

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Finish Machining of HP Outer Casing- Inlet End for Steam Turbine <u>Drg.no. 01052630000</u>	Indent no. 20250429 TTX/ TDC/2025/135 Page 1 of 4
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Scope of Work

H.P Outer Casing- Inlet End of Steam Turbine in finish machined condition is proposed to be subcontracted for Finish Machining work as per machining details & technical requirements furnished in drg.no. 01052630000.

H.P Outer Casing- Inlet End raw material with material specification HW19688 and casting Drg.01052630901 will be sent.

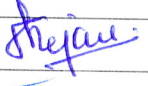


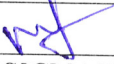
A) Scope of work at BHEL, Haridwar:

- Control marking
- All the connection and plates (item no. 2 to 4) shall be weld and assembled before hydraulic test at BHEL Haridwar.
- Hydraulic testing after complete machining shall be done at BHEL Haridwar.
- All operations detailed in section Z1-Z1, Z2-Z2, and View-Z3 on sheet-3 shall be carried out at the BHEL Haridwar works.

B) Scope of Work for vendor:

Vendor to carry out complete finish machining of Outer Casing -Inlet end as per machining details & technical requirements furnished in drg.no. 01052630000 consideration of following points:

- Machining should be carried out taking care of Rough machined (Casting) drg. as well as finish machined drg. Technical requirements specified in the rough machined drg. should be taken care of before carrying out finish machining.
- Vendor to machine details with reference to Guide dia. 2120 +0.2+0.1 (D) (Detail J, H & L; Sheet- 3) in **one setting**, maintaining required relative accuracies as per drg. are:
 - I-ring groove detail (Groove detail with ID 1490+/-0.2. Refer Detail L, Sheet-3)

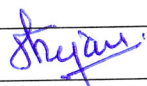
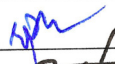
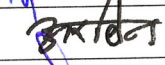

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TUM-PLG	Manoj Kr Gupta, Sr. Mgr.		02.08.25
DEPTT.	NAME	SIGNATURE	DATE

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- U-Seal sitting area & step detail (Refer Detail H, Sheet -3. Steps, faces & complete Detail with Dia. 1772 H7).
- Step face at 95-0.03mm from Top face (B) & details (Refer View H, Zone N-3, sheet -3).
- Shaft seal bores (Refer Detail J, Sheet -3. Inner dia. 840+0.09, 800 etc with steps & faces).
- Dimension 110 and all the bracketed dimension is a reference dimensions only (refer details G, Sheet-3).
- 50%-dimension values and dimension appears without brackets are to be maintained as per drg. after machining bosses as per drawing dimension.
- Buttress thread (Detail H & F. Thread with I.D 1865+0.2 mm & pitch 50 mm) machining is to be done before finish machining of the details as referred in point no.-1.
- Final machining cuts on these areas requiring high relative accuracy tolerances should be taken within short span of time in one go. These dimensions & runouts etc. should be checked & recorded by vendor's quality department after complete machining of job & before unloading job from machine.
- Other details requiring relative accuracies shall be as per drawing.

C) Important points: Vendor to note following important points:

- All other requirements of QP, Standards and technical requirements specified on the drawings to followed.
- No flaws like blow holes, shrinkage, inclusions etc. should open up during machining. However, if any flaw opens up during machining, vendor shall immediately intimate detail and location of flaw and corrective action

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proposed. Further machining will be suspended till BHEL approves corrective action.

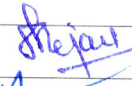



- BHEL shall furnish clarifications, if any, w.r.to scope of work or drg. dimensions / technical requirements to the vendor to enable it to submit technical / commercial offer.
- Party must ensure that all requirements indicated in the drg. regarding:
 - Surface finishes (Ra value indicated in microns).
 - Sizes and tolerances.
 - Geometrical accuracies e.g. run-outs, concentricity, parallelity, perpendicularity etc. shall be fully met.
 - Reference surfaces are clearly marked in the concerned drawings.

D) After finish machining, inspection report is to be submitted to BHEL for final clearance.

E) Inspection of the job at supplier's works shall be carried out as per BHEL approved quality plan by BHEL/ agency authorized by BHEL for which adequate prior notice (min. 4weeks) shall be given by the supplier.

F) Packing & Preservation:

- Conserve components as per BHEL's conservation instructions (Table-1 of ST 33004) suitable for 6 months. **PAINT IS NOT ALLOWED** on any surface. If as per ST33004 the outer unmachined surface of any component is specified to be painted, this requirement should be disregarded. Instead, the unmachined surface should be conserved in the same manner as the machined surface, following the conservation requirements outlined in ST33004.
- Cover joint plane flanges with plywood + rubber sandwiching (e.g., 10 mm rubber + 20 mm plywood) using suitable bracket and other critical machined surfaces with plastic/rubberized caps/wooden protectors to prevent mechanical damage.
- Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.

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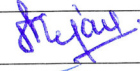

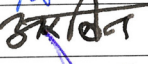

- Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.
- Ensure that all lifting lugs and bollards are clearly marked and easily accessible, as lifting and handling of the component together with its skid shall be carried out using the bollards provided on the component.
- Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.
- Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.
- Ensure packaging is durable enough to withstand the weight of the components and Packing of the finish machined component should be suitable to protect damage to machined surfaces during handling and transportation.

G) All cross-referred documents given in Annexure-I.

ANNEXURE-I

List of drawings / standards to be referred

1. Casting for HP Outer Casing-Inlet End (Rough machined): 0-10526-30901
2. HP Outer Casing-Inlet End (Finish machined drawing): 0-10526-30000
3. Log Sheet: 0-10526-30000 LS
4. Material Specification: HW19688
5. Product Standard: ST01013, ST01030
6. Packing & Preservation..... ST33004

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Pre-Qualifying Requirement (PQR)

	HP OUTER CASING- INLET END (Drg. no. - 01052630000) (Complete Finish Machining)	Indent No. 20250429 & 20250430 TTX/PQR/2025/136
SL. No.	REQUIREMENT	REMARKS
1	Only those vendors should quote who have following machine, facilities installed & operational at their works for following operations for machining, fitting works of "HP Outer Casing- Inlet End" as per Drg. No. 01052630000 . Raw material casting (Drg. No. 01052630901) shall be supplied to vendor after control marking for complete finish machining as per drawing.	Vendor to confirm.
2	Vendor must have suitable tooling / facility such as Marking Table / Machine Bed etc. in good working condition, to facilitate marking. Vendor must have suitable facility for lifting / handling the subject job.	Vendor to confirm.
3	Turning / Vertical Boring Operation :-	
3.1	CNC Vertical Boring Machine, suitable for Vertical Boring of HP Outer Casing- Inlet End as per drawing & T.R.'s requirement. Machine Requirement : (a) Table diameter of machine = 4000 mm or more. (b) Maximum Turning Height of job = 2800 mm or more. (c) Ram Stroke = 2600 mm or more (d) Weight capacity of machine = 45 Tons or more.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
4	Horizontal Boring work :-	
4.1	Vendor must have suitable CNC Horizontal Boring machine with suitable attachments (i.e. UT-800 or UT-1000) for machining of different details, holes, Threaded holes, Slots as per Drg. and TR requirement. Required Machine details as below : (i) SPINDLE + RAM (Movement) : 2000 mm (ii) X-AXIS : 4000 or more, Y-AXIS : 3500 mm or more, (iii) TABLE SIZE : 3000 x 3000 mm or more (iv) WEIGHT CAPACITY – 45 Ton or more.	(a) Vendor to confirm. (b) Vendor to provide machine accuracies & Geometrical details / specification for referred operation.
5	Vendor need to submit manufacturing process, tooling used for machining Butress Threads.	Vendor to submit the details
6	Fitting work :-	
6.1	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done as per drawing & TR.	Vendor to confirm.
7	Vendor to confirm that above machines (as per pt. no. 3 & 4) are available at their works & are in good working condition with capability of achieving accuracies, surface finish & tolerances as per drawing requirements. If necessary, Vendor can suggest alternate machines (other than specified in pt. no. 3 & 4) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit the machine accuracies & Geometry details along with specification.
8	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
9	Vendor to note that all tools, measuring equipment, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
10	BHEL reserves the right to verify the information provided by vendor. BHEL may also visit vendor works if so desired by BHEL. In case, the information provided by vendor is found to be false/ incorrect, their offer shall be rejected.	Vendor to note & Confirm.

(I K Ranjan)
Mgr. (TTX)

(R P Singh)
Sr. Mgr. (NCT)


LOGO		MANUFACTURER'S NAME AND ADDRESS:		MANUFACTURING QUALITY PLAN						PROJECT :SINGRAULLI – 1&2 (2X800MW)				
				ITEM : HP OUTER CASING - INLET (MACHINING)			QP NO.:1.01.03_HPOC-INLET(M) REV.NO.:00 DATE: 19.09.25 PAGE: 1 OF 3.			PACKAGE :TG CONTRACT NO. :1150-001 MAIN-SUPPLIER:BHEL				
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.
1.000	Receiving inspection (at manufacturer / sub-contractor works after induction, control marking, at BHEL-Haridwar and issue of CHP by NTPC RIO-Haridwar)													
1.100	Material Receiving Inspection at sub-contractor's work	Verification of identification of material	Major	Visual	100%	100%	As per BHEL drg./spec	As per BHEL drg./spec	PPMI V/ Q.no.	✓	P	V	-	Material will be supplied by BHEL. Transfer of identification to be ensured.
		Verification of dimensions as per control marking and visual Inspection	Major	Measure ment	100%	100%	As per drg./ Standard/ TDC	As per drg./ Standard/ TDC	Observ ation sheet	✓	P	-	-	
2.000	IN PROCESS INSPECTION													
2.100	Checks after machining as per TDC	Visual inspection and Dimensional measurement	Major	Visual & measure ment	As per Logsh eet	As per Logsh eet	As per BHEL drg./ TDC.	As per BHEL drg./ TDC.	Logshe et	✓	P	W	W	In case, surface having customer seal is being machined off, customer involvement is required for seal transfer. Refer to Note 3
3.000	Final Inspection													

MANUFACTURER/ SUB-SUPPLIER	 SUGANDH AGARWAL सुगन्ध अग्रवाल Manager / -प्रबंधक Q&A, गुणवत्ता आन्वेषण विभाग BHEL, HARIDWAR/भारतखण्ड, हरिद्वार	LEGEND: * RECORDS, IDENTIFIED WITH “TICK” (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUM “N” AS ‘W’	DOC. NO.:		
			FOR NTPC		

LOGO	MANUFACTURER'S NAME AND ADDRESS:	MANUFACTURING QUALITY PLAN						PROJECT :SINGRAULLI – 1&2 (2X800MW)						
		ITEM : HP OUTER CASING - INLET (MACHINING)				QP NO.:1.01.03_HPOC-INLET(M) REV.NO.:00 DATE: 19.09.25 PAGE: 2 OF 3.		PACKAGE :TG CONTRACT NO. :1150-001 MAIN-SUPPLIER:BHEL						
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N				D*	M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.
3.100	Document Check		Major	Visual	100%	100%	As per BHEL drg./ spec./ TDC	As per BHEL drg./ spec./ TDC	-	✓	P	V	-	
3.200	Preservation		Major	Visual	100%	-	As per BHEL drg./ spec./ TDC	As per BHEL drg./ spec./ TDC	COC	✓	P	V	-	
3.300	Packing		Major	Visual	100%	-	As per BHEL drg./ spec./ TDC	As per BHEL drg./ spec./ TDC	COC & Photo of packed casting	✓	P	V	-	

Notes:

1. Latest revision of BHEL specification/ standard shall be followed.
2. Sub-contractor shall maintain traceability (BHEL identification & customer seal) throughout the process i.e. receipt, machining and dispatch to BHEL-Haridwar. Wherever necessary, call to be raised for BHEL identification & NTPC seal transfer.
3. Sub-contractor to provide observation sheet of all machined dimensions which are not covered in log sheets.

MANUFACTURER/ SUB-SUPPLIER	 SUGANDH AGARWAL सुगंध अग्रवाल Manager / प्रबंधक Q&A गुणवत्ता आश्वासन विभाग BHEL, HARIDWAR/भ.एच.ई.एल., हरिद्वार	LEGEND: * RECORDS, IDENTIFIED WITH “TICK” (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUM “N” AS ‘ W”	FOR NTPC	DOC. NO.:		