

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding <u>Drg.no. 02030120202</u>	Indent no. <u>20210641</u> Page 1 of 4
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Scope of Work

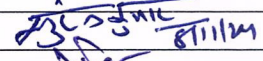

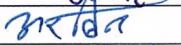

Outer Top Cover is a Fabricated structure in quadrants as per drawing. Outer Top Cover in finish machined condition, is proposed to be procured as per machining details & technical requirements furnished in drg.no. 02030120202. Refer BOM & drawings for material details.

A) Outer Top Cover will be sent to Vendor in four quadrants after completing following works at BHEL Haridwar:

- Rough Turning of four quadrants (Pre-liner welding) as per Rough Machining view (Stage- 2) of drawing in four quadrants individually, at Gantry Milling. However, Dim. 135mm at OD 6420mm, shall not be machined & will be left as 150mm as per Stage -1.
- SS Liner Welding as per View -K (Stage -3) in four quadrants individually.
- Turning of four quadrants of Outer Top Cover after liner welding as per Detail -Y (Stage- 4) & 'R/Mcg Diameters before assembly of facing plates' (stage -5) of drawing in four quadrants individually, at Gantry Milling.
- Drilling of total 460 holes M20 x 40 for fitting of Facing plates as per 'View on Arrow-W' (sheet-2) in four quadrants individually.
- Fitting & Welding of Facing Plates on four quadrants of Outer Top Cover individually as per drawing.

B) Scope of work for Vendor includes **Complete finish machining** of Outer Top Cover as per drawing requirements.

- Joint Plane & joint plane holes machining of four quadrants. For machining reference, reference belts (20mm width) shall be provided by BHEL on all joint planes.
- Assembly of four quadrants & combined pinning work. Joint plane fasteners & pins shall be provided by BHEL.

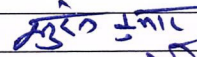

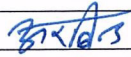
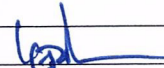
TTX	Surinder Kumar, Sr. Mgr.	
NCT	R.P. Singh, Sr. Mgr.	
TUM	Arbind Kumar Choubey, Sr. Mgr.	
TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	SIGNATURE

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding <u>Drg.no. 02030120202</u>	Indent no. Page 2 of 4
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- Finish Vertical boring of Outer Top Cover in assembled condition as per Section -AA (Final Machining). Machining of Facing Plates as per Detail-Q (Final Machining of Facing Plate).
- Seal Retainers shall be provided by BHEL to Vendor in finish machined condition as per drawing no. 12030120204, except for machining of Dia. With R2617.5 & R2602.5 along with chamfers 30 deg & width 32.6mm (Section BB of drawing 12030120204). These diameters With R2617.5 & R2602.5 along with chamfers 30 deg & width 32.6mm shall be machined only after fitting of Seal retainers in Facing plate grooves in Outer Top Cover. TR-5 of drawing 12030120204 to be ensured during machining. TR-6 shall be ensured at BHEL. After machining of Dia. With R2617.5 & R2602.5 along with chamfers 30 deg & width 32.6mm in Seal Retainer, Identification & position (Sr.no.) of all Seal Retainers (both halves) to be punch marked on bottom face of Seal Retainer. Relative position also to be marked on face of Seal retainer groove in Outer Top Cover.
- For fitting of Seal Retainers in Facing plate grooves in Outer Top Cover, 240 holes M16 x 30 as per 'View on Arrow-W' (sheet-2) to be machined after transfer marking from Seal Retainer. Fasteners for fitting of Seal Retainers shall be provided by BHEL.
- Complete machining of holes, bores, threaded holes as per 'Typical Plan' (sheet-2 of drawing) on CNC Horizontal Boring or Gantry Milling machine.
- Machining of Bores dia. 320+0.3, dia. 310+0.06 chamfers etc. as per Section -AA (Final Machining) (sheet-1), in Outer Top cover in assembled condition maintaining accuracy requirements on CNC Horizontal Boring or Gantry Milling machine.
- Refer TR-12 of drawing. Flow Line to be marked in Quadrant -1 as per drawing.
- After complete machining, vendor shall supply Outer Top Cover to BHEL in Half assembled condition or in quadrants.

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

- All other requirements of QP, Standards and technical requirements specified on the drawings to followed.

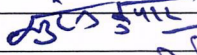
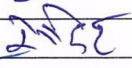
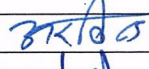
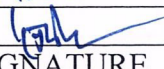
TTX	Surinder Kumar, Sr. Mgr.	
NCT	R.P. Singh, Sr. Mgr.	
TUM	Arbind Kumar Choubey, Sr. Mgr.	
TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	SIGNATURE

 HARIDWAR	<p style="text-align: center;">Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding</p> <p style="text-align: center;"><u>Drg.no. 02030120202</u></p>	<p>Indent no.</p> <p>Page 3 of 4</p>
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- No flaws like blow holes, shrinkage, inclusions etc. should open up during machining. However, if any flaw opens up during machining, vendor shall immediately intimate detail and location of flaw and corrective action proposed. Further machining will be suspended till BHEL approves corrective action.
- BHEL shall furnish clarifications, if any, w.r.to scope of work or drg. dimensions / technical requirements to the vendor to enable it to submit technical / commercial offer.
- Vendor must ensure that all requirements indicated in the drg. regarding:
 - Surface finishes (Ra value indicated in microns).
 - Sizes and tolerances.
 - Geometrical accuracies e.g. run-outs, concentricity, parallelity, perpendicularity etc. shall be fully met.

Reference surfaces are clearly marked in the concerned drawings.

- D) After finish machining, inspection report is to be submitted to BHEL for final clearance.
- E) Inspection of the job at supplier's works shall be carried out as per BHEL approved quality plan by BHEL/ agency authorized by BHEL for which adequate prior notice (min. 4weeks) shall be given by the supplier.
- F) All the machined surfaces must be protected against rust / corrosion by steam washable rust preventive suitable for six months.
- G) Finish machined job shall be packed properly. Packing should be suitable to protect any damage to job (special care to be taken to protect finished machined surfaces) during handling and transportation.
- H) All cross-referred documents given in Annexure-I

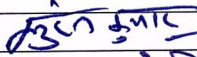
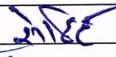
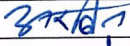

TTX	Surinder Kumar, Sr. Mgr.	
NCT	R.P. Singh, Sr. Mgr.	
TUM	Arbind Kumar Choubey, Sr. Mgr.	
TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	SIGNATURE

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding Drg.no. 02030120202	Indent no. Page 4 of 4
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ANNEXURE-I

List of drawings / standards to be referred

1. Outer Top Cover.....02030120202 00
2. BOM of Outer Top CoverBOM 02030120202 00
3. Stud32030120210-02
4. Hex nutHT00106 001
5. Dowel.....42030118402 00
6. Slt csk screw.....42030120211 00
7. Seal retainer.....12030120204 00
8. Facing Plates.....12030120201 00
9. Log Sheet.....02030120202 LS

TTX	Surinder Kumar, Sr. Mgr.	
NCT	R.P. Singh, Sr. Mgr.	
TUM	Arbind Kumar Choubey, Sr. Mgr.	
TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	SIGNATURE

Pre-Qualifying Requirement (PQR)

Indent No: 20240641

Outer Top Cover Drg. no. - 02030120202

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, fabrication, assembly works of 'Outer Top Cover', Drg. no. - 02030120202. Refer TDC provided for detailed Scope of Work.	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. Vendor must have suitable facility for lifting / handling subject job.	Vendor to confirm.
1.B.	<u>Horizontal Boring work :-</u>	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.B.i.	Horizontal Boring machine suitable for machining of joint face & details (holes, S/Faces), etc. of Outer Top Cover (in quadrants & in halves) as per drawing ,TR & TDC requirements.	
1.C.	<u>Fitting work :-</u>	
1.C.i.	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done at different stages of Outer Top Cover manufacturing as per drawing, TR &TDC scope of work requirements.	Vendor to confirm.
1.D.	<u>Drilling work :-</u>	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.D.i.	Drilling machine suitable for machining of Dowel holes at joints of Outer Top Cover quadrants after assembling & for machining of all holes, threaded holes etc. (all holes & details other than specified specially for machining on CNC machine) as per drawing, TR & TDC Scope of work requirements.	
1.E.	<u>Turning operation:-</u>	
1.E.i.	Vertical Boring Machine, suitable for machining of Outer Top Cover at different stages as per drawing, TR & TDC scope of work requirements. Main specifications are as follows:- (a) Table diameter of machine = 6500 mm or more. (b) Maximum Turning Height of job = 1200mm or more. (c) Maximum weight capacity of machine = 45 Tons or more.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.F.	Machining of Bore dia. 310 +0.06, dia. 320 +0.3, Chamfer 15X20 Deg., M/C for dimension 299.5+/-0.5, 80 Holes Dia. 117 (PCD 6160), 16 nos. M48x5P holes (PCD 6160), 16 Pilot holes Dia. 16 (PCD 6300), 12 Holes M64x4P (PCD 6160), 72 Holes M64x4x90 (PCD 4750), 2 holes dia. 40 (PCD 5620) using CNC Machine as per drawing (Complete details as per 'Typical Plan', SH-2 & Bores as per Section AA- Final Machining SH-1) :-	
1.F.i.	CNC Horizontal Boring Machine, suitable for machining of specified bores / holes as per drawing, TR & scope of work requirements. - For holding the Job in vertical condition, suitable Angle Plates, clamping arrangement & toolings should be available for machining. OR - For holding the Job in horizontal condition, suitable Rotary Table, Right angle head, Boring Bars, toolings etc. should be available for machining.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.

OR		
1.F.ii.	<u>CNC Gantry Milling Machine along with required toolings, suitable for machining of specified bores / holes as per drawing, TR & scope of work requirements.</u>	
2	Vendor to confirm that above machines (as per pt. no. 1.A to 1.F) 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.F) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
3	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
4	Holes for fitting Seal Retainers in Outer Top cover, are to be transfer marked from Seal Retainers, as per Drawing TR.	Vendor to confirm.
5	Vendor to note that Dovetail groove (Parting - off groove) in "SEAL RETAINER" is to be machined on Vertical Boring machine, in assembled condition with Facing Plates & Outer Top Cover.	Vendor to confirm.
6	Vendor to note that all tools, measuring equipment, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
7	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

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding <u>Drg.no. 02030121502</u>	Indent no. 20240639 Page 1 of 4
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Scope of Work

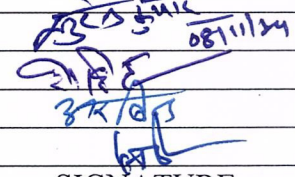
Outer Top Cover is a Fabricated structure in quadrants as per drawing. Outer Top Cover in finish machined condition, is proposed to be procured as per machining details & technical requirements furnished in drg.no. 02030121502. Refer BOM & drawings for material details.

A) Outer Top Cover will be sent to Vendor in four quadrants after completing following works at BHEL Haridwar:

- Rough Turning of four quadrants (Pre-liner welding) as per Rough Machining view (Stage- 2) of drawing in four quadrants individually, at Gantry Milling. However, Dim. 135mm at OD 7110mm, shall not be machined & will be left as 150mm as per Stage -1.
- SS Liner Welding as per View -K (Stage -3) in four quadrants individually.
- Turning of four quadrants of Outer Top Cover after liner welding as per Detail -Y (Stage- 4) & 'R/Mcg Diameters before welding facing plates' of drawing in four quadrants individually, at Gantry Milling.
- Drilling of total 460 holes M20 x 40 for fitting of Facing plates as per 'View on Arrow-W' (sheet-2) in four quadrants individually.
- Fitting & Welding of Facing Plates on four quadrants of Outer Top Cover individually as per drawing.

B) Scope of work for Vendor includes **Complete finish machining** of Outer Top Cover as per drawing requirements.

- Joint Plane & joint plane holes machining of four quadrants. For machining reference, reference belts (20mm width) shall be provided by BHEL on all joint planes.
- Assembly of four quadrants & combined pinning work. Joint plane fasteners & pins shall be provided by BHEL.

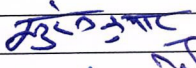
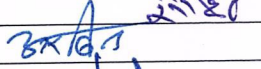


TTX	Surinder Kumar, Sr. Mgr.	
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TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	
		SIGNATURE

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding <u>Drg.no. 02030121502</u>	Indent no. Page 2 of 4
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- Finish Vertical boring of Outer Top Cover in assembled condition as per Section -AA (Final Machining). Machining of Facing Plates as per Detail-Q (Final Machining of Facing Plate).
- Seal Retainers shall be provided by BHEL to Vendor in finish machined condition as per drawing no. 12030118404, except for machining of Dia. With R2930 & R2915 along with chamfers 30 deg & width 32.6mm (Section BB of drawing 12030118404). These diameters With R2930 & R2915 along with chamfers 30 deg & width 32.6mm shall be machined only after fitting of Seal retainers in Facing plate grooves in Outer Top Cover. TR-5 of drawing 12030118404 to be ensured during machining. TR-6 shall be ensured at BHEL. After machining of Dia. With R2930 & R2915 along with chamfers 30 deg & width 32.6mm in Seal Retainer, Identification & position (Sr.no.) of all Seal Retainers (both halves) to be punch marked on bottom face of Seal Retainer. Relative position also to be marked on face of Seal retainer groove in Outer Top Cover.
- For fitting of Seal Retainers in Facing plate grooves in Outer Top Cover, 320 holes M16 x 30 as per 'View on Arrow-W' (sheet-2) to be machined after transfer marking from Seal Retainer. Fasteners for fitting of Seal Retainers shall be provided by BHEL.
- Complete machining of holes, bores, threaded holes as per 'Typical Plan' (sheet-2 of drawing) on CNC Horizontal Boring or Gantry Milling machine.
- Machining of Bores dia. 350+0.3, dia. 340+0.06 chamfers etc. as per Section -AA (Final Machining) (sheet-1), in Outer Top cover in assembled condition maintaining accuracy requirements on CNC Horizontal Boring or Gantry Milling machine.
- Refer TR-13 of drawing. Flow Line to be marked in Quadrant -1 as per drawing.
- After complete machining, vendor shall supply Outer Top Cover to BHEL in Half assembled condition or in quadrants.

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

- All other requirements of QP, Standards and technical requirements specified on the drawings to followed.

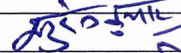
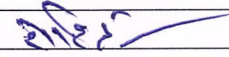
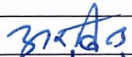
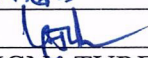
TTX	Surinder Kumar, Sr. Mgr.	
NCT	R.P. Singh, Sr. Mgr.	
TUM	Arbind Kumar Choubey, Sr. Mgr.	
TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	SIGNATURE

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding <u>Drg.no. 02030121502</u>	Indent no. Page 3 of 4
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- No flaws like blow holes, shrinkage, inclusions etc. should open up during machining. However, if any flaw opens up during machining, vendor shall immediately intimate detail and location of flaw and corrective action proposed. Further machining will be suspended till BHEL approves corrective action.
- BHEL shall furnish clarifications, if any, w.r.to scope of work or drg. dimensions / technical requirements to the vendor to enable it to submit technical / commercial offer.
- Vendor must ensure that all requirements indicated in the drg. regarding:
 - Surface finishes (Ra value indicated in microns).
 - Sizes and tolerances.
 - Geometrical accuracies e.g. run-outs, concentricity, parallelity, perpendicularity etc. shall be fully met.

Reference surfaces are clearly marked in the concerned drawings.

- D) After finish machining, inspection report is to be submitted to BHEL for final clearance.
- E) Inspection of the job at supplier's works shall be carried out as per BHEL approved quality plan by BHEL/ agency authorized by BHEL for which adequate prior notice (min. 4weeks) shall be given by the supplier.
- F) All the machined surfaces must be protected against rust / corrosion by steam washable rust preventive suitable for six months.
- G) Finish machined job shall be packed properly. Packing should be suitable to protect any damage to job (special care to be taken to protect finished machined surfaces) during handling and transportation.
- H) All cross-referred documents given in Annexure-I

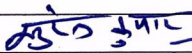

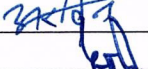

TTX	Surinder Kumar, Sr. Mgr.	
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TUM	Arbind Kumar Choubey, Sr. Mgr.	
TUM-PLG	Sudip Kr Srivastav, Sr. Mgr.	
DEPTT.	NAME	SIGNATURE

 HARIDWAR	Technical Delivery Condition for Sub-contracting for Machining of Outer Top Cover after Liner & Facing Plate Welding Drg.no. 02030121502	Indent no. Page 4 of 4
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ANNEXURE-I

List of drawings / standards to be referred

1. Outer Top Cover.....02030121502 00
2. BOM of Outer Top CoverBOM 02030121502 00
3. Stud M56*5.5P.....32030118410-02
4. Hex nut m56.....HT00106 003
5. Dowel.....42030118402 00
6. Slt csk screw.....42030120211 00
7. Seal retainer.....12030118404 00
8. Facing Plates.....12030121501 00
9. Log Sheet.....02030121502 LS

TTX	Surinder Kumar, Sr. Mgr.	
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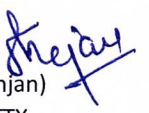
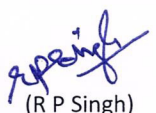
Pre-Qualifying Requirement (PQR)

Indent No: 20240639

Outer Top Cover Drg. no. - 02030121502

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, fabrication, assembly works of 'Outer Top Cover', Drg. no. - 02030121502. Refer TDC provided for detailed Scope of Work.	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. Vendor must have suitable facility for lifting / handling 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.	Horizontal Boring machine suitable for machining of joint face & details (holes, S/Faces), etc. of Outer Top Cover (in quadrants & in halves) as per drawing , TR & TDC requirements.	
1.C.	Fitting work :-	
1.C.i.	Vendor must have suitable facility / arrangement for different fitting / assembly works to be done at different stages of Outer Top Cover manufacturing as per drawing, TR & TDC scope of work requirements.	Vendor to confirm.
1.D.	Drilling work :-	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.D.i.	Drilling machine suitable for machining of Dowel holes at joints of Outer Top Cover quadrants after assembling & for machining of all holes, threaded holes etc. (all holes & details other than specified specially for machining on CNC machine) as per drawing, TR & TDC Scope of work requirements.	
1.E.	Turning operation:-	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
1.E.i.	Vertical Boring Machine, suitable for machining of Outer Top Cover at different stages as per drawing, TR & TDC scope of work requirements. Main specifications are as follows:- (a) Table diameter of machine = 7200 mm or more. (b) Maximum Turning Height of job = 1200mm or more. (c) Maximum weight capacity of machine = 55 Tons or more.	
1.F.	<u>Machining of Bore dia. 340 +0.06, dia. 350 +0.3, Chamfer 15X20 Deg., M/C for dimension 300+/-0.5, 100 Holes Dia. 107 (PCD 6860), 20 nos. M48x5P holes (PCD 6860), 16 Pilot holes Dia. 16 (PCD 6860), 16 Holes M64x4P (PCD 6560), 80 Holes M72x4x95 (PCD 5340) using CNC Machine as per drawing (Complete details as per 'Typical Plan', SH-2 & Bores as per Section AA- Final Machining SH-1) :-</u>	
1.F.i.	CNC Horizontal Boring Machine, suitable for machining of specified bores / holes as per drawing, TR & scope of work requirements. - For holding the Job in vertical condition, suitable Angle Plates, clamping arrangement & toolings should be available for machining. OR - For holding the Job in horizontal condition, suitable Rotary Table, Right angle head, Boring Bars, toolings etc. should be available for machining.	(a) Vendor to confirm. (b) Vendor to provide machine details / specification for referred operation.
	OR	

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1.F.ii.	CNC Gantry Milling Machine along with required toolings, suitable for machining of specified bores / holes as per drawing, TR & scope of work requirements.	
2	Vendor to confirm that above machines (as per pt. no. 1.A to 1.F) 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.F) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
3	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
4	Holes for fitting Seal Retainers in Outer Top cover, are to be transfer marked from Seal Retainers, as per Drawing TR.	Vendor to confirm.
5	Vendor to note that Dovetail groove (Parting - off groove) in "SEAL RETAINER" is to be machined on Vertical Boring machine, in assembled condition with Facing Plates & Outer Top Cover.	Vendor to confirm.
6	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.
7	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.
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="text-align: center;">  (I K Ranjan) Mgr., TTX </div> <div style="text-align: center;">  (R P Singh) Sr.Mgr., PPC-T </div> </div>		