design updations (if required);
- c. Review of design of Valve coupling with Actuator and design updations (if required);
- d. Hot & cold clearance calculation for Turbine valves;
- e. Pressure drop calculation for turbine valves;
- f. Selection & suitability of coating for Turbine valve internals;
- g. Determination of Spindle leakage steam pressure & temperature at the valve leak-off area in different operating conditions (like full load, part load etc.);
- h. Spindle leakage flow calculation for Turbine valves in different operating conditions (like full load, part load etc.);
- i. Interference calculation for valve seat & casing for Turbine valves;
- j. Design of U-seal ring and determination of pre-compression value of U-seal ring of Turbine valve;

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- k. Review of design of Steam strainer and design updations (if required). Pressure drop calculation across steam strainer for turbine stop valves;
- l. Design of Yoke for Turbine valves;
- m. Review of design of Valve casing in forging variant and design updations (if required): Design & manufacturing feasibility of valve casing in forging variant with material Alloy 617M;
- n. Review of design of Studs & Cap nuts for Turbine valves and design updations (if required). Methodica for calculating the required Tightening torque for various Studs used in the Turbine valves;
- o. Procedure of heat tightening for Studs made with material Alloy 105. Methodica for calculating the delta L value for heat tightening of Studs;
- p. Checking of suitability of HT paint for turbine valve application;
- q. Clearance calculation for Angle ring at IP turbine connection;
- r. Review of design of flange of valve casing (IP turbine connection) and design updations (if required);
- s. Review of Valve force calculation due to steam pressure & Actuator forces;
- t. Based on the outcome of design Analysis, reiteration of design shall be carried out (if required);

**2- Analysis of Turbine admission valves (HP, IP & Overload valves):** Consultancy in the following areas of Analysis is required:

- a. Welded structure of valve casing from design safety point of view
- b. Design Analysis of valve casing for steady state, creep, low cycle fatigue, creep fatigue interaction and fracture mechanics
- c. Design loads and boundary conditions for valve casing.
- d. Identification of failure mode of valve internals
- e. Analysis methodology of valve internals
- f. Loads and boundary conditions on valve internals
- g. To review the Analysis results and provide feedback upon safety of valve casing and internals from strength point of view

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**3- Expected outcome of Consultancy:**

- a. Finalization of design of HP, IP & Overload valves for 800 MW AUSC Steam Turbine;
- b. Finalization of Analysis work of HP, IP & Overload valves for 800 MW AUSC Steam Turbine;
- c. Filling of the design/Analysis gaps listed above in scope of supply;

**4- Methodology of design consultancy:**

Consultancy shall be required at BHEL, Haridwar, India and consultant(s) shall have multiple visits on mutually agreed dates and there shall be close coordination with BHEL valve design and analysis team;

The information shared under the project shall be governed by the conditions of a Non-Disclosure Agreement to be signed with the Consultant(s) during Pre-Award stage/Post-Award stage, as applicable. The schedule of work shall be decided as per mutual agreement between the consultant(s) and BHEL.





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**Annexure-B**

**Expression of Interest Letter**

(To be submitted on the letter head of the party submitting the EOI)

To,  
Dy. General Manager  
Steam Turbine Engineering (STE-TG)  
Bharat Heavy Electricals Limited  
HEEP, Ranipur, Haridwar-249403  
Uttarakhand, INDIA  
Telephone: +91-1334-284590  
Telefax: +91-1334- 223954  
Email: rrawat@bhel.in

**Subject:** EOI for being Consultancy Provider for Review & design updations and Analysis of Turbine admission valves (HP, IP & Overload valves) for 800 MW rating Advance Ultra Super Critical Steam Turbine.

With reference to your EOI document Ref. No **BHEL/HWR/AUSC/STE/TG/EOI/P2/01** Rev.00 dated \_\_\_\_\_, we have examined the EOI document and understood its contents and hereby submit our application for pre-qualification for the aforesaid project.

1. We acknowledge that BHEL will be relying on the information provided in the application and the documents accompanying such application for the aforesaid consultancy work, and we certify that all information provided in the application and Annexure-A & C are true and correct; nothing has been omitted which renders such information misleading; and all documents accompanying such application are true copies of their respective originals.
2. We confirm to make available to BHEL, within the stipulated time, any additional information it may find necessary.
3. We agree and undertake to abide by all the terms and conditions of the EOI document.

In witness thereof, I / we submit this application under and in accordance with the terms of the EOI document.

Yours faithfully,

(Signature, name and designation of the Authorized Signatory  
Name and seal of the Applicant)

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**Annexure-C**

**Mandatory information to be furnished along with EOI, required by BHEL for technical evaluation of the Institutions/Consultancy organizations/Independent consultant/ team led by a Lead Consultant in collaboration with suitable partners as deemed necessary:**

Sr. No.	Description of Requirements	Relevant document Attached (Yes/No)
1	Experience in no. of years of design of high temperature Steam Turbine components of rating 500 MW or above, which shall include: 1.1- Design of complete main Turbine valves including: a- design of main Turbine valve casings; b- design of main Turbine valve internals; c- design of Yoke; d- design of coupling assembly between valve & actuator; 1.2- Experience in the selection/suitability of hard facing on turbine valve internals; 1.3- Design calculation of valve forces for Turbine valve actuators 1.4- Strength analysis and mechanical calculations of Steam turbine valve (HP, IP & Overload valves)	
2	List of design of Steam Turbines valves performed/reviewed/vetted for rating 500 MW or above of USC parameters (pressure 250 bar, temperature 593 deg C) or above;	
3	List of the OEMs of Steam Turbine to whom already consultancy services provided along with the brief nature of consultancy work	

**Desirable information required for technical evaluation of the institutions/consultancy organizations /independent consultant by BHEL to be furnished along with EOI.**

1	1.1- Experience in design of main turbine valves & its components made of Nickel based alloy of any MW rating operating above 600 deg C;  1.2- Experience in Strength analysis and mechanical calculations of main turbine valves & its components made of Nickel based alloy of any MW rating operating above 600 deg C;	



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**Disclaimer**

The information contained in this Expression of Interest document (the “EOI”) or subsequently provided to Applicant(s), whether verbally or in documentary or any other form, by or on behalf of BHEL or any of its employees or advisors, is provided to Applicant(s) on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided.

This EOI is not an agreement and is neither an offer nor invitation by BHEL to the prospective Applicants or any other person. The purpose of this EOI is to provide interested parties with information that may be useful to them in the formulation of their application for qualification pursuant to this EOI.

BHEL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Applicant upon the statements contained in this EOI. The issue of this EOI does not imply that BHEL is bound to select and shortlist Applicants for next stage of the Project.