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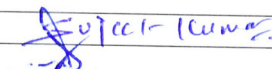
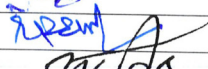
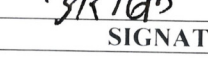
Scope of work

LP-2 Inner Casing of Steam Turbine is proposed to be sub-contracted for machining as per machining details & technical requirements furnished in drg. no. 01078332000 (Sheet 1 to 5). Scope of Work for finish machining includes the following:

- (1) The Fabricated LP Inner Casing in two halves as per drawing shall be sent to vendor after control marking along with the fasteners for machining of LP Inner Casing. The fabricated casing includes Plates (Grade: Carbon Steel), Casted Items (Grade: Steel Casting) & Forged items (Grade: Steel forging).
- (2) Since LP Inner casing is fabricated structure, special care must be taken while handling & overturning the job to avoid distortion. Distortion in casing may affect its assembly afterwards at BHEL works.
- (3) Machining to be carried out by party as per drg. no. 01078332000 (Sheet 1 to 5) of LP-2 Inner Casing.

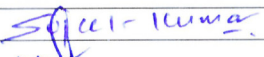
Note: All the diameters & axial dimensions in specified tolerances are to be maintained from reference plane.

- (4) Surface finish of joint plane should be Ra 1.6. Steam tightness of joint plane should be ensured by color matching. In assembled condition the gap at joint plane must not exceed following value:
From inside the Casing $\leq 0.02\text{mm}$
From outside the Casing $\leq 0.05\text{ mm}$
This must be checked by feeler gauge.
- (5) While doing color matching/ assembly of Upper half (U/H) and Lower Half (L/H), mismatch of holes observed or any other assembly related issue observed, vendor shall inform about proposed corrective action to BHEL immediately. Proper care shall be taken to assemble U/H & L/H to ensure its position as accurate as possible.
- (6) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing- 01078332000 (sheet-3) of LP-1 Inner Casing.
- (7) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01078332000-LS of LP-2 Inner Casing.

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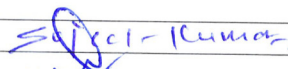
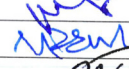
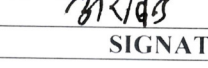
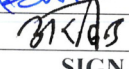
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- (8) All other requirements of QP, Standards and T.R. of the drawings to be followed.
- (9) No flaws like cracks etc. should open up during machining. However, if any flaw opens up during machining, vendor shall immediately intimate detail and location of flaw and corrective action proposed. Further machining will be suspended till BHEL approves corrective action.
- (10) BHEL shall furnish clarifications, if any, w.r.t. scope of work or drawing dimensions / technical requirements to the party to enable it to submit technical / commercial offers.
- (11) One complete set of all relevant drawings and product standards shall be furnished to the supplier for submitting the offer. Drawings and documents furnished to vendor should be treated as BHEL property. Strict confidentiality is to be maintained and under no circumstances these documents or copy of these should be transferred to third party without express permission of BHEL. On completion of supply these documents must be returned to BHEL. All dimensions in drawings are in MM (millimeters) unless otherwise specifically stated.
- (12) Drawings & documents specified in the Annexure-II may undergo minor revisions however, quantum of Forging/machining will remain same with minor variation. If any drawing undergoes revision, it shall be communicated to supplier at the earliest for which any sort of claim is not to be raised.
- (13) Party must ensure all requirements indicated in the drawing regarding:
- Surface finishes (Ra value indicated in microns)
 - All dimensions, sizes and tolerances
 - Geometrical accuracies e.g. run-outs, concentricity, parallelity, perpendicularity, flatness etc.
 - Dimensions shown within  are Critical to Quality (CTQ).
 - Reference surfaces are clearly marked in the concerned drawings.
- (14) Inspection of the job at supplier's works shall be carried out as per BHEL/ Customer approved quality plan by Customer/ BHEL/ agency authorized by BHEL for which adequate prior notice (min. 2 weeks) shall be given by the supplier.

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- (15) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.
- (16) No paint to be applied on Casing (Refer TR-7 of Drg- 01078332000, Sheet No-3).
- (17) All technical requirements listed in drawings shall be fully met.
- (18) Broad manufacturing plan for the machining of LP Inner casing is given in Annexure-I for reference purpose.
- (19) All cross-referred documents given in Annexure-II.
- (20) **Preservation & Packing:**
- Preserve components as per BHEL's preservation 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.
 - 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.

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(21) **Labelling & Marking:-**

A. Each half of the casing shall be clearly labelled with the following:-

- Component Name
- Drawing Number
- BHEL PO Number
- Handling Instructions (pictogram or written)
- "Do Not Lift from Machined Surface" warning

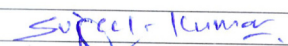
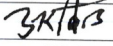
B. Ensure tags and labels are waterproof, non-removable, and securely attached.

C. Enclose a waterproof envelope containing the packing list and attach it externally.

D. Take photographic evidence of the packaging and protection before dispatch and submit it to BHEL.

(22) Broad manufacturing plan for the machining of LP Inner casing is given in Annexure-I for reference purpose.

(23) All cross-referred documents given in Annexure-II.

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ANNEXURE-I

1. CNC Horizontal Boring:

- a) Machining of joint plane of Upper Half of the LP inner Casing, machining of joint plane holes and machining of alignment points.
 - b) Machining of joint plane of Lower Half of the LP inner Casing & machining of alignment points.
 - c) Transfer marking of joint plane holes from Upper Half to Lower Half.
 - d) Drilling & tapping of joint plane holes in Lower Half. Holes at Section K-K in L/H to be machined after V. Boring operation.
 - e) Machining of Inlet pipe details in Upper Half as per drg. (refer Section C-C, Section R-R and Detail-U, Sheet-1)
 - f) Machining of Man Hole Flange in U/H (refer View-V, Section F1-F1, Sheet-1)
2. Color Matching & Assembly of Upper Half & Lower Half with the help of BHEL supplied fasteners. Color matching of joint plane of Upper Half & Lower half to be done as per standard-HW0992017. After the assembly of both the halves Joint Flanges shall be tag welded with the help of plates from outside at four locations (2 locations at each side) to ensure proper fixing/ rigidity of both the halves at its position.
3. Drilling & reaming of Taper Pin holes in assembled condition. Fitting of Taper Pins into the holes.

4. CNC Vertical Boring:

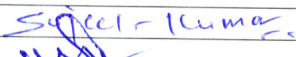
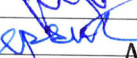
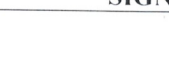
- a) Vertical Boring: Complete Turning of LP Inner Casing as per drawing in two settings.

5. CNC Horizontal Boring:

- a) Drilling of Parallel Pin Holes as per Details-X & Y of sheet-2.
- b) Drilling of holes as per Details- M & N of sheet-1&3.
- c) Dismantling of both the halves.
- d) Machining of details such as Section H-H, Section G-G Detail-Z, Detail-Y & other remaining details in Lower Half & Upper Half as per drawing.

6. CNC Horizontal Boring/ Universal Radial drill Machine:

- a) Drilling of BVMS holes as per sheet-5 in Upper Half.

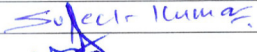
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ANNEXURE-II

List of drawings / standards to be referred

1. LP-2 Inner Casing Machining01078332000
2. Color Matching Standards.....HW0992017
3. Identification Marking.....HW0400397
4. Log Sheets01078332000LS

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