HARIDWAR	**Pre-Qualifying Requirement (PQR) for complete machining of LP Inner Casing (Drg No: 01074132000, 01078332000, 01074182000 & 01078382000)**	

SL.No	REQUIREMENT	REMARKS
1.	Only those vendors should quote who have following machines installed & operational at their works for complete machining of LP Inner Casing (Drg No: 01074132000, 01078332000, 01074182000 & 01078382000) with following specifications: -	Vendor to Note.
A.	**CNC Horizontal Boring Machine: -** (a) X traverse : 6000 mm or more (b) Y traverse : 5000 mm or more (c) Ram + Spindle movement in Z direction : 2000 mm or more (d) Machine RAM along with suitable attachments should be capable of pinning operation (refer detail-X of sheet-2) (e) Rotary Table of suitable size with weight capacity 30Tons or more (f) Machine should have right angle head facility for drilling & milling. (g) Machine should be suitable to accommodate the job for machining.	Vendor to confirm & submit machine details along with geometrical accuracy.
B.	**CNC Vertical Boring Machine:-** (a) Table Dia : 6500 mm or more (b) Table Capacity: 65Tons or more (c) Swing: 6600 mm or more (d) RAM should be suitable to machine bore depth 2700mm or more (e) Machine should be suitable to accommodate job height 5400mm or more for machining (f) If table diameter is less than 6500mm, vendor to give detail of table, suitable fixture/arrangement for mounting & clamping the job on machine table. Table should be capable of handling unsymmetrical load of 80 Tons or more during machining.	Vendor to confirm & submit machine details along with geometrical accuracy.
2.	Vendor to confirm that above Machines (A & B) installed at their works are in good working condition with capability of machining similar size item as per Sl. No: 1 and capable of achieving all the dimensions, surface finish, accuracies & tolerances as per drawing. If necessary, vendor may suggest alternate machines/methods (other than machines specified at point A & B) suitable for machining the job as per drawing, for review and acceptance by BHEL	Vendor to confirm
3.	Vendor should have suitable facility such as Marking Table or Machine Bed etc. suitable to accommodate subject job for marking purpose. Vendor should also have suitable facility for lifting & handling the job.	Vendor to confirm.
4.	Vendor to confirm that all the dimensions & surface finish of the component shall be met as per drawing.	Vendor to confirm.
5.	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 & agree.

HARIDWAR	**Pre-Qualifying Requirement (PQR) for complete machining of LP Inner Casing (Drg No: 01074132000 & 01078332000) with BVMS Holes**	

SL.No	REQUIREMENT	REMARKS
1.	Only those vendors should quote who have following machines installed & operational at their works for complete machining of LP Inner Casing (Drg No: 01074132000 & 01078332000) with following specifications: -	Vendor to Note.
A.	**CNC Horizontal Boring Machine: -** (a) X traverse : 6000 mm or more (b) Y traverse : 5000 mm or more (c) Ram + Spindle movement in Z direction : 2000 mm or more (d) Machine RAM along with suitable attachments should be capable of pinning operation (refer detail-X of sheet-2) (e) Rotary Table of suitable size with weight capacity 30Tons or more (f) Machine should have right angle head facility for drilling & milling. (g) Machine should be suitable to accommodate the job for machining.	Vendor to confirm & submit machine details along with geometrical accuracy.
B.	**CNC Vertical Boring Machine:-** (a) Table Dia : 6500 mm or more (b) Table Capacity: 65Tons or more (c) Swing: 6600 mm or more (d) RAM should be suitable to machine bore depth 2700mm or more (e) Machine should be suitable to accommodate job height 5400mm or more for machining (f) If table diameter is less than 6500mm, vendor to give detail of table, suitable fixture/arrangement for mounting & clamping the job on machine table. Table should be capable of handling unsymmetrical load of 80 Tons or more during machining.	Vendor to confirm & submit machine details along with geometrical accuracy.
C.	**Drilling Facility:-** Vendor should have suitable facility such as **Universal Radial Drill Machine** or **CNC Horizontal Boring Machine with Universal Head** for drilling BVMS holes as per sheet-5 of drawing no-01074132800 & 01078332800	Vendor to confirm & submit details.
2.	Vendor to confirm that above Machines (A, B & C) installed at their works are in good working condition with capability of machining similar size item as per Sl. No: 1 and capable of achieving all the dimensions, surface finish, accuracies & tolerances as per drawing. If necessary, vendor may suggest alternate machines/methods (other than machines specified at point A, B& C) suitable for machining the job as per drawing, for review and acceptance by BHEL	Vendor to confirm
3.	Vendor should have suitable facility such as Marking Table or Machine Bed etc. suitable to accommodate subject job for marking purpose. Vendor should also have suitable facility for lifting & handling the job.	Vendor to confirm.
4.	Vendor to confirm that all the dimensions & surface finish of the component shall be met as per drawing.	Vendor to confirm.
5.	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 & agree.

Scope of work

LP Inner Casing of Steam Turbine is proposed to be sub-contracted for machining as per machining details & technical requirements furnished in Drg. No. 01074132000 (Sheet 1 to 4) respectively. 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. 01074132000 (Sheet-1 to 4) of LP-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 ≤ 0.02mm
From outside the Casing ≤ 0.05 mm
This must be checked by feeler gauge.

(5) **Following special care shall be exercised by vendor while machining the LP Inner Casing:-**

- Dimension 1860mm to be ensured in Upper Half. (Refer detail-X, Sheet-1). If required machining to be done.
- Dimension 1850mm to be ensured in Lower Half. (Refer Section G-G, Sheet-1). If required machining to be done.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

- Dimension 1252.5mm to be ensured in Lower Half. (Refer Section F-F, Sheet-1). If required machining to be done.
- Dimension 95mm (height of key slot) to be ensured in Lower Half. (Refer Section H-H, Sheet-2). If required machining to be done.
- Dimension 1825mm, to be ensured in Upper Half & Lower Half. (Refer Section D-D, Sheet-1). If required machining to be done.
- Finish machining of Joint Plane of U/H & L/H (separately) of LPIC should be done in single pass.
- Threaded Hole M42 at Section K-K in Lower half to be machined after Vertical Boring Operation. Transfer marking from Upper Half to Lower Half to be done in assembled condition after Vertical Boring operation.

(6) While doing Color Matching/ assembly of Upper half (U/H) and Lower Half (L/H), if 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.

(7) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing-01074132000 (sheet-3).

(8) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01074132000-LS of LP Inner Casing respectively.

(9) All other requirements of QP, Standards and T.R. of the drawings to be followed.

(10) 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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

(11) 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.

(12) 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.

(13) Drawings & Documents specified in the annexure-II may undergo minor revisions however, quantum of fabrication/machining work will remain same with minor variation. If any drawing undergoes revision, it shall be communicated to vendor at the earliest for which any sort of claim not to be raised.

(14) 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.

(15) 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.

(16) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.

(17) No paint to be applied on Casing (Refer TR-7 of Drg- 01074132000, Sheet No-3).

(18) All technical requirements listed in drawings shall be fully met.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

(19) **Preservation & Packing**

a) 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.
b) 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.
c) Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.
d) Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.
e) 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.
f) Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.
g) Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.
h) 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.

(20) **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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

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.

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

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

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

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 & Threading of Joint Plane Holes in Lower Half. Holes at Section K-K in L/H to be machined after Vertical 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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

ANNEXURE-II

List of drawings / standards to be referred

1. LP-1 Inner Casing Machining ..……. 01074132000
2. Color Matching Standards…….. HW0992017
3. Identification Marking…… HW0400397
4. Instruction for Painting & Conservation.. ST33004
5. Log Sheets …….. 01074132000LS

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

Scope of work

LP-1 Inner Casing of Steam Turbine is proposed to be sub-contracted for machining as per machining details & technical requirements furnished in drg. no. 01074132000 (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. 01074132000 (Sheet 1 to 5) of LP-1 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 ≤ 0.02mm
From outside the Casing ≤ 0.05 mm
This must be checked by feeler gauge.

(5) **Following special care shall be exercised by vendor while machining the LP Inner Casing:-**

- Dimension 1860mm to be ensured in upper half. (Refer detail-X, Sheet-1). If required machining shall be done.
- Dimension 1850mm to be ensured in Lower Half. (Refer Section G-G, Sheet-1). If required machining to be done.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

- Dimension 1252.5mm to be ensured in Lower Half. (Refer Section F-F, Sheet-1). If required machining to be done.
- Dimension 95mm (height of key slot) to be ensured in Lower Half. (Refer Section H-H, Sheet-2). If required machining to be done.
- Dimension 1825mm to be ensured in Upper half & Lower half. (Refer Section D-D, Sheet-1). If required machining shall be done.
- Finish machining of Joint Plane of U/H & L/H (separately) of LPIC should be done in single pass.
- Threaded Hole M42 at Section K-K in Lower half to be machined after Vertical Boring Operation. Transfer marking from Upper Half to Lower Half to be done in assembled condition after Vertical Boring operation.

(6) 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.

(7) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing- 01074132000 (sheet-3) of LP-1 Inner Casing.

(8) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01074132000-LS of LP-1 Inner Casing.

(9) All other requirements of QP, Standards and T.R. of the drawings to be followed.

(10) 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.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

(11) 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.

(12) 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.

(13) 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.

(14) 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.

(15) 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.

(16) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.

(17) No paint to be applied on Casing (Refer TR-7 of Drg- 01074132000, Sheet No-3).

(18) All technical requirements listed in drawings shall be fully met.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

(19) **Preservation & Packing:**

a. 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.

b. 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.

c. Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.

d. Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.

e. 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.

f. Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.

g. Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.

h. 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.

(20) **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.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

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.

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

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

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

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.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

ANNEXURE-II

List of drawings / standards to be referred

1. LP-1 Inner Casing Machining ..……. 01074132000
2. Color Matching Standards…….. HW0992017
3. Identification Marking…… HW0400397
4. Instruction for painting & conservation… ST33004
5. Log Sheets …….. 01074132000LS

DEPTT.	NAME	SIGNATURE	DATE
TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

Scope of work

LP Inner Casing of Steam Turbine is proposed to be sub-contracted for machining as per machining details & technical requirements furnished in Drg. No. 01074182000 (Sheet 1 to 4) respectively. 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. 01074182000 (Sheet-1 to 4) of LP-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 ≤ 0.02mm
From outside the Casing ≤ 0.05 mm
This must be checked by feeler gauge.

(5) **Following special care shall be exercised by vendor while machining the LP Inner Casing:-**

- Dimension 1860mm to be ensured in Upper Half. (Refer detail-X, Sheet-1). If required machining to be done.
- Dimension 1850mm to be ensured in Lower Half. (Refer Section G-G, Sheet-1). If required machining to be done.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		

- Dimension 1252.5mm to be ensured in Lower Half. (Refer Section F-F, Sheet-1). If required machining to be done.
- Dimension 95mm (height of key slot) to be ensured in Lower Half. (Refer Section H-H, Sheet-2). If required machining to be done.
- Dimension 1825mm, to be ensured in Upper Half & Lower Half. (Refer Section D-D, Sheet-1). If required machining to be done.
- Finish machining of Joint Plane of U/H & L/H (separately) of LPIC should be done in single pass.
- Threaded Hole M42 at Section K-K in Lower half to be machined after Vertical Boring Operation. Transfer marking from Upper Half to Lower Half to be done in assembled condition after Vertical Boring operation.

(6) While doing Color Matching/ assembly of Upper half (U/H) and Lower Half (L/H), if 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.

(7) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing-01074182000 (sheet-3).

(8) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01074182000-LS of LP Inner Casing respectively.

(9) All other requirements of QP, Standards and T.R. of the drawings to be followed.

(10) 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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

(11) 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.

(12) 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.

(13) Drawings & Documents specified in the annexure-II may undergo minor revisions however, quantum of fabrication/machining work will remain same with minor variation. If any drawing undergoes revision, it shall be communicated to vendor at the earliest for which any sort of claim not to be raised.

(14) 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.

(15) 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.

(16) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.

(17) No paint to be applied on Casing (Refer TR-7 of Drg- 01074182000, Sheet No-3).

(18) All technical requirements listed in drawings shall be fully met.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		

(19) **Preservation & Packing**

a) 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.
b) 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.
c) Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.
d) Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.
e) 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.
f) Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.
g) Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.
h) 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.

(20) **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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

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.

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

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

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		

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 & Threading of Joint Plane Holes in Lower Half. Holes at Section K-K in L/H to be machined after Vertical 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 (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.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		

ANNEXURE-II

List of drawings / standards to be referred

1. LP-1 Inner Casing Machining ..……. 01074182000
2. Color Matching Standards…….. HW0992017
3. Identification Marking…… HW0400397
4. Instruction for Painting & Conservation.. ST33004
5. Log Sheets …….. 01074182000LS

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM.		

Scope of work

LP 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 4) respectively. 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 4) of LP-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 $\leq$ 0.02mm
From outside the Casing $\leq$ 0.05 mm
This must be checked by feeler gauge.

(5) **Following Special shall be exercised by vendor while machining the LP Inner Casing:-**

- Dimension 1860mm to be ensured in upper half. (Refer detail-X, Sheet-1). If required machining to be done.
- Dimension 1850mm to be ensured in Lower Half. (Refer Section G-G, Sheet-1). If required machining to be done.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

- Dimension 1252.5mm to be ensured in Lower Half. (Refer Section F-F, Sheet-1). If required machining to be done.
- Dimension 95mm (height of key slot) to be ensured in Lower Half. (Refer Section H-H, Sheet-2). If required machining to be done.
- Dimension 1825mm to be ensured in Upper half & Lower half. (Refer Section D-D, Sheet-1). If required machining to be done.
- Finish machining of Joint Plane of U/H & L/H (separately) of LPIC should be done in single pass.
- Threaded Hole M42 at Section K-K in Lower half to be machined after Vertical Boring Operation. Transfer Marking from Upper Half to Lower Half to be done in assembled condition after Vertical Boring operation.

(6) While doing Color Matching/ assembly of Upper half (U/H) and Lower Half (L/H), if 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.

(7) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing-01078332000 (sheet-3).

(8) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01078332000-LS of LP Inner Casing respectively.

(9) All other requirements of QP, Standards and T.R. of the drawings to be followed.

(10) 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.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

(11) 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.

(12) 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.

(13) Drawings & Documents specified in the annexure-II may undergo minor revisions however, quantum of fabrication/machining work will remain same with minor variation. If any drawing undergoes revision, it shall be communicated to vendor at the earliest for which any sort of claim not to be raised.

(14) 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.

(15) 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.

(16) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.

(17) No paint to be applied on Casing (Refer TR-7 of Drg- 01078332000, Sheet No-3).

(18) All technical requirements listed in drawings shall be fully met.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

(19) **Preservation & Packing**

a) 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.

b) 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.

c) Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.

d) Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.

e) 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.

f) Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.

g) Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.

h) 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.

(20) **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.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

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.

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

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

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

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 & Threading of Joint Plane Holes in Lower Half. Holes at Section K-K in L/H to be machined after Vertical 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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

ANNEXURE-II

List of drawings / standards to be referred

1. LP-2 Inner Casing Machining ..……. 01078332000
2. Color Matching Standards…….. HW0992017
3. Identification Marking…… HW0400397
4. Instruction for Painting & Conservation.. ST33004
5. Log Sheets …….. 01078332000LS

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

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 ≤ 0.02mm
From outside the Casing ≤ 0.05 mm
This must be checked by feeler gauge.

(5) **Following special care shall be exercised by vendor while machining the LP Inner Casing:-**

- Dimension 1860mm to be ensured in upper half. (Refer detail-X, Sheet-1). If required machining shall be done.
- Dimension 1850mm to be ensured in Lower Half. (Refer Section G-G, Sheet-1). If required machining to be done.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

- Dimension 1252.5mm to be ensured in Lower Half. (Refer Section F-F, Sheet-1). If required machining to be done.
- Dimension 95mm (height of key slot) to be ensured in Lower Half. (Refer Section H-H, Sheet-2). If required machining to be done.
- Dimension 1825mm to be ensured in Upper half & Lower half. (Refer Section D-D, Sheet-1). If required machining shall be done.
- Finish machining of Joint Plane of U/H & L/H (separately) of LPIC should be done in single pass.
- Threaded Hole M42 at Section K-K in Lower half to be machined after Vertical Boring Operation. Transfer marking from Upper Half to Lower Half to be done in assembled condition after Vertical Boring operation.

(6) 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.

(7) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing- 01078332000 (sheet-3) of LP-1 Inner Casing.

(8) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01078332000-LS of LP-2 Inner Casing.

(9) All other requirements of QP, Standards and T.R. of the drawings to be followed.

(10) 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.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

(11) 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.

(12) 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.

(13) 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.

(14) 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.

(15) 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.

(16) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.

(17) No paint to be applied on Casing (Refer TR-7 of Drg- 01078332000, Sheet No-3).

(18) All technical requirements listed in drawings shall be fully met.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

(19) **Preservation & Packing:**

a. 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.
b. 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.
c. Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.
d. Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.
e. 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.
f. Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.
g. Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.
h. 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.

(20) **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.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

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.

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

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

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

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.

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

ANNEXURE-II

List of drawings / standards to be referred

1. LP-2 Inner Casing Machining ..……. 01078332000
2. Color Matching Standards…….. HW0992017
3. Identification Marking…… HW0400397
4. Instruction for painting & conservation… ST33004
5. Log Sheets …….. 01078332000LS

TTX	Sujeet Kumar, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr.Mgr.		
NCT	R.P. Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

Scope of work

LP Inner Casing of Steam Turbine is proposed to be sub-contracted for machining as per machining details & technical requirements furnished in Drg. No. 01078382000 (Sheet 1 to 4) respectively. 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. 01078382000 (Sheet-1 to 4) of LP-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 ≤ 0.02mm
From outside the Casing ≤ 0.05 mm
This must be checked by feeler gauge.

(5) **Following Special shall be exercised by vendor while machining the LP Inner Casing:-**

- Dimension 1860mm to be ensured in upper half. (Refer detail-X, Sheet-1). If required machining to be done.
- Dimension 1850mm to be ensured in Lower Half. (Refer Section G-G, Sheet-1). If required machining to be done.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

- Dimension 1252.5mm to be ensured in Lower Half. (Refer Section F-F, Sheet-1). If required machining to be done.
- Dimension 95mm (height of key slot) to be ensured in Lower Half. (Refer Section H-H, Sheet-2). If required machining to be done.
- Dimension 1825mm to be ensured in Upper half & Lower half. (Refer Section D-D, Sheet-1). If required machining to be done.
- Finish machining of Joint Plane of U/H & L/H (separately) of LPIC should be done in single pass.
- Threaded Hole M42 at Section K-K in Lower half to be machined after Vertical Boring Operation. Transfer Marking from Upper Half to Lower Half to be done in assembled condition after Vertical Boring operation.

(6) While doing Color Matching/ assembly of Upper half (U/H) and Lower Half (L/H), if 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.

(7) Identification Marking to be done according to standard- HW0400397 as per TR-7 of drawing-01078382000 (sheet-3).

(8) All the machining/assembly requirements are to be achieved and recorded as per QA document no-01078382000-LS of LP Inner Casing respectively.

(9) All other requirements of QP, Standards and T.R. of the drawings to be followed.

(10) 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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

(11) 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.

(12) 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.

(13) Drawings & Documents specified in the annexure-II may undergo minor revisions however, quantum of fabrication/machining work will remain same with minor variation. If any drawing undergoes revision, it shall be communicated to vendor at the earliest for which any sort of claim not to be raised.

(14) 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.

(15) 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.

(16) After finish machining, inspection reports and log sheets are to be submitted to BHEL for final clearance.

(17) No paint to be applied on Casing (Refer TR-7 of Drg- 01078382000, Sheet No-3).

(18) All technical requirements listed in drawings shall be fully met.

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

(19) **Preservation & Packing**

a) 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.
b) 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.
c) Wrap large components with a minimum 90 GSM polythene sheet, and enclose them with industrial-grade shrink wrap.
d) Place components on strong suitable wooden skids or metal base frames with sufficient load-bearing capacity.
e) 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.
f) Use shock-absorbing materials (e.g., rubber pads) between the component and the skid/base to avoid impact damage during transport.
g) Lock components with appropriate metallic strap/ slings or belts with skid after wrapping and placement on skids/base frames.
h) 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.

(20) **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

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

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.

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

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

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

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 & Threading of Joint Plane Holes in Lower Half. Holes at Section K-K in L/H to be machined after Vertical 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.

TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		
DEPTT.	**NAME**	**SIGNATURE**	**DATE**

ANNEXURE-II

List of drawings / standards to be referred

1. LP-2 Inner Casing Machining ..……. 01078382000
2. Color Matching Standards…….. HW0992017
3. Identification Marking…… HW0400397
4. Instruction for Painting & Conservation.. ST33004
5. Log Sheets …….. 01078382000LS

DEPTT.	NAME	SIGNATURE	DATE
TTX	Shiv Shanker Oraon, Sr. Mgr.		
TUM-Plg	Manoj Kumar Gupta, Sr. Mgr.		
NCT	Rohit Pratap Singh, Sr. Mgr.		
TUM	Arbind Kumar Choubey, DGM		

Pre-Qualifying Requirement (PQR) **Indent No: 20240146**

HP-IP Bearing Pedestal (Drg. no. - 01170132000)

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, assembly works of "HP-IP Bearing Pedestal (Drg. no. - 01170132000)". Casting of HP-IP Bearing Pedestal along with cover (casting drg. no. 01170148901) shall be supplied to vendor. Refer Scope of work details provided.	Vendor to confirm.
1.A.	Vendor must have suitable toolings / facility such as Marking Table / Machine Bed etc. in good working condition, to facilitate marking / transfer marking of job (as required). Vendor must have suitable facility for lifting / handling the subject job.	Vendor to confirm.
1.B.	**Horizontal Boring work :-**	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.B.i.	Vendor must have suitable CNC Horizontal Boring machine with suitable attachments (like Right angle Milling head, Boring & Facing head, Rotary table etc.) for machining of joint plane, holes, pocket, slot, details, bores etc. in Bearing Pedestal and cover, individually & in assembled condition as per drawing, TR & scope of work requirements.	
1.C.	**Drilling work :-**	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.C.i.	Drilling machine suitable for machining of holes, threaded holes etc. as per drawing, TR & scope of work requirements.	
1.D.	**Fitting work :-**	
1.D.i.	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done at different stages of HP-IP Bearing Pedestal manufacturing as per drawing, TR & scope of work requirements.	Vendor to confirm.
2	Vendor to confirm that above machines (as per pt. no. 1.A to 1.C) 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. 1.A to 1.C) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
3	Front and rear faces and bores B & C of both the pedestal and cover to be machined in one operation as per TR no. 5 on sheet-1 of drg.	Vendor to note & agree.
4	Gravity Leak test and Hydro test will be done at HEEP, BHEL Haridwar.	Vendor to note & agree.
5	Transfer marking of holes from Cover to pedestal casing to be done. Also, item no. 2 of bearing pedestal (cover) to be jointly finished.	Vendor to note & agree.
6	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
7	Vendor to note that all tools, measuring equipments, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
8	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 & agree.

20/05/24
(Nadeem Ali)
Dy. Mgr. / TTX

20/5/24
(Sachin Maggu)
Mgr. / NCT

20/5/24
(Sudeep Singh Saluja)
Sr. Mgr. / PPC-T

Pre-Qualifying Requirement (PQR) Indent Nos.: 20240146

LP-LP Bearing Pedestal (Drg. no. - 01182458000)

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, assembly works of "LP-LP Bearing Pedestal (Drg. no. - 01182458000)". Casting of LP-LP Bearing Pedestal along with cover (casting drg. no. 01182458901) shall be supplied to vendor. Refer Scope of work details provided.	Vendor to confirm.
1.A.	Vendor must have suitable toolings / facility such as Marking Table / Machine Bed etc. in good working condition, to facilitate marking / transfer marking of job (as required). Vendor must have suitable facility for lifting / handling the subject job.	Vendor to confirm.
1.B.	**Horizontal Boring work :-**	
1.B.i.	Vendor must have suitable CNC Horizontal Boring machine with suitable attachments (like Right angle Milling head, Boring & Facing head, Rotary table etc.) for machining of joint plane, holes, pocket, slot, details, bores etc. in Bearing Pedestal and cover, individually & in assembled condition as per drawing, TR & scope of work requirements.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.C.	**Drilling work :-**	
1.C.i.	Drilling machine suitable for machining of holes, threaded holes etc. as per drawing, TR & scope of work requirements.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.D.	**Fitting work :-**	
1.D.i.	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done at different stages of LP-LP Bearing Pedestal manufacturing as per drawing, TR & scope of work requirements.	Vendor to confirm.
2	Vendor to confirm that above machines (as per pt. no. 1.A to 1.C) 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. 1.A to 1.C) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
3	Front and rear sealing surfaces (bearing seal ring) and bores B & C of both the pedestal and cover to be machined in one operation as per TR no. 1 of drg.	Vendor to note & agree.
4	Gravity test for leaks and Hydro test will be done at HEEP, BHEL Haridwar.	Vendor to note & agree.
5	Transfer marking of holes from Cover to pedestal casing to be done. Also, item no. 2 of bearing pedestal (cover) to be jointly finished.	Vendor to note & agree.
6	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
7	Vendor to note that all tools, measuring equipments, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
8	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 & agree.

20/05/24.
(Nadeem Ali)
Dy. Mgr. / TTX

20/5/24
(Sachin Maggu)
Mgr. / NCT

20/5/24
(Sudeep Singh Saluja)
Sr. Mgr. / PPC-T

Pre-Qualifying Requirement (PQR)		Indent No: 20250796 & 20250797
LP-GEN Bearing Pedestal (Drg. no. - 01180339000)		PQR Ref. No. TTX/PQR/2025/180
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, assembly works of "LP-GEN Bearing Pedestal (Drg. no. - 01180339000)". Casting of LP-GEN Bearing Pedestal along with cover (casting drg. no. 01180358901) shall be supplied to vendor.	Vendor to confirm.
1.A.	Vendor must have suitable toolings / facility such as Marking Table / Machine Bed etc. in good working condition, to facilitate marking / transfer marking of job (as required). Vendor must have suitable facility for lifting / handling the subject job.	Vendor to confirm.
1.B.	**Horizontal Boring work :-**	
1.B.i.	Vendor must have suitable CNC Horizontal Boring machine with suitable attachments (like Right angle Milling head, Boring & Facing head, Rotary table etc.) for machining of joint plane, holes, pocket, slot, details, bores etc. in Bearing Pedestal and cover, individually & in assembled condition as per drawing, TR & scope of work requirements.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.C.	**Drilling work :-**	
1.C.i.	Drilling machine suitable for machining of holes, threaded holes etc. as per drawing, TR & scope of work requirements..	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.D.	**Fitting work :-**	
1.D.i.	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done at different stages of LP-GEN Bearing Pedestal manufacturing as per drawing, TR & scope of work requirements.	Vendor to confirm.
2	Vendor to confirm that above machines (as per pt. no. 1.A to 1.C) 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. 1.A to 1.C) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
3	Front and rear sealing surfaces (bearing seal ring) and bores B & C of both the pedestal and cover to be machined in one operation as per TR no. 1 of drg.	Vendor to note & agree.
4	Gravity leak test and Hydro test will be done at HEEP, BHEL Haridwar.	Vendor to note & agree.
5	Transfer marking of holes from Cover to pedestal casing to be done. Also, item no. 2 of bearing pedestal (cover) to be jointly finished.	Vendor to note & agree.
6	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
7	Vendor to note that all tools, measuring equipments, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
8	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 & agree.

(I K Ranjan)
Mgr. / TTX

(R P Singh)
Sr. Mgr. / NCT

Pre-Qualifying Requirement (PQR)		Indent No: 20250796 & 20250797
LP-LP Bearing Pedestal (Drg. no. - 01182458000)		PQR Ref. No. TTX/PQR/2025/181
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, assembly works of "LP-LP Bearing Pedestal (Drg. no. - 01182458000)". Casting of LP-LP Bearing Pedestal along with cover (casting drg. no. 01182458901) shall be supplied to vendor.	Vendor to confirm.
1.A.	Vendor must have suitable toolings / facility such as Marking Table / Machine Bed etc. in good working condition, to facilitate marking / transfer marking of job (as required). Vendor must have suitable facility for lifting / handling the subject job.	Vendor to confirm.
1.B.	**Horizontal Boring work :-**	
1.B.i.	Vendor must have suitable CNC Horizontal Boring machine with suitable attachments (like Right angle Milling head, Boring & Facing head, Rotary table etc.) for machining of joint plane, holes, pocket, slot, details, bores etc. in Bearing Pedestal and cover, individually & in assembled condition as per drawing, TR & scope of work requirements.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.C.	**Drilling work :-**	
1.C.i.	Drilling machine suitable for machining of holes, threaded holes etc. as per drawing, TR & scope of work requirements.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.D.	**Fitting work :-**	
1.D.i.	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done at different stages of LP-LP Bearing Pedestal manufacturing as per drawing, TR & scope of work requirements.	Vendor to confirm.
2	Vendor to confirm that above machines (as per pt. no. 1.A to 1.C) 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. 1.A to 1.C) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
3	Front and rear sealing surfaces (bearing seal ring) and bores B & C of both the pedestal and cover to be machined in one operation as per TR no. 1 of drg.	Vendor to note & agree.
4	Gravity test for leaks and Hydro test will be done at HEEP, BHEL Haridwar.	Vendor to note & agree.
5	Transfer marking of holes from Cover to pedestal casing to be done. Also, item no. 2 of bearing pedestal (cover) to be jointly finished.	Vendor to note & agree.
6	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
7	Vendor to note that all tools, measuring equipments, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
8	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 & agree.

(I K Ranjan)
Mgr. / TTX

(R P Singh)
Sr. Mgr. / NCT

PQR: ESVCV Casing Drawing no 01122201010		TTX/PQR/2026/225
SL.No	**REQUIREMENT**	**REMARKS**
1.	Only those vendors should quote who have following machine installed & operational at their works for following operations of ESVCV Casing drawing no 01122201010	Vendor to Note
A.	**Milling Operation: -**	
i.	Horizontal Boring machine with rotary table and suitable to accommodate the job. Machine should be capable to carry out all milling operation as per drawing and Technical requirement.	Vendor to confirm & submit machine details. Vendor should also submit positional accuracy and runout of the machine.
B.	**Turning Operation: -**	
i.	CNC Horizontal Boring machine with rotary table and CNC controlled Boring Head: • Rotary table: 3 m X 3 m • Table Loading Capacity: 5 T or more Machine should be capable to carry out all Turning operation as per drawing and Technical requirement.	Vendor to confirm & submit positional accuracy of the machine and CNC Head along with basic machine details (X,Y,Z traverse, table size, spindle diameter & runout).
2.	Vendor must have suitable facility such as Marking Table/Machine Bed/ Machine Table etc. to facilitate marking of hole positions.	Vendor to confirm.
3.	Vendor to confirm that above machines (A & B) installed at their works are in good working condition with capability of achieving all the dimensions, surface finish, accuracies & tolerances as per drawing. If necessary vendor can suggest alternate machine other than specified in 1A to 1B for machining of the job with accuracies, surface finish & tolerance as per drawing, for review and acceptance by BHEL.	Vendor to confirm.
4.	Vendor to confirm that all the dimensions & surface finish of the component shall be met as per drawing.	Vendor to confirm.
6.	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 & agree.

Rpsingh
(Rohit Pratap Singh)
ES/NGT

(DILIP KUMAR)
ES/TTX.

TTx/PQR/2025/155.

Pre-Qualifying Requirement (PQR) for Indent No:

SL.No	REQUIREMENT	REMARKS
1.	Only those vendors should quote who have following machine installed & operational at their works for following operations of IVCV Casing L/H drawing no 01132131112/00 & 01132131112/01:-	Vendor to Note
A.	**Milling Operation: -**	
i.	CNC Horizontal Boring machine with rotary table and suitable to accommodate the job. •Rotary table: 3 m X 2.5 m •Table Loading Capacity: 15 T or more Machine should be capable to carry out all milling operation as per drawing and Technical requirement.	Vendor to confirm & submit machine details. Vendor should also submit positional accuracy and runout of the machine.
B.	**Turning Operation: -**	.
i.	**CNC Horizontal Boring machine with rotary table and CNC controlled Boring Head**: • Rotary table: 3.5 m X 2.5 m • Table Loading Capacity: 15 T or more • CNC Boring Head suitable to machine Bores at depth 1420 mm "OR" **CNC Vertical Turning Lathe:-** • Table size : 4 m or more & Swing 4 m or more • Height : 2.5 m or more • RAM Stroke: 1.5 m or more. • Table Loading Capacity: 15 Ton or more. • Buttress Thread Machining capability on Vertical Lathe Machine should be capable to carry out all Turning operation as per drawing and Technical requirement.	Vendor to confirm & submit positional accuracy of the machine and CNC Head along with basic machine details (X,Y,Z traverse, table size, spindle diameter & runout). Vendor to provide details of CNC Boring Head (Body Diameter, Length, Slide Length)
2.	Vendor to confirm that above machines (A & B) installed at their works are in good working condition with capability of achieving all the dimensions, surface finish, accuracies & tolerances as per drawing.	Vendor to confirm.
3.	Vendor to confirm that all the dimensions & surface finish of the component shall be met as per drawing. vendor to provide detail of complete manufacturing process for all Horizontal Boring, Vertical Boring & pipe milling operation including the detail of machining of Buttress Thread.	Vendor to confirm & Provide the detail.
4.	Vendor to note that all tools, measuring equipment's, technological items, CNC Programs, Checking Templates etc. required for manufacturing of subjected item shall be arrange by the vendor, in case of order.	Vendor To Confirm
5.	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 & agree.

Robert Partap Singh
ES/NCT

(DILIP KUMAR)
E4/TTx.

TTX/PQR/2025/156.

Pre-Qualifying Requirement (PQR) for Indent No:

SL.No	REQUIREMENT	REMARKS
1.	Only those vendors should quote who have following machine installed & operational at their works for following operations of IVCV Casing U/H drawing no 01132131111/00 & 01132131111/01:-	Vendor to Note
A.	Milling Operation: -	
i.	CNC Horizontal Boring machine with rotary table and suitable to accommodate the job. •Rotary table: 3 m X 2.5 m •Table Loading Capacity: 15 T or more Machine should be capable to carry out all milling operation as per drawing and Technical requirement.	Vendor to confirm & submit machine details. Vendor should also submit positional accuracy and runout of the machine.
B.	Turning Operation: -	
i.	CNC Horizontal Boring machine with rotary table and CNC controlled Boring Head: • Rotary table: 3.5 m X 2.5 m • Table Loading Capacity: 15 T or more • CNC Boring Head suitable to machine Bores at depth 1350 mm "OR" CNC Vertical Turning Lathe:- • Table size : 4 m or more & Swing 4 m or more • Height : 2.5 m or more • RAM Stroke: 1.5 m or more. • Table Loading Capacity: 15 Ton or more. Machine should be capable to carry out all Turning operation as per drawing and Technical requirement.	Vendor to confirm & submit positional accuracy of the machine and CNC Head along with basic machine details (X,Y,Z traverse, table size, spindle diameter & runout). Vendor to provide details of CNC Boring Head (Body Diameter, Length, Slide Length)
2.	Vendor to confirm that above machines (A & B) installed at their works are in good working condition with capability of achieving all the dimensions, surface finish, accuracies & tolerances as per drawing.	Vendor to confirm.
3.	Vendor to confirm that all the dimensions & surface finish of the component shall be met as per drawing. vendor to provide detail of complete manufacturing process for all Horizontal Boring, Vertical Boring & pipe milling operation.	Vendor to confirm & Provide the detail.
4.	Vendor to note that all tools, measuring equipment's, technological items, CNC Programs, Checking Templates etc. required for manufacturing of subjected item shall be arrange by the vendor, in case of order.	Vendor To Confirm
5.	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 & agree.

Rohit Pratap Singh
GT/NCT

(DILIP KUMAR)
GM/TTX