



BHARAT HEAVY ELECTRICALS LIMITED  
(A GOVT OF INDIA UNDERTAKING)

Water Systems Group- WEG & WS  
Boiler Auxiliary Plant (BAP), Ranipet

TECHNICAL SPECIFICATION FOR SLURRY PUMPS

SPECIFICATION NUMBER : ROS: 9081  
BUYER (EPC) : BHEL, BAP Ranipet  
APPLICATION : FLUE GAS DESULPHURIZATION SYSTEM

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## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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### 1.0 INTENT OF SPECIFICATION

This specification covers the minimum requirements for the complete design, material, manufacturing, shop inspection, testing at the manufacturer's works, supervision of erection & commissioning and performance guarantee testing for the Flue Gas Desulphurization plant. For project specific technical parameters, refer to **Annexure-A**. The following points may be noted:

- a. Bidder shall assume full responsibility for the entire equipment assembly and shall comply to the requirements of this specification and referred specifications/attachments to enquiry/order.
- b. In case, deviations are considered essential by the Bidder (after exhausting all possible efforts), the same shall be separately listed in the Bidder's proposal under separate section, titled as "List of Deviations/Exceptions to the Enquiry Document (**Annexure- II**)".
- c. Any deviation, not listed in Annexure - II, though reflected in any other part of the offer, shall not be considered.
- d. BHEL discretion is final in acceptance / rejection of exceptions / deviations listed by Bidders' proposal in Annexure – II. Only written approval by BHEL is valid means of acceptance of deviation / exception.
- e. Compliance to this specification shall not relieve the Bidder of the responsibility of furnishing equipment and accessories/auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.
- f. In case, the Bidder considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, the same shall be recommended along with reasons in a separate section and include the same in scope of supply.
- g. All accessories, items of work, though not indicated but required to make the system complete for its safe, efficient, reliable and trouble free operation and maintenance shall also be in supplier's scope unless specifically excluded.

### 2.0 APPLICABLE CODES & REGULATIONS

The design and materials shall conform to the requirements of applicable codes and regulations of the latest edition. The design, manufacture, installation and testing of the pump shall follow the latest applicable Indian/International (ASME/EN/Japanese) Standards. In general, pumps shall conform to latest edition of the following standards:

- IS:1520: Horizontal centrifugal pumps for clear cold fresh water
- IS:5120: Technical requirements of roto dynamic special purpose pumps
- API:610: Centrifugal pumps for general refinery service
- IS:5639: Pumps handling chemicals & corrosion liquids
- IS:5659: Pumps for process water
- HIS: Hydraulic Institute Standards USA
- ANSI HI 12.1 to 12.6 & ISO 9906 2012 grade 2B standard ( Pump Testing)

### 3.0 PROVENNESS CRITERIA: IF APPLICABLE

Bidders shall meet the Qualification Requirement (QR) for Slurry Pumps as per **Annexure-B** and **submit the Annexure to qualification requirement (Attachment-3K)**. Necessary documentary evidences shall be submitted along with the bid. **Offers of Bidders not meeting Qualification Criteria shall not be considered for evaluation.**

### 4.0 MATERIAL OF CONSTRUCTION



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	Material of construction	Horizontal Centrifugal Pumps	Vertical Sump Pumps
i.	Casing	1. Ductile Iron (65-45-12, ASTM A536) with replaceable rubber liner- 14000hrs to be guaranteed. <b>OR</b> 2. Ductile Iron with Hi Chrome liner - 14000hrs to be guaranteed. <b>OR</b> 3. In case of Hi chrome casing pump the Guaranteed wear life of casing shall not be less than 24000 hrs.	1. Ductile Iron (65-45-12, ASTM A536) with replaceable rubber liner- 14000hrs to be guaranteed. <b>OR</b> 2. Ductile Iron with Hi Chrome liner - 14000hrs to be guaranteed. <b>OR</b> 3. In case of Hi chrome casing pump the Guaranteed wear life of casing shall not be less than 24000 hrs.
ii.	Impeller	Hi Chrome or superior material with 14000 hrs guarantee.	Hi Chrome or Natural Rubber+ High chrome or superior material with 14000 hrs. Guarantee.
iii.	Solid Shaft	Duplex SS 2205 /EN8D /EN9 or any other superior material suitable for slurry application.	Duplex SS 2205 / EN8+Rubber Lined or any other superior material suitable for slurry application.
iv.	Shaft sleeve at mechanical seal ( If Applicable)	CD4MCU ASTM A 743/ Duplex 2205	CD4MCU ASTM A 743/ Duplex 2205
v.	Base Plate	Carbon steel with Epoxy Coating	Carbon steel with Epoxy Coating

**Note: The material and thickness of the liners shall ensure a minimum service life of 2 years before replacement.**

**The time period for warranty/ guarantee of the wear life /service life will be considered whichever is later for the above MOC details.**

### 5.0 SCOPE OF SUPPLY

Scope for the bidders shall include Design, Supply and Supervision of Erection & Commissioning.

**Design:** Includes basic engineering, detail engineering, preparation and submission of engineering drawings/calculations/datasheets/quality assurance documents/field quality plans, storage instructions, commissioning procedures, operation & maintenance manuals, performance guarantee test procedures and assisting BHEL in obtaining time bound approval from CUSTOMER.

**Supply:** Includes manufacturing/fabrication, shop floor testing, stage inspections, final inspections, painting & packing.

**Supervision of Erection & commissioning:** Includes supervision of erection & commissioning, supervision of trial operation, training of customer's O&M Personnel.

The scope of supply for Slurry pump shall include but not limited to the following:

Sl. No	Scope
1.	Slurry pump complete with
	i. Casing
	ii. Rotor and Shaft assembly
	iii. Drive motor as per specification
	iv. Coupling or Pulley & V-belt (As applicable)
	v. Common base frame for pump & motor and shock pads





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Sl. No	Scope
	vi. Single/ Double Mechanical seal as applicable with applicable Quenching/ Flushing plan
	vii. Flushing/Quenching and drain system Provision to be provided in mechanical seal in case of with Flushing/Quenching mechanical seal along with applicable API Plans. Water flow and pressure requirement to be duly mentioned while bid submission.
	viii. Coupling guards with bolts or V-belt guard (As applicable)
	ix. Discharge pressure guage(to be supplied as loose)
	x. Temporary Strainers required for commissioning
	xi. Expansion joints ( Bellows) at suction and Discharge
	xii. Casing drain terminated at battery limit with flange(if applicable)
	xiii. Cooling water piping for Bearing cooling(as applicable)
	xiv. Lubrication system (as applicable)
	xv. Foundation bolts for supplied items
	xvi. Pedestal for Pump(as applicable)
	xvii. Drip tray for drainage collection from pump (if applicable). However bidder to provide the same in case end customer requests for the same.
	xviii. Lantern Ring ( if applicable)
	xix. Mechanical Running and Performance test at shop
	xx. Painting and Rust Prevention during shipment and construction
	xxi. Supervision of Erection & commissioning at site.
	xxii. Special tools & tackles as applicable.
	xxiii. Accessory ( Internal) Piping within the skid(if applicable)
	xxiv. First fill of consumables like lubricants, etc.,
	xxv. Start-up & Commissioning & Mandatory spares.
	xxvi. Seaworthy Packing & Forwarding (for import supplies) to Project Site office
	xxvii. Installation, operation and maintenance manuals
	xxviii. In case of series pumps, common individual base frame to be provided by vendor with interconnecting piping (MOC: MSRL/ any other material suitable for handling slurry application), interconnecting expansion joints, interconnecting fasteners.
	xxix. Any other items required for completeness of the equipment except the items covered in the exclusions.

6.0	DESIGN & CONSTRUCTION
6.1	DESIGN REQUIREMENTS
1.	The pump shall be <b>single stage centrifugal type</b> capable of delivering the rated flow at rated head with margins as specified below.
2.	<p>All slurry pumps for a particular service shall be identical and interchangeable. The composition of Limestone slurry is provided in the Annexure for reference. Bidder shall consider the Slurry pumps accordingly with reference to construction and speed as follows.</p> <p>Tip speed of impeller :(a) for rubber lined pumps should not exceed 25m/sec, (b) for other pumps should not exceed 30m/sec- vendor to furnish the same in its offer.</p> <p>However, if the discharge head exceeds 6.0 bar bidder may consider higher tip speed subject with BHEL approval. The slurry velocity shall be in the range of 1.2 m/s to 2.3 m/s to prevent bed of solids in the</p>



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	pipe. Notwithstanding the above parameters, it shall be the bidders endeavor and responsibility to ensure that there shall be no settling of solids in the pipelines. Necessary calculations shall be submitted to BHEL for review.											
3.	All the pump wear parts in contact with the slurry shall be provided with replaceable rubber/elastomer liners suitable for the fluid handled. The bidder can also offer a hi-chrome alloy lined pump if the bidder has previous experience of the same for similar applications.											
4.	The pump shall be provided with seals of proven type and shall be designed for minimization of seal water consumption. The shaft shall be supported on heavy duty ball/roller bearings(FAG/SKF/TIMKEN/ or equivalent subjected to BHEL approval)											
5.	The Pump shall be capable of developing the required total head at rated capacity for continuous operation. Also the pumps shall be capable of being operated to give satisfactory performance at any point on the HQ characteristics curve. Bidder to confirm the pump operating range from 40% to 110% with respect to BEP of the quoted pump. Bidder to quote higher efficiency pumps based on the rated duty condition mentioned in the specifications.											
6.	The total head capacity curve shall be continuously rising from the operating point towards shut-off without any zone of instability and with a minimum shut-off head of about 15% more than the design head. Bidder can propose the pump with lower shut off condition also based on their past experience in similar project which will be subjected to BHEL approval.											
7.	Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. The head Vs capacity and BHP Vs capacity characteristics should match to ensure even load sharing and trouble free operation throughout the range. Components of identical pumps shall be interchangeable.											
8.	<div>Pumps shall run smoothly without undue noise and vibration. Peak to peak vibration limits shall be restricted to the following values during operation. Pump RPM shall be designed with respect to allowable pump tip speed and selected material of construction for pump impeller in Clause 6.1(2) above.</div> <table><tr><td>Speed</td><td>Antifriction Bearing</td><td>Sleeve Bearing</td></tr><tr><td>1500 rpm and below</td><td>75.0 micron</td><td>75.0 micron</td></tr><tr><td>3000 rpm</td><td>50.0 micron</td><td>65.0 micron</td></tr></table>			Speed	Antifriction Bearing	Sleeve Bearing	1500 rpm and below	75.0 micron	75.0 micron	3000 rpm	50.0 micron	65.0 micron
Speed	Antifriction Bearing	Sleeve Bearing										
1500 rpm and below	75.0 micron	75.0 micron										
3000 rpm	50.0 micron	65.0 micron										
9.	The pumps shall be capable of starting with discharge valve fully open and close condition. Motors shall be selected to suit to the above requirements. Continuous Motor rating (at 50 deg.C ambient) shall be at least ten percent (10%) above the maximum load demand of the pump in the entire operating range to take care of the system frequency variation and no case less than the maximum power Requirement at any condition of the entire characteristic curve of the pump.											
10.	The kW rating of the drive unit shall be based on continuously driving the connected equipment for the conditions specified. However, in cases where parallel operation of the pumps are specified, the actual motor rating is to be selected by the Bidder considering overloading of the pumps in the event of tripping of operating pump(s).											
11.	Pumps shall be so designed that pump impellers and other accessories of the pumps are not damaged due to flow reversal.											
12.	The Contractor under this specification shall take full responsibility in the operation of pump and motor as a unit.											
13.	The pumps shall be designed as impeller centrifugal pump. The pumps shall be wear-resistant, be equipped with flushing devices/provision to prevent sedimentation and shall be designed and installed in a manner to allow easy replacements, repair and maintenance.											
14.	Impellers shall be single piece casting. Fabricated impellers shall not be accepted.											



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15.	The slurry pumps shall be equipped with oil level indication (if applicable), coupling guard/V-belt guard & other accessories for collecting leakage, made of corrosion resistant material.
16.	Pumps must be carefully set to ensure that the net positive suction head available under all operating conditions will be adequate. The NPSH Values are to be referred to the least favorable operating conditions- lowest atmospheric pressure, lowest level of water on the suction side of the pump and highest temperature of the pumped fluid. An adequate safety margin of normally greater than 1m to the max NPSH required shall be provided.
17.	All pumps shall be fitted with pressure gauges on discharge end. ( To be supplied loose). The technical detail for the Pressure Gauge is specified elsewhere in the BHEL specification.
18.	Venting valve shall be fitted to all pumps at suitable points on the pump casing unless the pump is self-venting due to the arrangement of the suction and discharge nozzles. Drainage facilities shall be provided on the pump casing or adjacent pipe work to facilitate the dismantling of pumps. ( If Applicable)
19.	Pumps shall have stable head-capacity characteristics curve from run-off to shut-off.
20.	Selection of Duty point should preferably be at BEP (Best Efficiency Point). It should be noted that head variation is due to level variation in tank. Pump has to run in the system without compromising it's NPSH requirement at lowest water level in tank. Hence, when tanks are filled-up and at normal water level, pump will operate at the right of BEP. Pump's operating zone shall be considered accordingly.
21.	External flushing is required to remove the accumulated particles within the pump & provision for the same should be provided in order to remove the accumulated particles within the pump, all related information shall be mentioned in data sheet. Bidder to supply quenching plan system mounted on the pump base frame as per API plan and water requirement to be defined while submitting the bid.
22.	Pump should have adjustment provision of axial clearance between casing and impeller for maintenance of performance at best efficiency in the event of wear between impeller and casing.
23.	Each pump will have a coupling of adequate size, designed for full load and capable of supporting start-up an overload moment. Each half of the coupling will be factory mounted and locked to its shaft. The coupling must be able to accept the adjustment of the impeller. Bidder can also quote pumps with V-belt & Pulley arrangement.
24.	The Antifriction bearing of the pumps shall be designed for minimum useful life (L-10) of 20,000 hours of continuous operation (Under the design condition). The thrust bearing will have dimensions for a minimum of 175 % of the required load.
25.	The pumps shall have mechanical seals of cartridge type with self-lubrication sliding ring cartridges. The static part will be mounted on the seal plate with circumferential ring (O-ring) or another flexible sealing ring. Built in seal design will not be accepted.
26.	The sealing areas shall be designed in such a way so that solids do not precipitate, affect the cooling, or affect adjustment and mechanical functioning of the seals. Seals requiring jet cleaning shall be avoided. Bidder to furnish the water requirement for Plan 62 so that BHEL can arrange the same suitably.
27.	Pump induced vibration due to flow pulsations shall be avoided through suitable design.
28.	Each rotating equipment shall be first statically balanced and then dynamically balanced according to ISO 1940 Gr 6.3 (As applicable.).Moreover Bidder to ensure balancing of the impellers after mounting on the shaft as per relevant balancing standards. In case during operation deflection in the shaft or any other operation issues occur, the same needs to be rectified by the bidder without any price implication to BHEL.
6.2	<b>CONSTRUCTIONAL FEATURES</b>



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<b>A)</b>	<b>CASING</b>
a.	Pumps shall be of Radial Split Casing (if twin casing pump), Over-hang, End Suction Type Back Pull-out design, Vertical Discharge type for Horizontal Centrifugal Pump.
b.	The casing shall be designed to withstand the maximum shut-off pressure developed by the pump at the pumping temperature.
c.	Pump casing shall be provided with a vent connection and piping with fittings & valves. Casing drain as required shall be provided complete with drain valves, piping and plugs ( As Applicable).
d.	Pump casing to be provided with a connection for discharge pressure gauge as standard feature. (Pressure Gauge shall be supplied loose) It shall be structurally sound to provide housing for the pump assembly and shall be designed hydraulically to minimum radial load at part load operation.
e.	For single casing pumps, bidder to confirm that in case casing wears out by 50% during operation, pump allowable maximum pressure will not reduce. This shall be confirmed strictly for equipment and plant safety. A basis of calculation proving the same shall be submitted for review.
f.	Lifting provision of pump as a whole and individual casing half should be provided.
g.	Renewable wear rings ( As applicable) shall be provided at points of running clearance and shall be made from appropriate materials indicated in the referred standards.
<b>B)</b>	<b>IMPELLER</b>
a.	Impeller shall be semi-closed, closed or open type and designed in conformance with the detailed analysis of the liquid being handled. The impeller shall be secured to the shaft, and shall be retained against circumferential movement by keying, pinning or lock rings. On pumps with overhung shaft, impellers shall be secured to the shaft by a lockout or cap screw which tightness in the direction of normal rotation. Bidder may also propose threaded connection between impeller and shaft. Bidder shall provide evidence of zero contact between the slurry being processed and the Threaded region.
b.	Tipspeed of impeller: Please refer Clause 6.1(2)
c.	Miller number for the material should be justified for that pumping medium as per ASTM G75-95 as well as the corrosion effect of pumping medium
d.	Impeller as rotating assembly along with all elements should meet balancing standard of ISO 1940 Gr 6.3
e.	Maximum size impellers for the pump body shall not be quoted. By installation of a new impeller a head increase of 5% minimum shall be possible. Maximum size impeller to be quoted or as appropriate technically by the bidder. In case there is variation required in the system then same can be done thru by changing the pump RPM with change in pulley ratio.
<b>C)</b>	<b>IMPELLER/CASING WEARING RINGS</b>
a.	Replaceable type wearing rings shall be provided at suitable locations of pumps. Suitable method of locking the wearing ring shall be used. Wearing rings shall be provided in pump casing and/or impeller as per manufacturer's standard practice.
<b>D)</b>	<b>SHAFT</b>
b.	The shaft shall be ground and polished to final dimensions and shall be adequately sized to withstand all



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	stresses from rotor weight, hydraulic loads, vibration and torques coming in during operation.
c.	All Pump shafts shall be of ample size to transmit the maximum possible output from the prime mover.
d.	The pump shaft and coupling are to be so dimensioned that the maximum permissible torque of the shaft is higher than the maximum transmissible torque of the coupling and gear.
e.	Pumps shall operate smoothly throughout the speed range up to their operating speeds. The first coupled critical speed must be at least 20% higher than the maximum operating speed. The determination of the shaft diameter and the distance between two consecutive bearings must include a sufficiently large safety margin to satisfy this condition.
f.	Shafts shall be conservatively designed to transmit maximum power required and to assure rigidity. Shafts shall be machined and ground to close tolerances and shall be tapered to permit easy removal of the seals and bearings.
g.	Shaft shall run in high precision heavy duty roller bearings. Lubrication system provided shall be such that visual checking of lubricant level is possible
h.	No parts of the shaft should come in contact with the liquid medium for horizontal centrifugal pump.
i.	Shaft should have a keyed joint at impeller hub or thread connection between impeller and shaft is acceptable however in no circumstances Slurry shall come in contact with the threaded part.
<b>E)</b>	<b>SHAFT SLEEVES</b>
a.	Replaceable type fine finished shaft sleeves shall be provided at mechanical seals. Shaft sleeves shall be fastened to the shaft to prevent any leakage or loosening. Shaft and shaft sleeve assembly should ensure concentric rotation.
<b>F)</b>	<b>BEARINGS</b>
a.	Heavy duty bearings, adequately designed for the type of service specified in the enclosed pump data sheet and for long, trouble free operation shall be furnished. Proper lubricating arrangement for the bearings shall be provided. The design shall be such that the bearing lubricating element does not contaminate the liquid pumped. Where there is a possibility of liquid entering the bearings suitable arrangement in the form of deflectors or any other suitable arrangement must be provided ahead of bearings assembly. Bearings shall be easily accessible without disturbing the pump assembly. A drain plug shall be provided at the bottom of each bearings housing.
b.	The bearings may be ball, roller or sleeve bearing. If sleeve bearings are used these shall be machined for close running fit. The bearings shall be designed to take the necessary radial load as well as the net axial thrust. Bearings shall be lubricated properly and sized for an operating life of 20,000 hours on the basis of maximum load. Oil level indication shall be provided.
c.	Bearing housings on horizontal shaft pumps shall be designed to enable the bearings to be replaced without removing the pump or motor from its mounting. Bearing housings on horizontal shaft pumps shall be effectively protected against the ingress of water, pumped fluid and dust by suitable nonferrous deflectors.
d.	If bearing housing requires cooling water, volume and pressure of cooling water is to be indicated in Technical Data Sheet.
e.	Lubricating oil will be the responsibility of pump manufacturer. Hence, manufacturer has to make arrangement of first fill of oil at installation, and at commissioning stage. Quantity of oil and its grade is to be indicated in Drawing and Operation Manual.



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f.	Make of Bearings : SKF, FAG & TIMKEN or any other reputed make subjected to BHEL approval.
<b>G)</b>	<b>MECHANICAL SEALS</b>
a.	Mechanical seals shall be of single/double type with either sliding gasket or bellows between the axially moving face and shaft sleeves or any other suitable type. The sealing faces should be highly lapped surfaces of materials known for their low frictional coefficient and resistance to corrosion against the liquid being pumped.
b.	The pump supplier shall coordinate with the seal maker in establishing the seal chamber of circulation rate for maintaining a stable film at the seal face. The seal piping system shall form an integral part of the pump assembly. For the seals under vacuum service, the seal design must ensure sealing against atmospheric pressure even when the pumps are not operating. Necessary provision for seal water supply along with complete piping fittings and valves as required shall form integral part of pump supply. Bidder to supply quenching plan system mounted on the pump base frame as per API plan and water requirement to be defined while submitting the bid.
c.	The Mechanical Seals shall be so arranged that repacking or fitting of replacement seals can be carried out with the minimum of disruption to plant operation.
d.	Design the mechanical seals chamber to have sufficient room to lubricate and get seal face cool with its own slurry.
e.	Provide requirements for periodical flushing to rinse the seal face for leaked slurry.
f.	Pump shall be supplied with mechanical seal. All mechanical seals, regardless of type or arrangement, shall be of the cartridge design. Hook sleeve cartridge should not be used.
g.	Requirement of flushing/quenching water, its quantity, and pressure to be indicated in data sheet.
h.	Slurry Pumps should have Zero leakage. However, quantity of leakage, if it is unavoidable, pump should have a provision of collecting of any drip leakage and flushing the same to nearby pit is to be providing without corroding the base plate of pump.
i.	Mechanical seals shall be fitted and installed in the pump before shipment and shall be clean. Mechanical seals shall be plugged with screw for shipping.
j.	Seal life shall be guaranteed for 14000 hrs. In the event seals fail before guarantee period, the bidder shall replace the same without any cost implication. Make of Mechanical Seals: Eagle Burgmann/ Flowserve/ John crane / any other make subjected to BHEL approval.
k.	All the mechanical seal shall have a lubrication arrangement i.e. Quenching (Plan 62) only. Bidder shall guarantee the seal life with quenching itself.
l.	For Quenching integrated piping along with their respective instruments, fittings will be in the scope of the bidder. The Quenching plans should meet the respective API Standards. Bidder to provide the quantity of water requirement for such arrangement so that BHEL can arrange the same suitably.
m.	BHEL will provide maximum pressure of 1 bar for Quenching requirement.
n.	Bidder may kindly note the ports for Quenching & Flushing ( if available) should be separate & same should be tightly sealed in case of non-usage.
<b>H)</b>	<b>COUPLING (if applicable)</b>
a.	The pump and motor shafts shall be connected with an adequately sized flexible coupling of proven design with a spacer to facilitate dismantling of the pump without disturbing the motor. Necessary coupling guards shall also be provided.



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b.	Coupling halves shall be machine matched to ensure accurate alignment. Couplings and gears must have a rated capacity of at least 120% of the maximum potential power transmission requirement.
c.	Coupling shall be of flexible type made of cast steel. The Bidder shall furnish both halves of the coupling. Both the Coupling halves shall be bored and keyed to fit shafts of the gearbox and the motor by bidder.
d.	All rotating parts such as coupling shall be covered with suitable protective guards. Guards shall be easily removable type. If weight of the coupling is heavy (>40 kgs), provision of tapped hole should be incorporated in right place of hub to handle the same effortlessly.
<b>I)</b>	<b>BASE PLATE</b>
a.	<p>A common base plate mounting both for the pump and motor shall be furnished. The base plate shall be fabricated steel and of rigid construction, suitably ribbed and reinforced. Base plate and pump supports shall be so constructed and the piping unit so mounted as to minimize misalignment caused by mechanical forces such as normal piping strain, internal differential thermal expansion and hydraulic piping thrust. Suitable drain troughs and drip lip shall be provided.</p> <p>The HT motors are in BHEL's scope. However, bidder should design the base frame in order to accommodate both the HT motor &amp; pump on the same base frame. (HT motor overall dimensions &amp; weight will be provided by BHEL after placement of PO).</p>
b.	Suitable holes shall be provided for grouting and these shall be so located that the base plate can be grouted in place without disturbing the pump and motor.
c.	Base plate must have provision of aligning driver and driven shaft in both directions of base plate so that shafts can be aligned. Similarly, provision must be provided for alignment of shaft in vertical plane.
d.	Pump manufacturer is to supply base plate along with Foundation bolt & Nut, "Taper wedge (if applicable)" and the necessary fastener for Pump and Motor with Base plate.
e.	Base plate must be provided with a trough, material of which must be compatible of pumping liquid. Leaked liquid, collected in trough, can be systematically routed at designated point
f.	Base plate must be stress-relieved for any residual welding stress and certificate to that effect is to be submitted as per inspection requirement.
<b>J)</b>	<b>ASSEMBLY AND DISMANTLING</b>
a.	Assembly and dismantling of each pump with drive motor shall be possible without disturbing the grouting base plate or alignment.
<b>K)</b>	<b>ADDITIONAL REQUIREMENT FOR VERTICAL SUMP PUMP</b>
a.	The pumps shall be designed for continuous operation. The pump shall be <b>single stage centrifugal type with semi open or open impeller</b> . The pump impeller shall be cantilever type and shall not be supported below the base plate for easy withdrawal.
b.	The pump shall deliver the rated flow at rated head with margins as specified in the respective clauses. The pump shall be capable of pumping of slurry with solid concentration upto 30 wt% & particle lumps of 6-7mm.
c.	The material chosen for the pump components shall be suitable for the fluid handled and shall be proven in similar application.
d.	The pumps shall not be supported below the base plate level for easy withdrawal without entering the sump.
e.	Typical GA Drawing for the vertical pump sumps is attached ( Annexure J). The bidder to design the pumps accordingly meeting the minimum & maximum water levels as provided.





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<b>M)</b>	<b>ACCESSORIES:</b>
<b>1.</b>	<b>Suction Strainers</b>
<b>i.</b>	Temporary conical strainer to be provided so as to avoid entry of any particle into the pump at the time of commissioning/starting up. <b>Note:</b> Pipe sizes / Flange sizes will be informed during detail engineering with respect to strainer size & its mounting holes.
<b>ii.</b>	Quantity of Temporary Conical Strainers : 1 no. at the suction of each horizontal pump. For the vertical pumps the same is not required.
<b>iii.</b>	MOC & Size of the temporary conical strainers: As per the attached sizing sheet ( Annexure K)

### 6.3 Motor

Please refer to the motor specification attached TECI: LT MOTOR: REV 05(**Annexure-F**). The motor make is subject to end customer approval. The motor painting schedule is subject to customer approval.

**Note:** 1) All HT Motors are in BHEL Scope.

2) HT Motor Range: Above 200kW.

3) For HT motor pumps, provision for Vibration sensor and Key Phase Marker Sensor should be provided.

a) Vibration Sensor: 4 provisions on the pump. Thread size of M6x1 (M6x1 threaded provision 12mm deep) for each vibration sensor.

b) Key Phase Marker Sensor: 1 Provision. Notch (of size 30mmL x 15mmW x 3mmD) for phase marker probes are to be provided.

### 7.0 GENERAL REQUIREMENTS:

S. No.	Description
1.	Metric unit shall be used in the drawings and in the any displays on the equipments. Special attention should be taken that the unit of pressure shall be in dual scales of kPa and kg/cm <sup>2</sup> G. For instance the pressure gauges should have dual unit's indication.
2.	Descriptions in the drawings, documents and in the displays shall be in English
3.	All rotating parts such as coupling shall be covered with suitable protective guards. Guards shall be easily removable type.
4.	The equipment shall be designed to withstand the corrosive and moist environment in which these are proposed to operate.
5.	Noise level produced by any rotating equipment individually or collectively shall not exceed 85 dBA measured at a distance of 1.0 meter horizontally from the source in any direction and 1.5m above operating floor. Predicted sound pressure levels for the pump drive assemblies shall be submitted as part of the proposal data.
6.	The overall vibration level shall be as per ISO 10816 /HIS 9.6.4.11 for casing vibrations.
7.	Suitable drain connections shall be provided (as applicable).
8.	The equipment shall be suitable for stable operation continuously.





## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
9.	Limit of connection: The buyer (BHEL) has an intention to minimize interface for utilities as much as possible. The bidder shall consider this requirement in the planning stage of layout for the equipment. The bidder shall provide the header piping for utilities and branch piping to each nozzle. Terminal points for all utilities shall be located at skid edge. The bidder shall specify all terminal points with tie-in number in the P&ID and submit it in the proposal to confirm the scope of supply.
10.	Corrosion allowance: Corrosion allowance for entire equipment shall be in accordance with latest applicable Indian / International standard.
11.	Flanges shall be in accordance with ANSI B16.5 Class 150, However if Vendor Proposes any other drilling standard, prior approval from BHEL to be taken & Vendor to provide one no. extra pipe fittings such as expansion bellow, concentric reducer/expander etc. for each pump with fasteners suitable for handling slurry application shall be provided by the bidder.
12.	Name plate: All equipment shall be provided with nameplates indicating the item number and service name. Name plates shall be of 304 Stainless steel plate and placed at a readily visible location. Nameplate of main equipment shall have enough information, which will be confirmed during engineering phase. Stainless steel nameplates for all instruments and valves shall be provided.
13.	Rotation arrows shall be cast in or attached with stainless steel plate on each item of rotation equipment at a readily visible location.
14.	Unless otherwise specified, all equipment items where the weight exceeds 15 kg shall be provided with suitable lifting lugs, ears or ring bolts or tapped holes for lifting rings. Minimum shock factor for lifting lugs shall be minimum 2.0. The position of lifting lugs and reference dimension shall be shown on GA and/or outline drawings. NDT shall be conducted for lifting lugs. When any spreader bars are required for lifting and laydown, the bidder shall provide spreader bar with equipment.
15.	Skid Mount/Transportation: Equipment shall be fabricated as skid mount design as much as practical to minimize erection at the site.
16.	Two pieces of stainless steel earth lugs shall be provided with equipment diagonally. The position of earth lugs shall be shown on each GA and/or outline drawing.
17.	Provide double nuts for Foundation bolts.
18.	Bidder shall provide allowable vibration level on foundation in foundation drawings and/or general arrangement drawings.
19.	If the driver/driven equipment train is in the resonance condition or any vibration problems occur, the bidder shall solve the problems in a timely manner.
20.	Bidder shall provide the mating flanges with the necessary gaskets. Gasket Material shall be of EPDM/Neoprene Rubber or any other material suited for slurry application.
21.	All the surfaces of the carbon steel should be rust prevented before shipment for the period of at least 12 months for storage and construction.
22.	Bidder to provide capacity of crane or hoist required for material handling and the details of heaviest component to be handled.
23.	The list of all Bought out items with makes and country of origin to be mentioned along with offer to be submitted.
24.	Quality Plan to be submitted along with the offer.
25.	Minor Chipping i.e. up to 50 mm thk, micro leveling and providing shim plates for erection of equipment / item at site shall be in the scope of bidder.



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S. No.	Description
26.	All the fasteners which are in contact with slurry should be of High chrome/ Duplex material only. All other fastener shall be as per manufacturer's standard practice and proven experience. Bidder should ensure that the fasteners should not get corroded/damaged in case of spillage of slurry or due to any environmental condition. In case of corrosion or damaged the same needs to be replaced by the bidder without any cost implication to BHEL.
<b>8.0</b>	<b>PACKING AND FORWARDING</b>
1.	<p>Proper packing to be ensured.</p> <p>Indigenous Supply: Pump &amp; sub system assembly shall be wrapped in polythene bags &amp; packed in a strong rigid wooden crate. Rain water should not enter into the pump internals during storage in the outer yard of power plant.</p> <p>Imported Supply: All imported supply should be packed as per Sea worthy packing specification no. <b>PE-TS-888-100-A001 (Annexure-H)</b>. Liberal packing materials and struts shall be provided to arrest rolling and to protect from transit damages.</p>
2.	Equipment and process materials shall be packed and semi-knocked down, to the extent possible, to facilitate handling and storage and to protect bearings and other machine surfaces from oxidation. Each container, box, crate or bundle shall be reinforced with steel strapping in such a manner that breaking of one strap will not cause complete failure of packaging. The packing shall be of best standard to withstand rough handling and to provide suitable protection from tropical weather while in transit and while awaiting erection at the site.
3.	Equipment and materials in wooden cases or crates shall be properly cushioned to withstand the abuse of handling, transportation and storage. Packing shall include preservatives suitable to tropical conditions. All machine surfaces and bearings shall be coated with oxidation preventive compounds. All parts subject to damage when in contact with water shall be coated with suitable grease and wrapped in heavy asphalt or tar impregnated paper.
4.	Crates and packing material used for shipping will become the property of owner (CUSTOMER).
5.	Packaging or shipping units shall be designed within the limitations of the unloading facilities of the receiving ports and the ship will be used. It shall be the bidder's responsibility to investigate these limitations and to provide suitable packaging and shipping to permit transportation to site.
6.	Packing (tare) shall be part of the equipment cost and shall not be subject to return. The packing should ensure integrity and cohesiveness of each delivery batch of equipment during transportation. In case of equipment assemblies and unit's delivery in the packing of glass, plastics or paper the specification of packing with the material and weight characteristics are to be indicated.
7.	<p>Each package should have the following inscriptions and signs stenciled with an indelible ink legibly and clearly:</p> <ol style="list-style-type: none"> <li>Destination</li> <li>Package Number</li> <li>Gross and Net Weight</li> <li>Dimensions</li> <li>Lifting places</li> <li>Handling marks and the following delivery marking</li> </ol>
8.	Each package or shipping units shall be clearly marked or stenciled on at least two sides with project details as per enquiry.



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
	In addition, each package or shipping unit shall have the symbol painted in red on at least two sides of the package, covering one fourth of the area of the side.
9.	Each part of the equipment which is to be shipped as a separate piece or smaller parts packed within the same case shall be legibly marked to show the unit of which it is part, and match marked to show its relative position in the unit, to facilitate assembly in the field. Unit marks and match marks shall be made with steel stamps and with paint.
10.	Each case shall contain a packing list showing the detailed contents of the package. When any technical documents are supplied together with the shipment of materials no single package shall contain more than one set of such documents. Shipping papers shall clearly indicate in which packages the technical documents are contained.
11.	The case number shall be written in the form of a fraction, the numerator of which is the serial number of the case and the denominator the total number of case in which a complete unit of equipment is packed.
12.	Wherever necessary besides usual inscriptions the cases shall bear special indication such as "Top", "Do not turn over", "Care", "Keep Dry" etc. as well as indication of the center of gravity (with red vertical lines) and places for attaching slings (with chain marks)
13.	Marking for Safe handling: To ensure safe handling, packing case shall be marked to show the following: <ul style="list-style-type: none"><li>a. Upright position</li><li>b. Sling position and center of Gravity position</li><li>c. Storage category</li><li>d. Fragile components ( to be marked properly with a clear warning for safe handling)</li></ul>
14.	Each crate or package is to contain a packing list in a waterproof envelope. All items are to be clearly marked for easy identification against the packing List. All cases, packages etc. are to be clearly marked on the outside to indicate the total weight where the weight is bearing and the correct position of the slings are to bear an identification mark relating them to the appropriate shipping documents. All stencil marks on the outside of cases are either to be made in waterproof material or protected by shellac or varnish to prevent obliteration in transit.
15.	<b>The packing slip shall contain the following information: -</b> Customer name, Name of the equipment, Purchase Order number with Date, Address of the delivery site, Name and Address of the Sender, Serial Number of pump & accessories, BHEL item Code, Gross Weight and Net weight of Supplied items.
16.	Prior to transport from manufacturer's work to destination, components of the unit shall be completely cleaned to remove any foreign particles. Flange faces and other machined surfaces shall be protected by an easily removable rust preventive coating followed by suitable wrapping.
17.	All necessary painting, corrosion protection & preservation measures shall be taken as specified in painting schedule. Supplier shall consider the coastal environment zone which is defined as "very severe" during final finishing/shipping.
18.	Successful bidder shall furnish the detail packing /shipment box details with information like packing box size, type of packing, weight of each consignment, sequence no. of dispatch, no. of consignment for each deliverable item against each billing break up units/ billable blocks. Without these details the BBU shall not be approved during detail engineering.  Also, complete billing break-up with above mentioned details shall be submitted within 10days of LOI.



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
19.	All items/equipment shall be dispatched in properly packed condition (i.e. no item shall be dispatched in loose condition such that it becomes difficult to store/identify its location at site at a later stage).
20.	Cases which cannot be marked as above shall have metal tags with the necessary markings on them. The metal tags shall be securely attached to the packages with strong steel binding wire. Each piece, Skid, Case or package shipped separately shall be labelled or tagged properly. <b>Note:</b> Vendor to Provide photos of Packing boxes along with Packing box dimensions before dispatch.
<b>9.0</b>	<b>SUPERVISION OF ERECTION, TESTING AND COMMISSIONING</b>
1.	The erection of Slurry Pumps will be done by owner as per Erection Manual and check List. However, the bidder shall make visits for the supervision of erection, pre-commissioning & post-commissioning check-up, start-up, testing and trial runs of all the items covered under the scope of supply.
2.	Total number of visits shall be 6 and number of days per visit shall be 5 working days. Total number of working days= 6 x 5 = 30 days. Travel duration shall be additional.
3.	TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supply portion.
4.	Per day Charges for supervision shall be quoted by the bidder.
5.	Price comparison for evaluating the lowest bid will be considered all main supply, supervision of E&C charges and mandatory spares price all together.
<b>10.0</b>	<b>EXCLUSIONS</b>
	The following work associated with the slurry pump will be by BHEL: <ul style="list-style-type: none"><li>a. Civil foundations</li><li>b. Walkways, platforms and ladders</li><li>c. Element handling hoists</li></ul>
<b>11.0</b>	<b>INSPECTION AND TESTING</b>
<b>A)</b>	Minimum Testing requirements to be considered are as below: The typical quality plan is enclosed with this specification( <b>ANNEXURE-G</b> ).
1.	Bidder shall submit the quality plan during the Post ordering stage subject to BHEL / end customer approval.
2.	For surfaces with rubber lining, degree of cleaning shall be visually checked before the application of the coating. There must be no area with oxidation, dirt or partially or generalized corrosion defects.
3.	Test certificates shall be issued for each lot of raw material used in the coating, corresponding to specific weight and traction resistance.
4.	For surfaces with rubber lining, adherence test shall be conducted on production samples. Adherence test shall be conducted on the actual surface through hammering. In order to verify the absence of air packets (or) surface without adherence.
5.	For surfaces with rubber lining, Coating thickness shall be checked at 100%. A High voltage porosity test will be conducted on 100 % of the coated surface.



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
<b>B)</b>	<b>General Inspection requirements to be considered are as below:</b>
1.	Bidder shall furnish written copies of shop production, fabrication and quality test procedures and drawings to be used for review by BHEL / CUSTOMER prior to manufacture. Inspection of above mentioned tests by BHEL/ CUSTOMER representative at bidder's works is envisaged.
2.	The Bidder shall furnish performance test procedure along with standard. The test procedure will be reviewed and approved by the BHEL/CUSTOMER.
3.	Slurry Pumps will be inspected at the Bidder's works before dispatch or where the test facilities are available.
4.	The Bidder shall conduct performance test for the remaining pumps and submit the reports.
5.	A dynamic balancing certificates evidencing that the rotating assembly has been balanced dynamically shall be sent to CUSTOMER/ BHEL within one (1) week of the successful completion of balancing.
6.	Acceptance tolerance of actual versus guaranteed performance for capacity, head, efficiency and power absorbed shall be as per applicable standard.
7.	Vibration levels shall be measured during shop running/performance tests.
8.	Contract shaft seals shall be used during shop tests, unless the seal design is unsuitable for the shop-test condition.
9.	Slurry pumps shall not be released for shipment, until shop tests data and performance tests curves have been approved by Owner.
10.	Bidder should furnish performance guarantee as per applicable standard guarantee for the design, manufacture, material and safe operation of the equipments.
11.	BHEL shall witness the test at Bidder's works and a notice of minimum three (3) weeks shall be given for attending the inspection.
12.	Bidder to arrange all calibrated gauges, Instruments during inspection.
13.	Mechanical running and the performance test shall be carried out at factory. Bidder to arrange Motor of same / higher rating for the shop test and inspection.
14.	The performance test may be carried out using water at shop and shall be converted to the design condition.
<b>12.0</b>	<b>PAINTING – As per enclosed document Annexure-E</b>
<b>13.0</b>	<b>SPARES,TOOLS &amp; TACKLES</b>
<b>13.1</b>	<b>START UP &amp; COMMISSIONING SPARES</b>
	Start-up & Commissioning Spares shall be part of the main supply of the Slurry pumps. Start-up & commissioning spares are those spares which may be required during the start- up and commissioning of the equipment/system. All spares required for successful operation till commissioning of pump shall come under this category. Bidder shall provide an adequate stock of such start up and commissioning spares to be brought by him to the site for the equipment erection and commissioning. The spares must be available at site before the equipments are energized.
<b>13.2</b>	<b>MANDATORY SPARES</b>
	The mandatory spares list is provided in the enclosed <b>Annexure-D</b> . The Mandatory spares price will be considered for bid evaluation.



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
	<p>Mandatory spare parts items shall be handed over separately and shall not be mixed with the supply of the main equipment parts. Spares shall be sent in pre-decided lots in containers/secure boxes. All boxes/containers are to be distinctly marked in red color with boldly written "S" mark on each face of the containers. Spares shall not be dispatched before dispatch of main equipment's. Each item shall be labelled in English and be packed against damage and sealed to prevent deterioration from corrosion.</p> <p>All spares supplied under this contract shall be strictly inter-changeable with the parts for which they are intended for replacements. All the Initial spares shall be manufactures along with the main equipment components as a continuous operation as per same specification and quality plan. Supply of spares shall be subjected to the approval of BHEL</p>
<b>13.3</b>	<b>SPECIAL TOOLS &amp; TACKLES:</b>
	<p>Any special tools &amp; tackles required for the entire equipment to disassemble, assemble or maintain the units, they shall be included in the quotation and furnished as part of the initial supply of the machine. List of special tools &amp; tackles shall be decided by bidder as per his proven practice. When special tools are provided, they shall be packaged in separate, boxes with lugs and marked as "Special Tools for (tag / item number)." Each tool shall be stamped or tagged to indicate its intended usage. Levers and eye bolts for the removal of parts to be serviced shall be submitted with special tools.</p>
<b>14.0</b>	<b>PERFORMANCE GUARANTEE</b>
	<p>All performance tests for Slurry pumps shall be carried out in accordance with any latest international codes/standards. Bidder to submit the PG test procedure for approval &amp; Conductance of PG test shall be subjected to the final approval of end customer.</p> <ol style="list-style-type: none"><li>1) Bidder shall furnish Performance guarantee for the design, manufacture, material, safe and trouble-free operation of the Slurry pump and its accessories</li><li>2) Bidder shall guarantee and demonstrate the rated capacity of the pump at the rated head.</li><li>3) Noise level <math>\leq 85</math> dB (A) at 1m horizontal distance from equipment/enclosures and 1.5m above operating floor is to be guaranteed.</li><li>4) Vibration levels measured on the non-rotating parts shall not exceed the zone limit "B" as defined in ISO 10816 at steady conditions and shall not exceed the zone limit "C" as defined in ISO 10816 at transient conditions.</li><li>5) Acceptance tests to be carried out as per the procedure defined by the bidder which shall be submitted for BHEL/ CUSTOMER approval.</li><li>6) In the event that the performance test is unsuccessful, bidder shall take necessary remedial action at his cost and the performance test shall be repeated.</li></ol>
<b>15.0</b>	<b>BID EVALUATION CRITERIA FOR POWER CONSUMPTION:</b>
1.	<b>POWER GUARANTEE</b> Bidder to specify the guaranteed power consumption at motor input terminal per Pump operating at the duty point in the offer.
2.	<b>BID EVALUATION CRITERIA FOR POWER CONSUMPTION:</b> <b>Refer Annexure C</b>
<b>16.0</b>	<b>LIQUIDATED DAMAGES FOR POWER CONSUMPTION</b>
	<b>Refer Annexure C</b>



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
<b>17.0</b>	<b>WARRANTY</b>
1.	<p>Warrantee Shall be 24 months from the date of taking over by customer site / Operational acceptance or 36 months from the date of last supply of equipment whichever is earlier.</p> <p>Please note that overall warranty on Goods whether repaired / replaced in total shall not exceed 24 months from the date of such repair / replacement or 36 months from the date of last supply of equipment whichever is earlier. However, the warranty. Period shall not be extended beyond 24 months from the date when the Goods are first placed in commercial operation / Operational acceptance or 36 months from the date of last supply of main equipment whichever is earlier.</p> <p>Warrantee Shall be 24 months from the date of taking over by customer site / Operational acceptance or 36 months from the date of last supply of equipment whichever is earlier.</p> <p>Please note that overall warranty on Goods whether repaired / replaced in total shall not exceed 24 months from the date of such repair / replacement or 36 months from the date of last supply of equipment( including mandatory spares) whichever is earlier</p>
2.	<p>In case of failure of the equipment to meet the guarantee, CUSTOMER/BHEL reserves the right to reject the equipment. However, CUSTOMER/BHEL reserves the right to use the equipment until new equipment supplied by bidder meets the guaranteed requirement.</p>
<b>18.0</b>	<b>FIRST FILL OF CONSUMABLES:</b>
1.	<p>Bidder's scope shall also include supply and filling of all chemicals, reagents, resins, lubricants, grease, filters and consumable items for operation up to commissioning including top up requirements. All lubricants proposed for the plant operation shall be suitable for all operating and environmental conditions that will be met on site consistent with good maintenance procedures as instructed in the maintenance manuals.</p>
2.	<p>Detailed specifications for the lubricating oil, grease, gases, servo fluids, control fluids, chemicals including items qualities and quantities required per month of the plant operation for the CUSTOMER/BHEL's approval herein shall be furnished within 2 months of placement of Order. On completion of erection complete list of bearings/equipment giving their location and identification marks shall be furnished to BHEL along with lubrication requirements. All types of chemicals, consumables, lubricants and grease shall be readily obtainable locally and the number of different types shall be kept to a minimum. For each type and grade of lubricant recommended, bidder shall list at least three equivalent lubricants manufactured by alternative companies.</p>
<b>19.0</b>	<b>TRAINING</b>
	<p>Successful bidder shall provide comprehensive training for CUSTOMER/BHEL Engineering, O&amp;M, Erection &amp; Commissioning staffs at site covering all aspects of the Slurry pumps - Operation &amp; Maintenance, Troubleshooting etc. (for minimum 2 days).</p>
<b>20.0</b>	<b>CONFLICT</b>
	<p>Bidder's equipment shall be designed for and shall meet the service, performance and minimum level of quality requirements specified. Bidder shall be solely responsible for advising CUSTOMER in writing of any conflicts between the specifications and Bidder's design, including performance and levels of quality. Bidder agrees that its obligations, liabilities and warranties shall not be diminished or extinguished due to its meeting the requirements of the Specification.</p>





## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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S. No.	Description
21.0	<b>DOCUMENTATION</b>
A	<b>DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER</b>
	<p>The Bidder shall submit all documents, drawings, diagrams and all such information, which are necessary to fully understand the offer for techno – commercial evaluation.</p> <p>The documents mentioned as <b>to be submitted along with the offer</b> are required for proper evaluation purpose and vendors are requested to comply with above in all respect.</p>
B	<b>DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT</b>
	<p>The Successful bidder shall submit all documents, mentioned <b>as to be submitted after award of contract</b>, for review, approval.</p> <p>Drawings that are reviewed by the CUSTOMER/ BHEL will be returned to bidder with a transmittal letter with any comments and / or questions marked on the drawings or noted in the letter. All comments and questions must be resolved before a resubmission of drawings / documents. If the design has not developed enough to resolve some of the comments or questions, bidder shall place a “hold” on those items or areas of design. CUSTOMER/ BHEL reserves the right to return drawings unprocessed to bidder if there exists any evidence that bidder has not acknowledged all comments and questions.</p> <p>All necessary GA drawings, sections, sub-assembly drawings, specifications of main and sub components and necessary set of operation &amp; maintenance manual as asked by CUSTOMER must be furnished by bidder in soft and hard copy forms. For all documents softcopy format shall be searchable pdf, however in addition all drawings, diagrams like P&amp;IDs shall be supplied in ACAD or other editable format and all lists in Excel format. Further break up of technical documents will be discussed during finalization of the purchase contract.</p> <p>Unless agreed otherwise, ten (10) hard copies and five (05) sets of electronic copies of all documents are to be submitted in the English language. Electronic Copies shall be submitted in primary original data format (e.g. DOC, XLS, DWG) as well as in a printable non-proprietary document format (e.g. PDF). Especially P&amp;IDs shall be submitted as DWG files and PDF files. Bidder to ensure submission of hard copies as per CUSTOMER requirement for all engineering drg/doc and for all subsequent revisions along with a soft copy through email to concerned project team. However all the engineering related information shall be furnished in soft form to BHEL.</p>

### I. DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER:

Sl. No.	Description	Require For Part	Purpose
1.	<b>Annexure to qualification requirements : Attachment -3K</b>	I	Qualification Requirement (QR)
2.	Reference plant details of similar or higher capacity Slurry Pumps supplied ( <b>ANNEXURE-I</b> )	I	QR
3.	Seal & Sign of bidder on all pages of specification	I	Technical Evaluation of Bid (TEB)
4.	Deviation List (if any)	I	TEB
5.	Slurry Pump & Motor Sizing Calculation	I	TEB
6.	GA drawing all offered pumps with foundation details	I	TEB
7.	Filled Data Sheets of Slurry Pumps & All accessories	I	TEB





## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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8.	Performance curves i. Flow v/s Head ii. Flow v/s NPSH iii. Flow v/s Efficiency iv. Flow v/s Power Consumption v. Torque v/s Speed curve for motor selection	I	TEB
9.	Required Electric power & other Utility List	I	TEB
10.	Make of all bought out items & sub vendor list	I	TEB
11.	Quality Plan	I	TEB
12.	List of Start-up & Commissioning Spares	I	TEB
13.	List of Special Tools	I	TEB
14.	Delivery Schedule	I	TEB
15.	Catalogue	I	TEB

### II. DOCUMENTS TO BE SUBMITTED AFTER CONTRACT:

Sl. No.	Description	Handing over of Documents after Contract (in weeks)	Purpose
1.	Utility Consumption & Lubricating Oil List	2	Customer Approval
2.	Foundation Drawing, Foundation Bolts, static & dynamic details	2	Customer Approval
3.	GA drawing including cross sectional view of Slurry Pumps & Accessories with bill of material (in PDF & AutoCAD format)	2	Customer Approval
4.	GA drawings for Pumps in series arrangement with interconnecting piping & expansion joints drawings	2	Customer Approval
5.	P&ID drawing of Slurry Pumps & Lube Oil System in PDF & AUTOCAD format	3	Customer Approval
6.	GA drawings of mechanical seal and coupling for offered slurry pumps	3	Customer Approval
7.	Filled Data Sheets of Slurry Pumps & All accessories	3	Customer Approval
8.	Quality Plan with Inspection & Performance Test Procedure at site	3	Customer Approval
9.	Pump & Motor Sizing Calculation	4	Customer Approval
10.	Performance curves i. Flow v/s Total Pressure ii. Flow v/s Efficiency iii. Flow v/s Power consumption iv. Torque v/s Speed curve for motor selection	4	Customer Approval
11.	Motor Rating in KW	4	Customer Approval
12.	Sub vendors List	4	Customer Approval
13.	Manufacturing Schedule	4	Customer Approval
14.	Approximate weight of each skid	5	To arrange lifting



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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Sl. No.	Description	Handing over of Documents after Contract (in weeks)	Purpose
15.	List of Special Tools	8	E&C
16.	List of Start-up & Commissioning Spares	9	E&C
17.	Required Electric power	10	E&C
18.	Pre- Commissioning Check List	10	E&C
19.	Installation & assembly procedure	10	E&C
20.	Erection & Commissioning Schedule	10	E&C
21.	Recommended Repair Procedure	10	E&C
22.	Operation and Maintenance Manual (10 hardcopies and 5 electronic copies in English)	10	E&C
23.	Electrical Load List with Single Line Diagram	10	BHEL Review
24.	Control Logic of Slurry Pumps	10	BHEL Review
25.	Catalogue	10	BHEL Review
26.	Proforma Packing List	12	Dispatch

### 22.0 LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED:

**The following type test reports shall be submitted for each type and rating of LT motor of above 50 KW only**

1. Measurement of resistance of windings of stator and wound rotor.
2. No load test at rated voltage to determine input current power and speed
3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors)
4. Full load test to determine efficiency power factor and slip.
5. Temperature rise test.
6. Momentary excess torque test.
7. High voltage test.
8. Test for vibration severity of motor.
9. Test for noise levels of motor:
  - Noise level for all the motors shall be limited to 85dB (A) except for BFP motor for which the maximum limit shall be 90 dB(A). Vibration shall be limited within the limits prescribed in IS/IEC 60034-14. Motors shall withstand vibrations produced by driven equipment. Motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads (If applicable), if not Bidder to ensure & Vibration shall be within the limit prescribed in IS/IEC 60034-14 & HIS Standard. If Vibration limits exceeds Bidder to provide required support to rectify the issue with no cost implication to BHEL.
10. Test for degree of protection
11. Over speed test.



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

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12. Type test reports for motors located in fuel oil area having flame proof

enclosures as per IS 2148 / IEC 60079-1

- All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
- The type test reports once approved for any projects shall be treated as reference. For subsequent projects of CUSTOMER, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design Change”. Minor changes if any shall be highlighted on the endorsement sheet.

### ANNEXURE I : REFERENCE LIST FOR SLURRY PUMPS

Sl. No.	Project Name , Customer & Plant capacity	Coal fired Yes/No	Wet Limestone Based FGD Yes/No	Type of Slurry Pump	Model	Capacity	Head in meter of slurry column	Speed	Year of Commissioning	Qty
						m <sup>3</sup> /hr.	meter	rpm		



## TECHNICAL SPECIFICATION OF SLURRY PUMPS

ROS:9081:00

### ANNEXURE II : LIST OF DEVIATIONS/EXCEPTIONS TO THE ENQUIRY DOCUMENT

Enquiry No : \_\_\_\_\_; Project : \_\_\_\_\_

SI No	Clause No	Page No	Description of Deviation









**QUALIFICATION REQUIREMENT FOR SLURRY PUMPS :  
PROJECT: FGD PACKAGE OF PANKI 1X660 MW**

**OAB:QR-3K:PNK**

Bidder shall be a manufacturer of Slurry Pump. Bidder shall have previous experience of manufacturing and supplying the Slurry Pump of the type, application and minimum equipment rating as stipulated below such that the blower should have been in successful operation in at least one (1) plant for a period not less than one(1) year as on 02<sup>nd</sup> Nov 2015.

Name of Equipment	Type of Equipment	Application	Equipment Rating
Slurry Pumps	Centrifugal type	(a) Wet Limestone based FGD application. or (b) Similar Process/duty application.	Flow 50 M <sup>3</sup> /hr (Minimum) and Head of 30 Meters of Liquid water Column.

Bidder shall offer and supply only the type of the above equipment(s) for which he himself is qualified.

The following documents shall be submitted for the qualification:

- (i) 3K format (as per enclosed) duly filled with Bidder seal and signature.
- (ii) Contract copy of the blower and Technical Extract along with Approved GAD/Datasheet of the blower supplied for the reference plant.
- (iii) Performance Certificate on the letter head of the End user with seal and sign of the competent authority. Performance Certificate shall contain the contact details of the End User.
- (iv) Reference list for oxidation blowers shall be submitted.

If the documents mentioned at (ii), (iii) are not in English, then the documents have to be translated to English by a certified translator. The credentials of the translator shall also be submitted along with the qualification requirement.

Bidder's offer is liable for rejection if there is any shortage in document as mentioned above.



3K FORMAT FOR OXIDATION BLOWERS		
We declare that, we, have manufactured and supplied at least one (1) number of Slurry Pump with <b>Flow 50 M<sup>3</sup>/hr (Minimum) and Head of 30 Meter of water Column (minimum)</b> of Centrifugal type and working in Wet Limestone based FGD application or any similar Process application and which has been in successful operation for minimum one (1) year reckoned as on 2nd Nov 2015.		
Sl. No.	Description	Reference Work
1	Name of the reference plant & location:	
2	Client name and his address:	
3	No. of units and capacity in MW of unit:	
4	Whether power plant is coal fired	-*Yes/*No
5	Whether operating in a Wet Limestone based FGD application.	-*Yes/*No
6	Name of equipment manufacturer & address:	
7	Date of commission of the equipments:	
8	Model no. of the equipment:	
9	Brief Technical particulars of the equipments:	
10	Flow in M <sup>3</sup> /hr	
11	Head in Meter of water column	
12	Whether the equipment(s) are in successful operation in at least one (01) plant for a period not less than one(01) year reckoned as on 02nd Nov 2015	*Yes/*No
13	Flue gas Desulphurization system details:	*Technical extract/ *paper letter/ *email/
		*Drawing from user or *contract document or *scheme or *any document in public domain enclosed at annexure....
14	Scope of Work:	*Letter of Award or *Contract or *P.O. enclosed at Annexure.....
15	Performance details:	*Certificate/*Letter/*E-mail from End user enclosed at Annexure.....

\* Strike off whichever is not applicable

Bidder sign:

Bidder seal with Name and Date:

Designation:

## **POWER LOADING & LIQUIDATED DAMAGES FOR PANKI (1 X 660 MW)**

### **ANNEXURE: R4U2:C**

#### **BID EVALUATION CRITERIA FOR POWER CONSUMPTION**

Power loading shall be applicable for slurry pumps designated as “continuous duty condition” in enclosed pump datasheet.

In case, Guaranteed Shaft power offered by the bidder exceeds the base value specified, his bid price will be loaded for excess power consumption as per the formula given below.

Adjustment factor for excess power consumption in INR =  $(GPC-BV) \times PL \times \text{No's of Working pumps}$

GPC- Guaranteed Power Consumption quoted by bidder in KW

BV- Base Value. (Auxiliary Power Consumption at motor Input, refer **Annexure-A Sln-26**)

PL- Power Loading

#### **LIQUIDATED DAMAGES FOR POWER CONSUMPTION**

1. If actual Power Consumption at motor input terminal during prove out (or) PG Test operating at the duty point exceeds the value guaranteed by the bidder, liquidated damages for shortfall in performance shall be deducted from contract price as per the formula given below

Liquidated damage deductible in INR =  $(APC-GPC) \times P \times \text{No's of Working pumps}$

Where

- GPC- Guaranteed Power Consumption quoted by bidder in KW
- APC- Actual Power Consumption in KW
- P- Penalty

#### **Note:**

1. LD will be levied after conducting performance test as above subjected to the maximum 25% of the main equipment value. LD will be adjusted from the pending bills payable to the bidder.

2. For conducting PG test at project site for demonstrating the guaranteed parameters of pump, vendor has to make own arrangement for TA/DA and hotel charges, which is to be considered while submitting the offer.

---

SL NO	DESCRIPTION	POWER LOADING (PL)	LIQUIDATED DAMAGES (LD)
	PROJECT		
1	PANKI (1 X 660MW)	INR 5,84,000 (INR Five Hundred eighty-four thousand only) or Equivalent foreign currency for per 1KW increase in Auxiliary Power Consumption.	INR 5,84,000 (INR Five Hundred eighty-four thousand only) or Equivalent foreign currency for per 1KW increase in Auxiliary Power Consumption.

Note: In case, guaranteed power input at motor terminal offered by the bidder exceeds the base value specified in the data sheet, his bid price will be loaded for excess power consumption.

For lower values no loading will be considered.

Note:. Acceptable shortfall Limit with LD (+1%) of the guaranteed auxiliary power consumption.

MANDATORY SPARES FOR SLURRY PUMPS TO BE SUBMITTED ALONG WITH TECHNICAL OFFER.																		Annexure : R4U2-D			
(SLURRY PUMPS FOR PANKI (1 X 660MW) : R4U2)										Mandatory Spares											
										Note (applicable for all the following FGD projects) : Bidder to clearly mention the model number for each of the spares. Bidder to optimize the number of mandatory spares for the below project. If the model number of two or more mandatory spares is same only ONE SET should be considered for the same ( unless otherwise specified by bidder to be considered). ONE SET should contain the required number of spares as mentioned below. For pricing also same methodology should be opted. Bidder to clearly mention C: Considered , R: Repetitive or NA : Not Applicable in the respective columns for each mandatory spare.											
										(1) Impeller Assembly - 1 nos. of each type & size.		(2) Seals - 1no of each type & size		(3) Bearings -1nos. of each type & size.		(4) Motor-1no. of each type & size		(5) Motor-Pump Coupling/ Belt Pulley Arrangement if applicable) : 1 No. of each type & size.		6) Casing Liners (If replaceable liners applicable)-1sets	
Main Supply						Supervision				Model		C :Considered R : Repetitive NA : Not Applicable		Model		C :Considered R : Repetitive NA : Not Applicable		Model		C :Considered R : Repetitive NA : Not Applicable	
Sl. No.	Description	Head of each pump (in meter of slurry column)	Capacity of each pump (in m3/hr)	Total Number of pump	Model Selected (to be filled by vendor)	Bidder to furnish : QUOTED/NOT QUOTED	Total Visits	Total Supervision Charges	Model	C :Considered R : Repetitive NA : Not Applicable	Model	C :Considered R : Repetitive NA : Not Applicable	Model	C :Considered R : Repetitive NA : Not Applicable	Model	C :Considered R : Repetitive NA : Not Applicable	Model	C :Considered R : Repetitive NA : Not Applicable	Model	C :Considered R : Repetitive NA : Not Applicable	
1	LIMESTONE SLURRY FEED PUMP	35	47	(1W + 1 S)			Bidder to consider 6 visits each of 5 Working Days.														
2	GYP SUM BLEED PUMP	60	98	(1W + 1 S)																	
3	FILTRATE WATER TANK PUMP	25	81	(1W + 1 S)																	
4	SECONDARY HYDROCYCLONE FEED TANK PUMP	45	57	(1W + 1 S)																	
5	WASTE WATER TANK PUMP	35	26	(1W + 1 S)																	
6	AUXILIARY ABSORBENT TANK PUMP	25	175	(1W + 1 S)																	
7	ABSORBER AREA DRAIN SUMP PUMP	30	160	(1W )																	
8	GYP SUM AREA DRAIN SUMP PUMP	25	50	(1W )																	
9	LIMESTONE AREA DRAIN SUMP PUMP	25	50	(1W )																	

Note : Frame Plate Liner, Cover Plate Liner, Volute Liner , Back Plate Liner & throat bush (As Applicable) to be considered as replaceable Casing Liners

## ANNEXURE: R4U2: E

### Painting Specification for Slurry Pump:




<b>Surface Preparation :</b> Blast Cleaning to SA 2 ½ (Near white metal) with surface profile 35 – 50µm.					
<b>Coating Procedure :</b>					
Sl No.	Coat	Paint	No. of Coats / DFT	DFT(µm min.)	Total DFT µm (min)
1.	Primer coat	Two Coat of Epoxy resin based Epoxy Zinc phosphate primer to IS 13238.	1 Coat/DFT= 35µm per coat	70	140 Microns
2.	Finish coat	Two coat of Epoxy based polyamide cured finish paint IS 14209.	1 Coat/DFT= 35µm per coat	70	
<b>Shade:</b> Light grey. <b>Shade no :</b> 631 of IS:5					

### GENERAL NOTES

- 1). No painting is required for Galvanized, non-ferrous & stainless steel items, except as indicated above.
- 2). Machined items are to be applied with coat of temporary rust preventive oil.
- 3). All steel structures shall be provided with painting as given in the specification.
- 4). Finish coat to be applied after an interval of min 10 hrs. And within 6 months (after completion of intermediate coat).
- 5). Primer coat on steel shall be applied in shop immediately after blast cleaning by airless spray technique.

PRODUCT STANDARD  
ELECTRICAL, CONTROLS & INSTRUMENTATION  
BAP / BHEL / RANIPET – 632 406

TECI: LT MOTOR: REV 05  
PAGE 1 OF 10  
EFFECTIVE DATE : 28.07.2021

DOCUMENT TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS																
ITEM : LT MOTOR																
PROJECT : BHEL STANDARD																
	NAME	DESIGNATION	SIGNATURE	DATE												
PREPARED BY	ALAN S G	ENGINEER		28/7/2021												
REVIEWED BY	CHANDRASEKAR A P	DM		28-07-2021												
APPROVED BY	JEYAMURUGANAND M	AGM		28/07/2021												
ISSUED BY EDC – ECI																
<p>RECORD OF REVISIONS:</p> <table> <tr> <td>REVISION NUMBER 00</td> <td>INITIAL RELEASE - Dt. 19.03.2013</td> </tr> <tr> <td>REVISION NUMBER 01</td> <td></td> </tr> <tr> <td>REVISION NUMBER 02</td> <td>Cl. No: 5- Packing and Drawing included</td> </tr> <tr> <td>REVISION NUMBER 03</td> <td>Cl. No: 2.20, 2.21, 2.38, 2.39, 2.43 added</td> </tr> <tr> <td>REVISION NUMBER 04</td> <td>Cl.No: 2.3, 4(b) - ECI:DATASHEET:LTMOTOR:00 added</td> </tr> <tr> <td>REVISION NUMBER 05</td> <td>Cl.No: 2.36, 2.40, 4(b), 5(a) Updated</td> </tr> </table>					REVISION NUMBER 00	INITIAL RELEASE - Dt. 19.03.2013	REVISION NUMBER 01		REVISION NUMBER 02	Cl. No: 5- Packing and Drawing included	REVISION NUMBER 03	Cl. No: 2.20, 2.21, 2.38, 2.39, 2.43 added	REVISION NUMBER 04	Cl.No: 2.3, 4(b) - ECI:DATASHEET:LTMOTOR:00 added	REVISION NUMBER 05	Cl.No: 2.36, 2.40, 4(b), 5(a) Updated
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REVISION NUMBER 04	Cl.No: 2.3, 4(b) - ECI:DATASHEET:LTMOTOR:00 added															
REVISION NUMBER 05	Cl.No: 2.36, 2.40, 4(b), 5(a) Updated															

**SPECIFICATION**

**VENDOR  
COMPLIANCE/  
REMARKS**

**1 SITE CONDITIONS**

1.1	Altitude above mean sea level	>1000 m.	
1.2	Ambient temperature condition	6 to 50°C.	
1.3	Relative humidity	100%	
1.4	Atmosphere	Tropical, Dusty, salty, corrosive & highly polluted as in a coal based Thermal power plant.	

**2 GENERAL**

2.1	Reference standards	IS 15999, IS 12615, IS/IEC-60034, IS 1231, IS 6362, IS 2253, IS 12065, IS 12075	
2.2	Design ambient	50 Deg.C	
2.3	Application/ Type( Normal/ Energy efficient)	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.4	Duty cycle	Continuous S1	
2.5	Rated voltage, frequency & Phases	415 V AC $\pm 10\%$ ; 50 Hz (+5% to -5%); 3 phase	
2.6	Combined variation of Voltage and frequency	10% absolute sum	
2.7	Motors efficiency class	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.8	Minimum starting voltage	80% of the rated voltage	
2.9	Minimum voltage under which motor will run satisfactorily	75% of the rated voltage for 5 minutes	
2.10.	Capacity to restart (at specified voltage)	i. Two successive starts from cold condition ii. Two HOT restarts starts from Hot condition iii. Three equally spread start per hour	
2.11	High speed bus transfer withstand capability	Suitable to withstand 150 % of rated voltage	
2.12	Type of balancing for rotor	Dynamic balancing	
2.13	Direction of rotation	Suitable for both direction	
2.14	Direction of cooling air	Non-drive end to driving end	
2.15	Class of insulation	Class F with temperature rise limited to Class B.	
2.16	Winding treatment	The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot, humid & tropical climate.	
2.17	Allowed winding temperature rise at continuous full load	60°C by thermometer method & 70°C by resistance method	
2.18	Accelerating Torque at minimum permissible Starting voltage	10% of full Load Torque	



2.19	<b>Pullout Torque at rated voltage</b>	205% of full load torque	
2.20	<b>Ratio of Locked rotor KVA to KW for</b>	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.21	<b>Starting current</b>	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.22	<b>Starting time &amp; locked rotor withstand time</b>	The locked rotor withstand time ( LRWT) at 110% rated voltage (RV) under HOT condition shall be at least 2.5 sec more than the starting time at 80% of rated voltage for motors with acceleration time upto 20 sec at RV and 5 sec where the accelerating time is more than 20 sec at RV.	
2.23	<b>Momentary overload withstand capability</b>	60% of full load torque for 15 second without any damage.	
2.24	<b>Over speed withstand</b>	120% of rated speed for 2 minutes without any mechanical damage.	
2.25	<b>Hot thermal withstand curve</b>	margin of at least 10% over the full load current	
2.26	<b>Cooling</b>	Totally enclosed fan cooled- IC 411(TEFC)	
2.27	<b>Vibration</b>	The peak amplitude of vibration shall be as per IS 12075	
2.28	<b>Noise level</b>	Within the limits specified by IS 12065 / <85 dB at 1 meter distance from motor.	
2.29	<b>Type of enclosure</b>	TEFC, IP 55 as per IS/IEC 60034-5	
2.30	<b>Type of mounting</b>	Horizontal foot mounted.	
2.31	<b>Bearings</b>	Ball or roller type / bearings effectively sealed against ingress of dust. The bearing shall be so constructed that the loss of lubricating grease is kept to minimum. Sealed bearings are also acceptable	
2.32	<b>Lubricant Type</b>	Grease	
2.33	<b>Bearing life</b>	minimum life of 40000 Working hours	
2.34	<b>Shaft extension</b>	Key slotted bare shaft extension with key at the driving end.	
2.35	<b>Terminal box Type</b>	Weather proof IP 55 as per IS/IEC 60034-5; Capable of being turned through 360° in steps of 90°.	
2.36	<b>Cable gland and lugs</b>	Double compression type nickel plated brass cable glands and annealed tinned copper crimping lugs to suit the cable size i) Size of power cables will be intimated after PO. ii) For space heater cable glands and lugs suitable for 2CX2.5 to be provided	



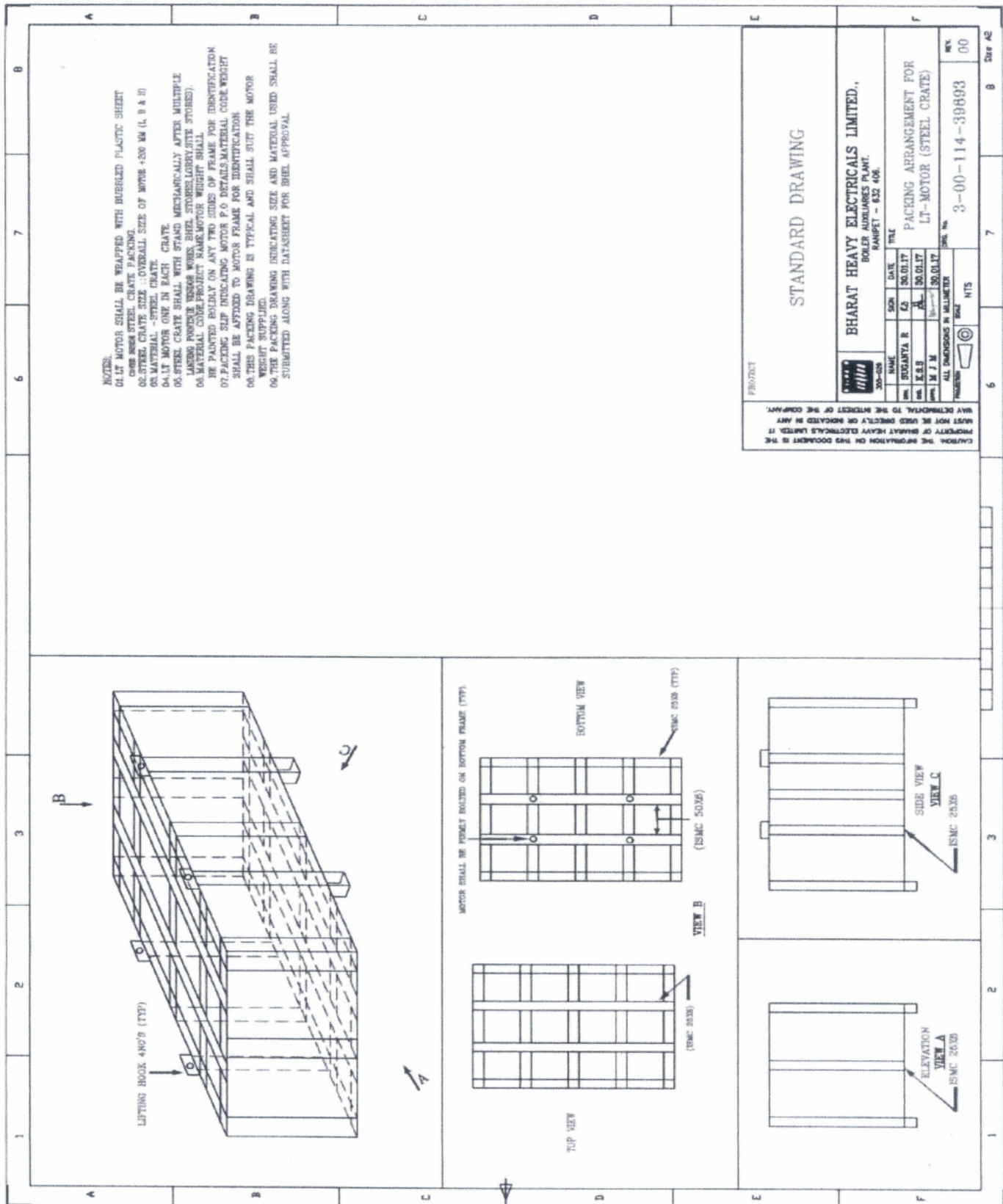
2.37	Type of terminals	Stud / screw type with plain washers, spring washers / checknuts & lugs	
2.38	Min.Spacing between Gland plate and Center stud(in mm)	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.39	Phase to Phase/Phase to Earth air clearance(in mm) in Terminal Box	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.40.	Fault level	40KA for 0.25Sec	
2.41	Painting	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.42	Space heaters:		
2.42.a	i) Motors above 30 kW	Separate space heater suitable for 240V, Single Phase, AC,50 Hz	
2.42.b	ii) Motors below 30 kW	Winding shall be suitable for heating at 24 V, Single phase, AC,50 Hz	
2.43	Terminals for space heater	As per the document LT MOTOR:PROJECT SPECIFIC DETAILS	
2.44	RTD for winding	Two numbers of Thermistors / RTD for each phase as below are to be provided A. Motors above 37 Kw shall have thermistors Or RTD if specifically called for in enquiry. B. Motor rated 160kW and above shall have RTDs	
2.45	Bearing RTD	For motors 132 Kw and above	
2.46	Terminals for RTD/ Thermistor	Thermistors/ RTDs shall be terminated in an auxiliary terminal box. Details shall be furnished in TB diagram.	
2.47	Earthing	Two no of earthing provisions on terminal box and on motor body(on opposite sides)	
2.48	Name plate	As per IS/IEC 60034-8 and Additional data on name plate : a. Bearing DE/ NDE details. b. Year of manufacture	
2.49	Lifting Device	Eye bolt or lugs to facilitate safe lifting	
3	<b>INSPECTION &amp; TESTING</b>	As per applicable quality plan	

4 **DOCUMENTS**

a) Along with offer:	One set of technical data sheet as per the enclosed format and Motor general arrangement drawing giving foundation details, shaft details.	
b) After placement of Purchase order ( within 15 days)	<p>Three sets of the following for approval:</p> <ol style="list-style-type: none"> <li>1. Technical Data sheet as per the enclosed format ECI:DATASHEET:LTMOTOR:00</li> <li>2. Motor general arrangement drawing giving foundation details, shaft details and weight</li> <li>3. Motor Terminal box arrangement drawing</li> <li>4. Motor characteristic curves : Torque vs Speed with load curve superimposed Speed vs Current Time vs Current Thermal with stand curve Load vs Efficiency Load vs Slip Load vs Power factor Speed vs Time Load vs Current</li> <li>5. Suggested steel crate packing drawing (Drawing No:- 3-00-114-39893) or vendor standard packing drawing subject to approval.</li> </ol> <p>The following shall be submitted:</p> <ol style="list-style-type: none"> <li>1. Guarantee certificate.</li> <li>2. O &amp; M manuals.</li> <li>3. Acceleration time and LRWT calculation shall be submitted for review.</li> </ol>	

5 **PACKING**

	<ol style="list-style-type: none"> <li>a) As per suggested Drawing No:- 3-00-114-39893</li> <li>b) The packing shall meet the Transport, Environment &amp; Storage hazards.</li> <li>c) As per Packing Procedure QA:CI: STD:PR:03 or as per Manufacturer's Standard Practice subject to approval.</li> </ol>	
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ECI: DATASHEET: LTMOTOR: 00

TECHNICAL DATA SHEET OF LT MOTOR

P.O No:

DATA SHEET - Customer No:

Project:

CL.NO	CHARACTERISTICS	VENDOR DATA(To be filled by Vendor)
1.0	Application	
1.1	Fan / Load Curve referred	
2.0	Manufacturer	
3.0	Type & frame size	Normal/ Energy efficient      Frame size:
3.1	Degree of Protection	IP55
4.0	Rated output in kW	
4.1	Rated speed	
5.0	Rated voltage , frequency & phases	415 V $\pm$ 10% AC; 50 Hz $\pm$ 5%; ( Check voltage as per Enquiry) 10% absolute sum; 3 phase
6.0	Full load current	Amps
7.0	Energy efficient	As per IS 12615
8.0	Efficiency & power factor at Full load	Eff-                      Pf-
9.0	Efficiency & power factor at 75 % load	Eff-                      Pf-
10.0	Efficiency & power factor at 50 % load	Eff-                      Pf-
11.0	Duty Cycle	S1 - Continuous
12.0	Rated torque	
13.0	Starting current	As per IS standards
14.0	No load current (with mechanism coupled)	(at Rated.V and Frequency)
15.0	Starting torque in % of full load torque	
16.0	Pull up torque in % of full load torque	
17.0	Pull out torque in % of full load torque	

18.0	No load starting time ( without mechanism coupled)	
19.0	Locked rotor withstand time at rated voltage	a.Hot b.Cold
20.0	Locked rotor withstand time at minimum starting voltage	a.Hot b.Cold
21.0	Locked rotor withstand time at 110% rated voltage	a.Hot b.Cold
22.0	Starting time at minimum starting voltage with mechanism coupled	
23.0	Starting time at rated voltage with mechanism coupled	
24.0	Maximum permissible starting time	
25.0	Stator thermal time constant	Minutes
26.0	Type & No of terminals brought out	
27.0	Stator winding connection	Delta / Star
28.0	Class of insulation & temperature rise	Class F; 60 <sup>0</sup> C by thermometer method / 70 <sup>0</sup> C by resistance method.
29.0	Minimum permissible starting voltage	Volts
30.0	Resistance per phase at 20Deg C ( Indicative )	Ohms
31.0	No of successive starts in Hot condition	
32.0	Quantity and power consumption of space heater	Quantity:                  Watts:
33.0	Direction of rotation	Bi-Directional.
34.0	Bearing make & type	Make: Drive End: Non Drive End:
35.0	Lubricant quantity grade & recommended interval of lubrication	

36.0	Type of mounting & shaft orientation	Foot mounting; Horizontal.
	<u>Terminal Box</u>	
37.0	Location & angle of rotation	
38.0	Gland size for stator winding	
39.0	Gland size for space heater	Suitable for 2CX2.5 sq.mm (armoured), if applicable.
40.0	Cable entry	
41.0	GD <sup>2</sup> of motor (kg-m <sup>2</sup> )	
42.0	Total weight of motor ( kg).	
43.0	Weight of stator ( kg )	
44.0	Weight of rotor ( kg )	
45.0	Anticipated bearing life in Hours	
46.0	Method of connection to driven equipment	
47.0	Limiting rotor temperature for determining safe stall time	
48.0	RTD for winding/ Bearing	Applicable: YES <input type="checkbox"/> NO <input type="checkbox"/>
49.0	Grade of balance of motor	
50.0	Standard continuous rating at 40 Deg C ambient.	
51.0	Derated rating of motor at 50 Deg C.	
52.0	a. Locked Rotor KVA	
	b. Ratio of Locked rotor KVA / Rated KW	
53.0	a. Motor Dynamic Load	Upward/ Downward—
	b. Motor Static load	Upward / Downward—
54.0	PAINT SHADE	

Vendor's signature and seal

Rev No :

Date :



The following curves are to be enclosed during datasheet approval.

1. GA drawing , Terminal box arrangement
2. Torque Vs Speed with load curve superimposed.
3. Speed Vs Current
4. Time Vs Current
5. Thermal with stand curve
6. Load Vs Efficiency
7. Load Vs Slip
8. Load Vs Power factor
9. Speed Vs Time
10. Load Vs Current.

The following information shall be specifically provided for motors suitable for VFD drive ( if called for in eqny during datasheet approval in addition to datasheet.

1. Stator Resistance
2. Stator leakage reactance
3. Magnetising reactance
4. Rotor resistance referred to stator
5. Rotor reactance referred to stator

Vendor's signature and seal.

Date

## LT MOTOR DATA SHEET FOR PANKI PROJECT

### 19.00.00 MOTORS

#### 1.00.00 H.V. & L.V. MOTORS

##### Sr. No. Description

1.01.00 Manufacturer	
1.02.00. Type and frame size &	
1.03.00 design code no.	
1.04.00. Nos. required	
1.05.00. Application	
1.06.00 Specification & Codes	
1.07.00 Capacity for	
i) for specified climatic conditions (500C)	
ii) At 400C ambient	
1.08.00. Location for installation	
1.09.00. Type of enclosure & ventilation	
1.10.00. Degree of protection	
1.11.00 Type of duty	
1.12.00. No. of phases, frequency & voltage	
1.13.00. Permissible variations in	
a) Voltage	
b) Frequency	
c) Combined	
1.14.00. At rated voltage & frequency	
a) Full load current	
b) Full load speed	
c) No load current	
1.15.00. Minimum permissible voltage during starting	
1.16.00. Maximum permissible time at minimum permissible voltage during running at full load.	
1.17.00. Maximum permissible time at 75% of rated voltage during running at full load.	
1.18.00. Whether motor stalls at 70% of rated voltage.	
1.19.00 Efficiency & power factor Load (% of full load)	
100	
50	



### LT MOTOR DATA SHEET FOR PANKI PROJECT

25	
0	
At start Duty Point	
1.20.00 Stator winding	
i) Connection	
ii) Type & nos. of terminals Brought out	
iii) Resistance between terminals at 20°C	
iv) Resistance per phase at 20°C	
v) Inductance per phase	
vi) Capacitance per phase	
1.21.00. Starting current as % of full load current	
i) With IS tolerance	
ii) Without IS tolerance	
1.22.00 Torque at full load in Kgm.	
1.23.00 Break away torque in % of full load torque	
1.24.0. Pull up torque in % of full load torque	
1.25.00. Pull out torque in % of full load torque	
1.26.00 Starting time in sec. Without mechanism coupled or Mechanism coupled through hydraulic coupling when it may be presumed that load is transferred to motor shaft only after attaining almost full speed.	
i) with rated voltage	
ii) with 80% of rated voltage	
iii) with 110% of rated voltage	
1.27.00 Starting time in sec. With mechanism coupled through Flexible coupling.	
i) with rated voltage	
ii) with 80% of rated voltage	
iii) with 110% of rated voltage	
1.28.00 Safe stall time (hot motor)	
i) At rated voltage	
ii) At 80% of rated voltage	
iii) At 110% of rated voltage	
1.29.00 Safe stall time (Cold motor)	
i) At rated voltage	

LT MOTOR DATA SHEET FOR PANKI PROJECT	
ii) At 80% of rated voltage	
iii) At 110% of rated voltage	
1.30.00 Limiting motor temperature to determine safe stall time	
1.31.00 Permissible maximum accelerating time (hot motor)	
i) At rated voltage	
ii) At 80% of rated voltage	
iii) At 110% of rated voltage	
1.32.00. Permissible maximum accelerating time (cold motor)	
i) At rated voltage	
ii) At 80% of rated voltage	
iii) At 110% of rated voltage	
1.33.00 Insulation	
i) Class of insulation	
ii) Material & treatment of insulation	
1.34.00 Whether insulation is suitable for 415 V, 6.6KV, ungrounded system	
1.35.00 Temperature rise under normal conditions over 50 Deg C ambient temperature	
i) By resistance method	
----- Degree centigrade over cooling water temp. for CACW motors	
----- Degree centigrade over cooling water temp. for CACA motors	
ii) By Thermometer method	
----- Degree centigrade over cooling water temp. for CACW motors	
----- Degree centigrade over cooling water temp. for CACA motors	
1.36.00 Method of starting	
1.37.00. Permissible starting duty cycles	
1.38.00. Stator thermal time constant	
1.39.00 Maximum permissible voltage During high speed bus transfer & special design feature.	
1.40.00 Time required for voltage to decay down to when driving voltage is removed.	
i) At 50% of rated voltage	
ii) At 40% of rated voltage	
iii) At 25% of rated voltage	
iv) At 0% of rated voltage	
1.41.00 Method of cooling	

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1.41.01 Details of water cooling system	
i) No. of cooler	
ii) Water requirement per cooler	
iii) Losses removed by cooler	
iv) Max. permissible temperature Of cooling water at inlet	
v) Max. permissible temperature Of cooling water at outlet	
vi) Maximum permissible pressure At water outlet	
vii) Water pressure drop through The cooler	
viii) Temp. of cold air coming Out & entering the machine For permissible cooling Water temperature of 310C	
ix) Temp. rise of air passing through machine at full load.	
x) Air pressure drop through The cooler	
xi) Temp. rise of water through cooler	
xii) Protection against leakage of water	
xiii) Arrangement to ensure the water flow	
1.42.00 Bearings	
i) Number	
ii) Type	
iii) Lubrication system	
iv) Quantity of lubrican reqd. For both the bearings.	
v) Life in hours at rated	
vi) Recommended lubricant	
vii) Bearing end play	
viii) Inlet oil pressure	
ix) Temp. rise of oil	
x) Max. permissible temp. ofBearing	
xi) Max. permissible temp. of Oil	
xii) Permissible running time without forced oil at full load & full speed	
xiii) Whether bearings are provided with 4 wire, platinum RTD having 100-ohm resistance at 0 Deg C for remote temp. indication.	

### LT MOTOR DATA SHEET FOR PANKI PROJECT

xiv) Whether bearings are provided with local temperature indicator having two adjustable contacts rated for 2A at 240V AC or 0.2A at 220V DC.	
xv) If forced lub oil system provided :	
i) Qty of lubricant required for initial filling.	
ii) Recommended period after which lubricant should be replaced	
iii) Bearing cooling water requirement	
iv) Max. permissible bearing cooling water inlet temp. (permissible)	
v) Max. permissible bearing cooling water outlet temp.	
1.43.00. Terminal designation correspond to direction of rotation (Facing driving end).	
1.44.00 Terminal boxes with accessories separate terminal boxes provided.	
i) Main	
ii) Space heaters	
iii) Winding temp. detectors	
iv) Bearing temp. detectors	
v) Moisture detectors	
vi) Neutral terminals	
1.45.00 Main terminal box details	
i) Type & Nos.	
ii) Fault level permissible for 0.25 sec.	
iii) Location	
iv) Cable gland size & no.	
v) Direction of cable entry.	
1.46.00. Space Heater	
i) Number	
ii) Location	
iii) Capacity of each	
iv) Total power requirement	
v) Voltage.	
1.47.00. Details of 4 wire platinum RTD having 100 ohm resistance at 0 Deg C for winding temp. detector.	

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i) Nos. provided	
ii) Location	
1.48.00 Whether CTs for differential protection are provided	
i) If Yes, no. of CTs supplied alongwith motors.C.T. details	
a) C.T. ratio	
b) Knee point voltage	
ii) S.C. withstand capacity	
1.49.00 Type of mounting	
1.50.00 Shaft orientation	
1.51.00 Shaft extension	
1.52.00 Grounding pads size nos. & location	
1.53.00 Method of coupling to driven mechanism	
1.54.00 Motor GD2	
1.55.00 Lifting device	
1.56.00 Weight	
i) Weight of stator (wound)	
ii) Weight of rotor (wound)	
iii) Weight of base plate	
iv) Weight of cooler	
v) Net weight of motor	
1.57.00 Shipping dimensions & weight	
1.58.00 Thermometer provided	
i) In cold air path	
ii) In hot air path	
iii) For measurement of oil temp.	
1.59.00 Characteristic curves furnished	
i) Speed vs. current at rated voltage	
ii) Speed vs. torque at 110%, 100%, 90% and 80% of rated voltage	
iii) Thermal withstand curve for hot & cold conditions.	
iv) Efficiency vs. load: Yes / No	
v) P.F. Vs. load: Yes / No	
vi) Current vs. time: Yes / No	

LT MOTOR DATA SHEET FOR PANKI PROJECT	
vii) Negative phase sequence curve: Yes / No	
1.60.00 Drawings furnished	
i) General arrangement of motor	
ii) Main terminal box showing the method of terminating the incoming cable	
iii) Instruction manuals	
1.61.00 Rotor design as per specification clause 5.04.00	
<b>Note : Data Sheet to be filled by the Bidder</b>	

**ANNEXURE-R4U2: G  
SCHEDULE OF GUARANTEES**

SL NO	DESCRIPTION	LIMESTONE SLURRY FEED PUMP	GYPSUM BLEED PUMP	FILTRATE WATER TANK PUMP	SECONDARY HYDRO CYCLONE FEED TANK PUMP	WASTE WATER TANK PUMP	AUXILIARY ABSORBENT TANK PUMP	ABSORBER AREA DRAIN SUMP PUMP	GYPSUM AREA DRAIN SUMP PUMP	LIMESTONE AREA DRAIN SUMP PUMP
1	Rated Capacity of the Pump. (m3/hr)									
2	Total Head at design capacity. (m)									
3	Guaranteed power consumption at Motor input Terminal at rated Head & capacity. (kw)									
4	Noise level at a distance of 1.0 meter from the equipment at site and 1.5m above operating floor. dB(A)									
5	Maximum vibration (peak to peak amplitude at site). (Microns)									
6	Equipment Availability. ( % )									
7	Pump Efficiency (%)									
8	Life of the Pump wear parts including Casing liners bearing etc. (Hours)									

**Note:** Bidder to provide the details for the applicable pumps.

Signature of the Bidder.....

Name.....

**VOLUME IIB**


**TECHNICAL SPECIFICATION  
FOR  
SEAWORTHY PACKING FOR EXPORT JOBS**

**SPECIFICATION NO. PE-TS-888-100-A001**



**BHARAT HEAVY ELECTRICALS LIMITED  
POWER SECTOR  
PROJECT ENGINEERING MANAGEMENT  
NEW DELHI, INDIA**



	<b>TITLE</b>  <b>TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING FOR EXPORT JOBS</b>	SPECIFICATION NO. <b>PE-TS-888-100-A001</b>	
		VOLUME II B	
		SECTION D	
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## 1.0 Purpose

The purpose of this specification is to describe minimum packing requirements for the different items/equipment for all export Project and also to define marking and shipping requirements during transportation by ship, road and air for all export jobs.

## 2.0 SCOPE

For export jobs, sea worthy packing capable of performing all necessary functions like prevention of damage to the contents, sufficient to support frequent handling and lengthy period of outdoor storage in adverse weather conditions are required. Workmanship and materials used shall be of high standard meeting the technical requirements and in accordance with best commercial export packing practices. Vendor shall be responsible for sea worthy export packing, however it shall meet the minimum requirements specified herein. Equivalent or better packing methods may be deployed subject to approval of the BHEL/Purchaser. Vendor shall submit the packing procedure for its equivalent for purchaser's approval during detailed engineering.

The scope this specification is to define VENDOR's responsibilities in terms of:

- Preservation of the GOODS/items/equipments before packing.
- Packing of the GOODS for road, rail, sea and/or air transportation to desired destination i.e. project site
- Making cases/crates
- Chemical Treatment/Fumigation before packing to prevent fungus, damage due to termite, borer, rats, etc.
- Marking of cases/crates.
- Other Services required.


## 3.0 Application

This specification is applicable to all the goods to be transported to project site and requires to be in transit for longer duration. *However, for "Misc cable erection items", "Fire sealing system" & "Exothermic welding material", the packing requirements shall be as per the procurement specification.*

## 4.0 Definitions

- "BHEL" : Main EPC vendor
- "OWNER" : Customer for a particular export project.
- "VENDOR" : Company(ies)/VENDOR(s) to whom the BHEL has placed Purchase Order for GOODS/ items/system/package.
- "GOODS": means all or part of the articles, material, equipment supplies including technical documentation, as described in the Purchase Order, to be supplied by VENDOR.
- "PACKER": Packaging Company to whom VENDOR intends to sub-contract the packing in case they do not have own packing capability/facilities .
- "FREIGHT FORWARDER" : Means the Company responsible for performing freight forwarding activities.

## 5. General Information

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The following requirements are intended as minimum requirements, and compliance to these requirements in no way absolves or relieves **VENDOR** of any responsibility or obligation outlined in the Purchase Order. In all circumstances, the packing will be designed and constructed in order to support **GOODS** during transportation as well as to prevent the Goods from damage due to impact, extreme climatic conditions, sun and rain. It must be ensured that the delivery of the **GOODS** to the jobsite by sea, road or air, in good condition.

**GOODS** shall be export packed in compliance with the best-established practices for international projects, in accordance with the following instructions. In the event of any conflict between these specified requirement and the established practices, specification requirement shall govern.

Due to climatic conditions and the complex transport operation(s), it is essential that protection and packing is of the highest standard. Packing means to efficiently protect the **GOODS** during the total transport operation; from the moment they leave the factory until they are delivered to the jobsite, including handling operations (loading/unloading) and storage.

When **VENDOR** do not have packing capabilities/facilities of their own and therefore intends to sub-contract, **VENDOR** have to inform **BHEL/Purchaser** of the name and address of proposed **PACKER(s)** for approval.

#### **6.0 Criteria for Selection of Packaging**

Packages are to be made according to categories, described in articles 8.1 to 8.5, depending on the type of materials, their fragility and size.

These categories have been established for the protection of equipment and material during multi-mode transports, i.e.: combination of overland and sea transport; containerization, air transportation.

In a general manner, the **GOODS** have to be packed in such a way that crates, bundles, pallets can be stored into General Purpose containers, wherever possible.

If **VENDOR** has any doubt about the correct method of protection or packing, he should contact **BHEL/Purchaser** in order to mutually agree on the adequate type of packing to be used.

Materials can be classified in following categories

- Hazardous Material
- Non-Hazardous Material
- 


Further to above categorisation, non-hazardous materials can be sub- categorised for selection of packing.

#### **6.1 Hazardous Materials**

Though handling of hazardous material may is not applicable in the scope of this specification. All hazardous material must be packed in adherence to the detailed requirement relating to packing, marking and labelling set out in the most recent report of the Board's Standard Advisory Committee on the Carriage of Dangerous Goods in Ships for sea freight, and the Restricted Articles Regulations, laid down by the International Air Transport Association for airfreight.

#### **6.2 Non-Hazardous GOODS**

The scope of this specification is to provide necessary guidelines for packing for power plant equipment, components, Pipings & Valves, Fittings, other structural items, electrical items, spare parts and erection materials. The procedure is defined in subsequent paragraphs in details in clause no. 8.0.

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## 7.0 Marking Instructions & Despatch details, Storage Code

### 7.1 Marking Instructions & despatch details

Packages and crates will be marked with indelible black paint, resistant to seawater. Marking must be perfectly legible.

The shipping marks, which will be as per fig-13, shall be stencilled on two sides and one end in clear characters at least 5 centimetres high (where crate size permits, otherwise use optimum size for each package dimension).

When the GOODS are to be shipped in containers then marking may be stencilled on one end only. However, packages must be stowed in a manner that shows these marks.

Crates containing fragile articles must be packed with special precaution against risk of breakage and must be stencilled on all sides "FRAGILE - HANDLE WITH CARE". Where crates are not to be overturned, VENDOR must show on the crates, clear and readily visible identification as per fig-12, to ensure they are kept in the correct position.

Packages/equipment of 2,000 kg or more must be marked with slinging points on all sides, in addition to the centre of gravity marks.

Number packages consecutively i.e. 1 of 10, 2 of 10, etc. Do not duplicate package numbers. VENDOR is responsible for any loss or damage caused by incorrect marking.

All cases/crates shall also be marked with the appropriate international standard graphic symbols for handling as shown in Fig 12.

As a minimum, all cases/crates are to be marked clearly on all four sides with:

- "HANDLE WITH CARE"
- "RIGHT SIDE UP"
- "KEEP DRY"

In the case of packages with a single gross weight totalling 2,000 kg and/or a height of more than 1m, the centre of gravity shall be clearly marked with the symbol on two adjoining sides. For all items of equipment with an eccentric centre of gravity this symbol shall be marked at the bottom, side and top of the package.


The slinging and lashing points shall be marked with a chain symbol.

When packing in cases/crates, these packages shall also have metal corners at the slinging points. (Fig-11)

External front and rear sides of the boxes to be planed for writing instructions.

Dispatch details such as consigner/consignee address, contract and case details, country of origin, port of delivery, stacking instructions shall be written on one side of the boxes. An anodized aluminum plate as per details and specifications given in fig-13 shall be provided on one side of the boxes.

One copy of packing slip wrapped in polyethylene bag covered with aluminum packing slip holder to be nailed on the external surface of the box. One more copy of the packing slip wrapped in polyethylene bag is to be kept inside the box at the pertinent place.

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## 7.2 Storage Code

The type of storage required is required to be specified, it will be shown on each packaging in **RED colour**.

- X Crates or packages to be stored outdoor without covers
- XX Crates or packages to be stored under tarpaulin
- XXX Crates or packages to be stored in covered or enclosed premises
- XXXX Crates or packages which must be stored in air-conditioned premises

## 8.0 GUIDELINES FOR PACKING GOODS

**8.1** In the subsequent paragraphs details of different types of packings for different types of GOODS are defined. Vendor shall make packing details/procedure based on the guidelines and submit for approval.

### 8.1.1 Packing for Pipe, Fittings, Flanges and Valves, Structural Steel

Particular attention should be brought to pipe, fittings, flanges, valves and structural steel. Packing categories for piping and fittings will differ according to the diameter and wall thickness of these products. VENDOR shall comply with the following established practice.

#### IMPORTANT NOTE:

***Depending on the project schedule and availability of ocean vessels, the piping and structural steel may be shipped in containers. In this event, VENDOR has to arrange the packages in such a way it allows the stuffing into Open Top in gauge containers.***

### 8.1.2 Pipe

Where practicable, pipe lengths shall be limited to 11.8 meters.

All pipes 2" included and below shall be packed in crates. All pipes to be capped and ends sealed with waterproof tape.

Pipes over 2" up to 6", shall be bundled and banded in bundles of uniform length. Bundling is carried out with U-IRON or traversal planks, joined with threaded connecting rods with locknuts. Quantities and strapping positions depend on the lengths, with a 120 cm spacing to prevent distortion. Bundle weight shall not exceed 2,000 kg. All pipes are to be capped and ends sealed with waterproof tape (tape is not necessary if end caps are of the pre-shrunk or self-sealing type).

Pipes larger than 6" shall be shipped as single lengths with the ends capped. End caps are to be of the recessed type to enable the use of soft faced hooks, but still completely sealing the end and also protecting the weld.


All stainless steel piping must be packed separately in wooden crates. Any banding of bundles is to be with the same material.

### 8.1.3 Pipe Fittings, Flanges and Valves

All pipe fittings, flanges and valves up to 6", are to be packed in cases/crates. For items over 6", these may be fixed securely to a pallet base and enclosed in a crate, for protection. Where valves have actuators attached, rigidity must be ensured for the valve and actuator. The vulnerable parts of the actuator are to be completely protected within a wooden crate.

All stainless steel fittings, flanges and valves of all sizes, must be packed separately in wooden crates. Any strapping is to be with the same material.

### 8.1.4 Structural Steel

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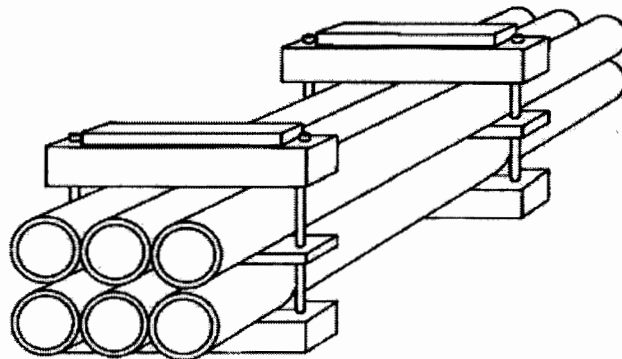
Structural Steel, reinforcing rods, bars, etc., should be packed in bundles of uniform length. Refer to articles 8.1.2, for strapping requirements. Bundle weight not normally to exceed 2,000 kg. Fabricated structures and structural steelwork, etc, should be bundled and packed using wooden beams and long bolting to secure the load.

## 8.2 Bundling – Packing Category I

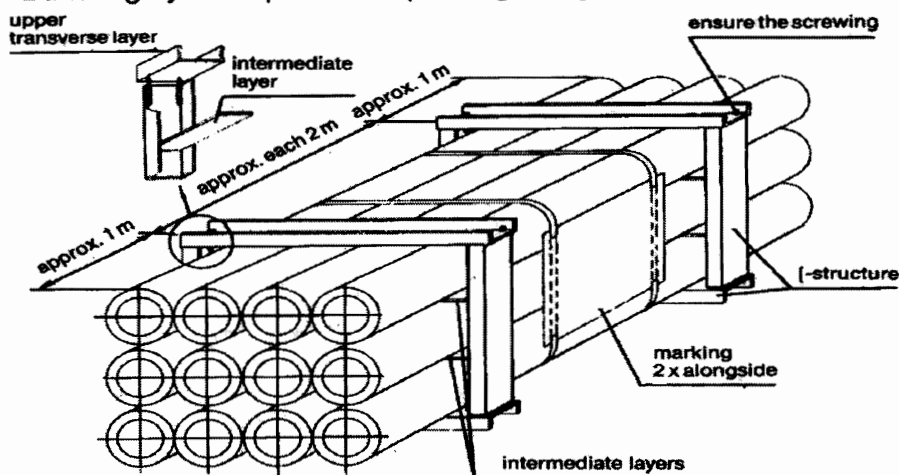
### 8.2.1 Type of Equipment

Equipment which is not subject to damage by corrosion or mechanical effect, i.e. pipes, piping, structural steel.


#### Packing category I



#### Bundling by U-shaped iron – packing category I A



### 8.2.2 Type of Construction

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- Bundling has to be effected
- By squared timber and threaded rods.
- With an intermediate layer (threaded on tightening bolts) according to the weight of the package.
- Wedge-shaped timbers must be added at the outer points of lower layer.
- Between the bolts a spacer must be nailed.
- The bolts must be secured (e.g. by locking nut).
- If single parts could protrude, an appropriate protection must be installed (flat iron or plates).
- Bundling with steel straps or PVC straps is not accepted.

### 8.3 Skids, Square Timber Constructions, Casings – Packing (Category II)

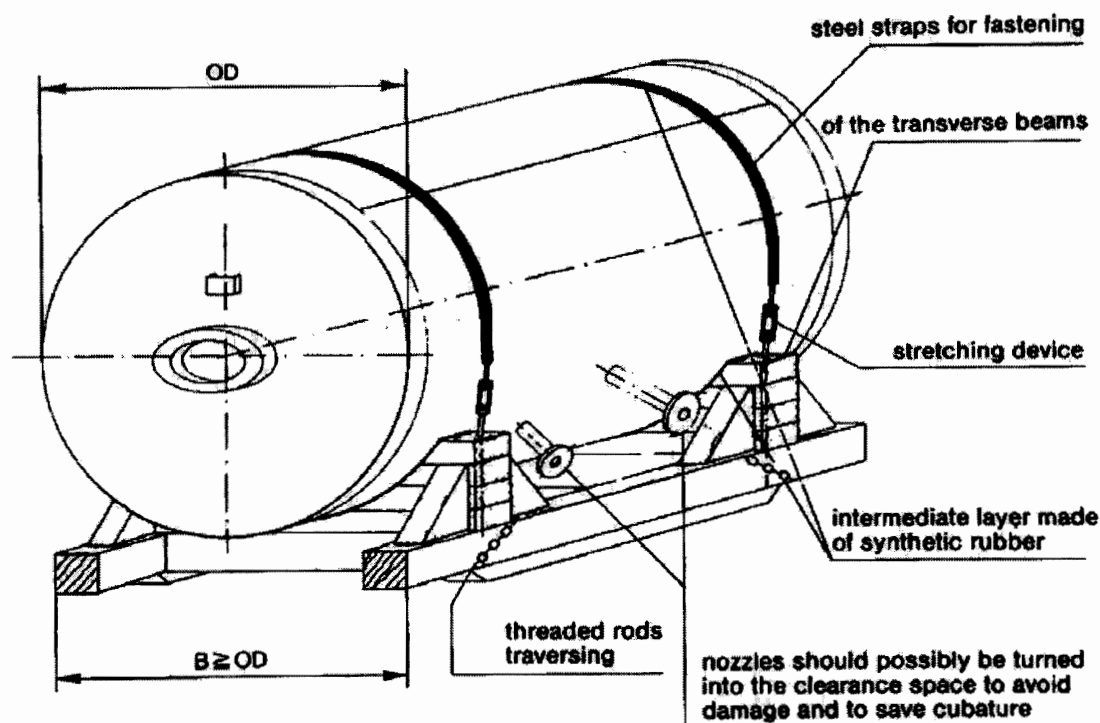
#### 8.3.1 Type of Equipment


Voluminous apparatus, tanks and/or heavy pieces those are not vulnerable to mechanical or corrosive effects.

#### 8.3.2 Type of Construction

- The construction skid can be made of wood or of metal.
- The fastening of the packages on the skid will be made by steel straps (flat iron) which have to be elastically lined, non-slip and securely bolted onto the skids.
- Flange openings have to be closed with gaskets and blind flanges or, if necessary, provided with cover.
- Skid constructions may not be less than the dimensions of the package in length or in width.
- Tanks and apparatus with their own support cradles must be supplied with an anti-slip lining.

### PACKING CATEGORY-II



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#### 8.4 Packing of GOODS in Wooden Crates/Cases/Boxes

*The construction of wooden crate/cases/boxes shall be as per the details indicated in clause 9.0 & Fig 1 to 11. Details indicated in the sketches for different categories Packing crates/boxes are only for a typical equipment considered for illustration.*

##### 8.4.1 Packing Category III

###### 8.4.1.1 Type of Equipment

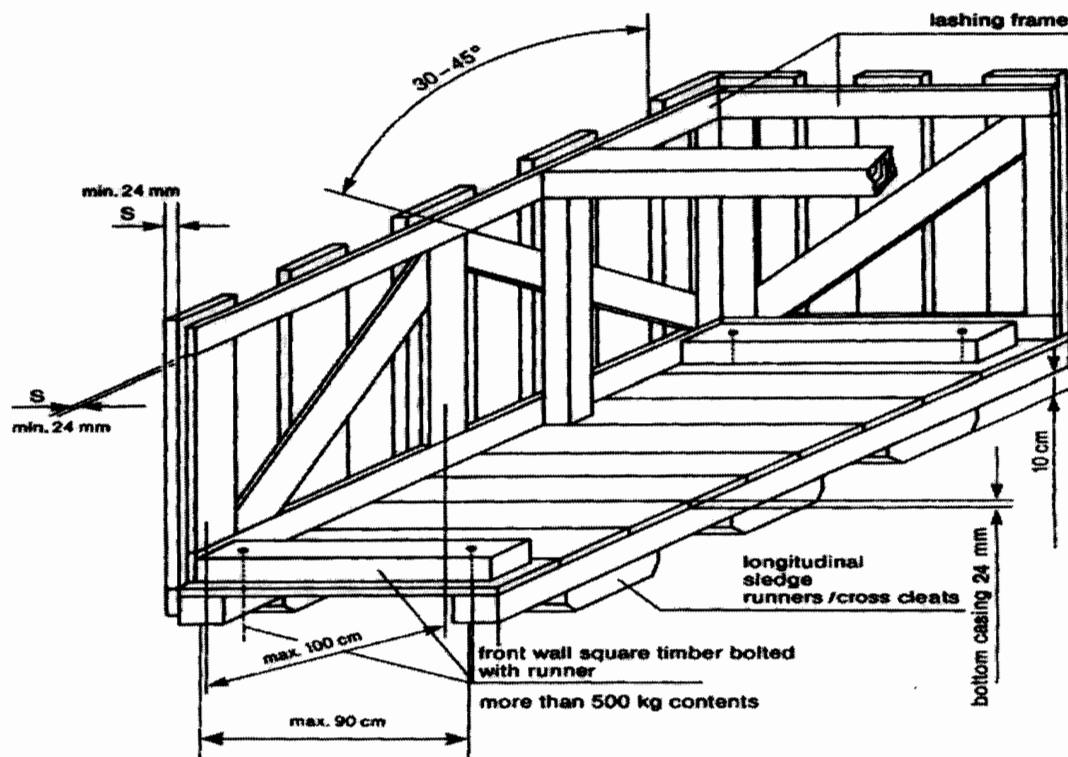
Fabricated equipment, which cannot be transported on cradles; frame-works, prefabricated piping and fittings, mechanical and electrical assemblies. *This type of packing is recommended where many parts of the equipment/component/assembly are not protruding out.*

###### 8.4.1.2 Type of Construction

The equipment must be safely fastened to the bottom with bolts, possibly by the runners or to be spread in such a manner that no protruding parts are possible. For parts, sensitive to rainwater and/or debris, a protection has to be made by a foil cap.

If it is possible that single part could protrude through the front/back side wall, they shall be closed completely. The marking of the package shall be done on plywood plates at the prescribed sides.

##### Packing Category III



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## 8.4.2 Cases with Lining – Packing Category IV

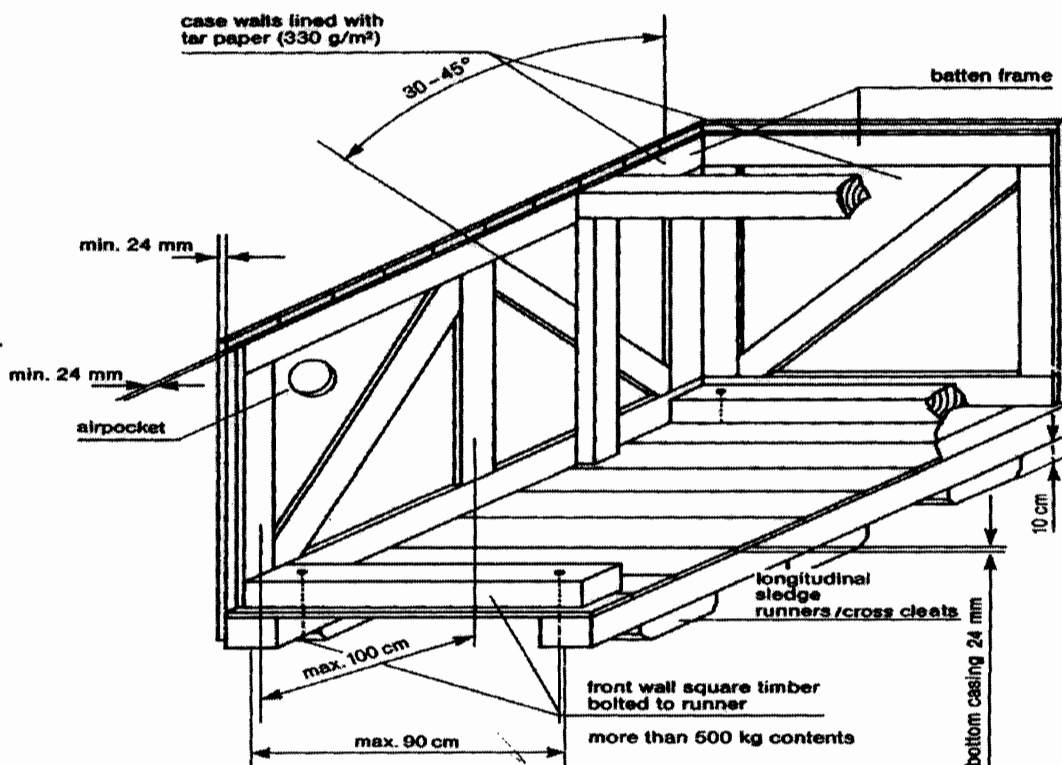
### 8.4.2.1 Type of Equipment

*Recommended for equipment and mechanical parts Equipment sensitive to mechanical damage or parts and components that are particularly at risk of theft or loss; pumps, elbows, flanges, fittings, tools, erection materials, etc.*

### 8.4.2.2 Type of Construction

The same type of construction as article 8.4.1.2, but with all sides completely boarded without space between the boards. Sides to be provided with waterproof lining; fabric-reinforced waterproof tar paper or polyethylene-foils resistant to ultraviolet rays can be used. Polyethylene-foil shall be fixed under the lid cover to avoid penetration of water. At weights of more than 500 kg the longitudinal runner must be bolted to the front all square timber. For ventilation inside the case, an opening in the waterproof lining must be placed between the diagonal battens and diagonal joists.

### Packing Category IV

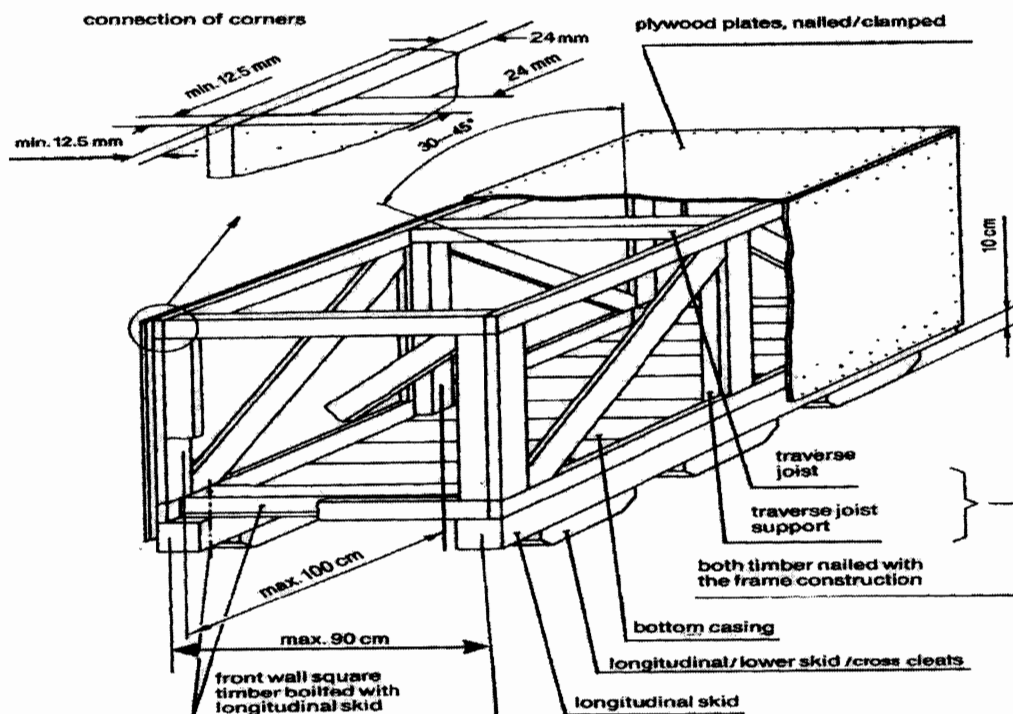


## 8.4.3 Cases with Alternative Surface Materials

### 8.4.3.1 Plywood Box – Packing Category IV A



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Case constructed of 5 layers of watertight, glued plywood with a total thickness of 12.5 mm. The frame must be constructed from minimum 24 mm timber or as per guide lines given above against clause 8.0, Fig 1 to 11 and must be suitable for the weight and nature of the parts to be packed. Planed square timber must be bolted with longitudinal skid and covered with diagonal joists. If applicable, construction of the cover and sides is to include diagonal bracing. Covers consisting of several layers of plywood are to be sealed with durable elastic putty or additional water-resistant sheets to be fixed.

#### 8.4.4 Case with Barrier Material – Polyethylene Foil – Packing Category V

##### 8.4.4.1 Type of Equipment

Sensitive equipment, simple electrical equipment, insulation materials, fire-resistant materials, with non-corrosion- guarantee for a period up to twelve (12) months.

##### 8.4.4.2 Type of Construction


Preservation by welding in polyethylene-foil with addition of desiccants and if necessary, application of non-corrosive contact agents, otherwise, type of construction as indicated in article 8.4.2.2.

Additional marking:

- Case with desiccants.

#### 8.4.5 Case with Barrier Material – Aluminium Compound Foil – Packing Category VI

##### 8.4.5.1 Type of Equipment

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Electrical equipment such as, switchboards, electric motors, sensitive equipment, with non-corrosion guarantee, for a period up to twelve (12) months.

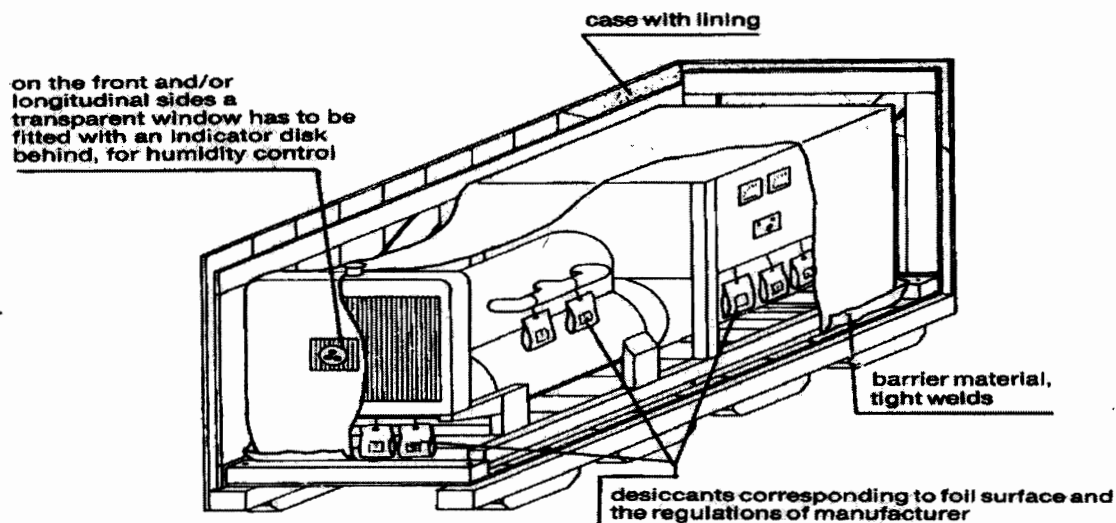
#### 8.4.5.2 Type of Construction

Type of construction as indicated in article 8.4.2.2. Preservation by sealing an aluminium compound foil, with the addition of desiccants. Humidity indicators, if required and installed in the barrier wrapping, shall allow easy control from the outside.

Additional marking:

- Case with desiccants.

#### Packing Category V/VI




#### 8.4.6 Double Case – Packing Category VII

##### 8.4.6.1 Type of Equipment

GOODS which are of high sensitivity to shock, impact and vibration, for instance, special electrical equipment like computers, switchboards, laboratory instruments

##### 8.4.6.2 Type of Construction

Case construction as indicated in article 8.4.2.2, with additional floating inner packing (case-in-case principle), padding corresponding to weight and sensitiveness. Preservation by sealing in aluminium compound foil with the addition of desiccants. The inner case has to be made of plywood or equivalent material with a thickness of 8-12 mm, depending on the weight of the GOODS to be packed. The inner buckles and/or frame borders have to be dimensioned so that the full stability of the inside case will be reached and no twisting is possible. The inner sides of the inside case will be lined with bituminous kraft paper on all sides (except bottom).

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#### **8.4.7 Cable Drum – Packing Category VIII**

##### **8.4.7.1 Type of Equipment**

All type of cables, wires, ropes, hoses.

##### **8.4.7.2 Type of Construction**

For all type of cables refer clause no. 11.1. For other items (wires, ropes, hoses) new or practically new drums are to be used. Planking of the e drums by use of boards, thickness minimum 20 mm, with additional double steel strapping, nailed, and carefully preserved/protected cable ends prior to packing.

#### **8.4.8 Hazardous Materials – Packing Category IX**

##### **8.4.8.1 Type of Equipment**

Hazardous materials according to the law are explosives, compressed gases, liquefied gases dissolved under pressure or deeply refrigerated, flammable liquids, flammable solids: substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases, oxidizing substances, organic peroxides, poisonous (toxic) and infectious substances; radioactive materials, corrosives, miscellaneous dangerous goods.

##### **8.4.8.2 Type of Construction**

Hazardous materials shall always be packed and documented separately from any other material. Selection of packaging materials, execution of packing and marking as well as documentation shall always be in compliance with the applicable laws and regulations. Any certificates required for transportation or for authorities to be supplied before shipment of the GOODS.

#### **8.4.9 Wooden Floor as a Transport Support – Packing Category X**

##### **8.4.9.1 Type of Equipment**

Any materials to be stuffed in containers or on flat racks and that are not stowed on standard pallets or otherwise suitably packed

##### **8.4.9.2 Type of Construction**


- Longitudinal internal square timbers bolted to the front wall runners, longitudinal skid.
- Maximum distance between longitudinal runners 90 cm (middle to middle of the runner).
- Full boarding of the floor.
- Attaching of lifting lugs and/or iron ropes for lifting/pulling the units off the transport equipment.
- If applicable, preservation of the equipment by sealing in polyethylene-foil or aluminium compound foil and the addition of desiccants.

#### **8.5 Air Transport Packing**

##### **8.5.1 General**

Certain types of material may have to be shipped by air from their country of origin. This means of transport will be exceptional, and will be used only:

- For GOODS, which are highly sensitive to shock or vibrations, such as computers, electronic instruments, or those of small dimensions and weight.
- For GOODS urgently required at the module yard(s) and/or jobsite.

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### 8.5.2 Type of Packing

Depending on the goods to be packed, VENDOR may use one of the following types:

- A triple-corrugated cardboard container made with waterproofed glue and a barrier layer of polyethylene on the outsides to keep out humidity.
- Wooden/cardboard packing cases: the wood being used for the framework and base of the cases, waterproofed triple-corrugated cardboard being used for the sides and top. These cases are of the "Bell" type, and used for material of small or medium dimensions.
- For larger dimensions, plywood cases are acceptable. The timber characteristics, cross-sections and thickness will be systematically determined by the nature of the loads to be packed.

### 8.5.3 Dimensions

In order to optimize the existing transport facilities (passenger or cargo aircraft), the dimensions of:

- Triple-corrugated containers.
  - Wooden/cardboard packing cases.
  - Plywood cases.
- Are to be adapted to pallets used for air transportation.

## 9.0 Detailed specification for Wooden Crates/Boxes/Cases and other packing materials

### 9.1 Technical specification for wood

The wood shall be Fir, Chir, Silver Oak (Gravillea Robusta), chemically treated mango and Pinewood with moisture content not exceeding 50%. The wood shall have flexural and compressive strength, stiffness, shock absorption and nail retention properties. The wood shall be free from common defects such as warp, bone, twist, knot, cracks, splits, end splits, bend, visible sign of infection and any kind of decay caused by insects or fungus, etc. Surface cracks with maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

### 9.2 Chemical Treatment of Wood:


The wood shall be chemically treated to provide protection against deterioration due to fungi and attack by termites, borers, marine organism and any other kind of infection. It shall be treated only after final processing like cutting, planning, joint grooving, etc.

### 9.3 TYPE, DESIGN & DIMENSION OF WOODEN PACKING CASES:

#### 9.3.1 PACKING OF EQUIPMENTS

Various mechanical, electrical and C&I equipment e.g. Pumps, motors, equipment skids, heat exchangers, control panels, switch gears, transformers, etc. shall be wrapped in weather proof packing and then secured in wooden packing cases. The construction of wooden packing cases/crates shall be as per details given below and also given in figure 1 to 11.

##### 9.3.1.1 Bottom Frame

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The construction of bottom frame shall be as per Fig-2. The No. of slides/runners for bottom frames shall be selected depending upon the weight and overall dimensions of the load to be carried. The equipment shall be secured by fixing their base frame/plate with the help of bolt and nuts etc. to bottom frame of the wooden packing cases/crates. The equipment not provided with base frame/plate like cylindrical vessels, etc to be secured to the bottom frame of the wooden cases with "C" clamps fabricated from steel channels/ angle iron.

#### 9.3.1.2 TOP FRAME

The construction of top frame shall be as per fig-3.

#### 9.3.1.3 END PANELS

The dimension of the end and lateral panels shall be calculated according to overall dimensions of the items to be packed. Diagonal braces shall be used for packing cases having height exceeding 500mm. Details of bracings shall be as per fig 5 to 9.

#### 9.3.1.4 Sling Plate


To facilitate lifting of cases, longitudinal under slide boards shall be fixed. To avoid damage to the box while lifting sling plates shall be provided. Refer fig-11.

#### 9.3.1.5 Angle Iron Cleats

Angle iron cleats shall be used for strengthening the joints as indicated in fig-10

#### 9.3.1.6 Other Requirements

- The thickness of planks for top, bottom, side and end panels shall be at least 25mm. Planks used for this purpose shall be joined with each other by tongue and groove joint. The groove dimension shall be such that tongue fits tightly into groove to make the joint.
- Runners/slides, traverse bars, etc shall be of single length i.e. without any joint. Planks for sheathing, diagonal bracing etc shall also be of single length up to 2400mm, proper jointing is permitted for planks for sheathing and diagonal bracings.
- Each equipment to be individually covered with double polyethylene petticoat. Sheet thickness of polythene sheet shall not be less than 0.175 mm (175 microns). The sealing shall be such so as not to allow moisture inside.
- The inner surface of 4 sides of shooks shall be nailed with bituminized water proof craft paper. Wherever 2 pieces of kraft paper are used, joint shall have an overlap of minimum 20 mm.
- All the inner sides of the box shall be nailed with bitumen coated HESSIAN POLYTHYLENE KRAFT PAPER. For top frame it shall project on all sides by 100mm and shall be nailed on sides. Wherever 2 pieces of kraft paper are used, joint shall have an overlap of minimum 20 mm.
- For delicate equipment like control panels and switchgears, lighting panels and lighting transformers, suitable cushioning material like rubberised coir (min. 50 mm thick and 100 mm wide) shall be provided on their bottom support and the gap between the panel and casing

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shall be filled with rubberized coir with distance between consecutive supports less than 500 mm (ref fig15). For other equipment suitable support from sides of the casing shall be provided.

- Switchgear cubicles, control panels and control desks shall be packed and shipped in separate convenient sections. The components e.g. circuit breakers relays and instruments etc. which are removed from panels for shipping purpose and shall be separately packed and shipped as per packing instructions in clause 10.4.
- Packing case for control panels and switchgear panels shall be finally covered with GI sheet of minimum thickness of 0.4mm.
- Packing cases shall be bound at edges by nailing MS clamps/brackets at sufficient intervals. Further heavier boxes shall be strapped with C clamps (ref fig-4) fabricated from steel channels/angles and lighter boxes shall be strapped with hoop iron strips.
- Silica gel is used for this purpose to protect contents over sufficiently long time from corrosion. Silica gel shall be indicating type confirming to IS-304 (1979) packed in cotton bags placed at different positions inside the packing for absorbing moisture and shall not come into directly contact with equipment/material inside the package. The quantity of silica gel shall be adequate for storage period of one year, however it shall not be less than 4 gm. per ltr. Volume of case subject to minimum 400 gm. Per case.



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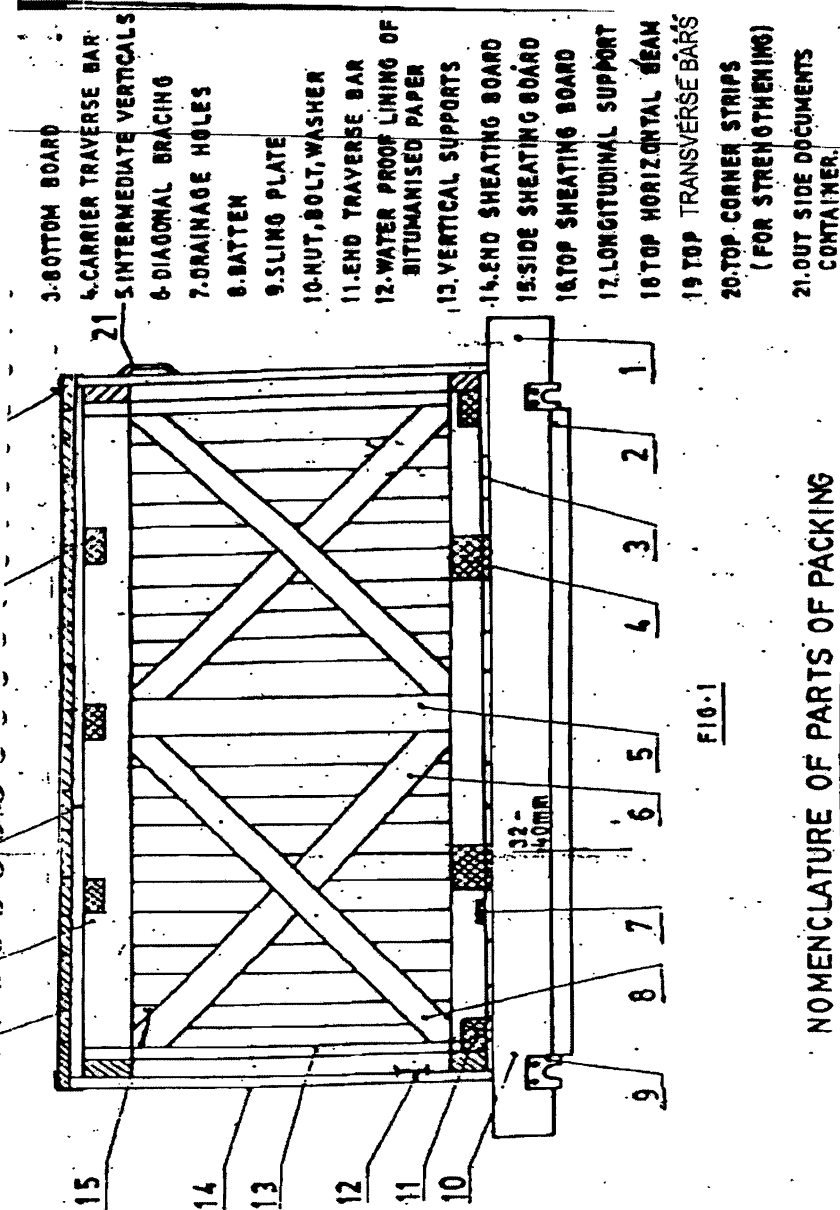


FIG-1

## NOMENCLATURE OF PARTS OF PACKING

### CASES

FIG-1

1 SLIDE  
2 UNDER SLIDE BOARD

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## BOTTOM FRAME ARRANGEMENTS

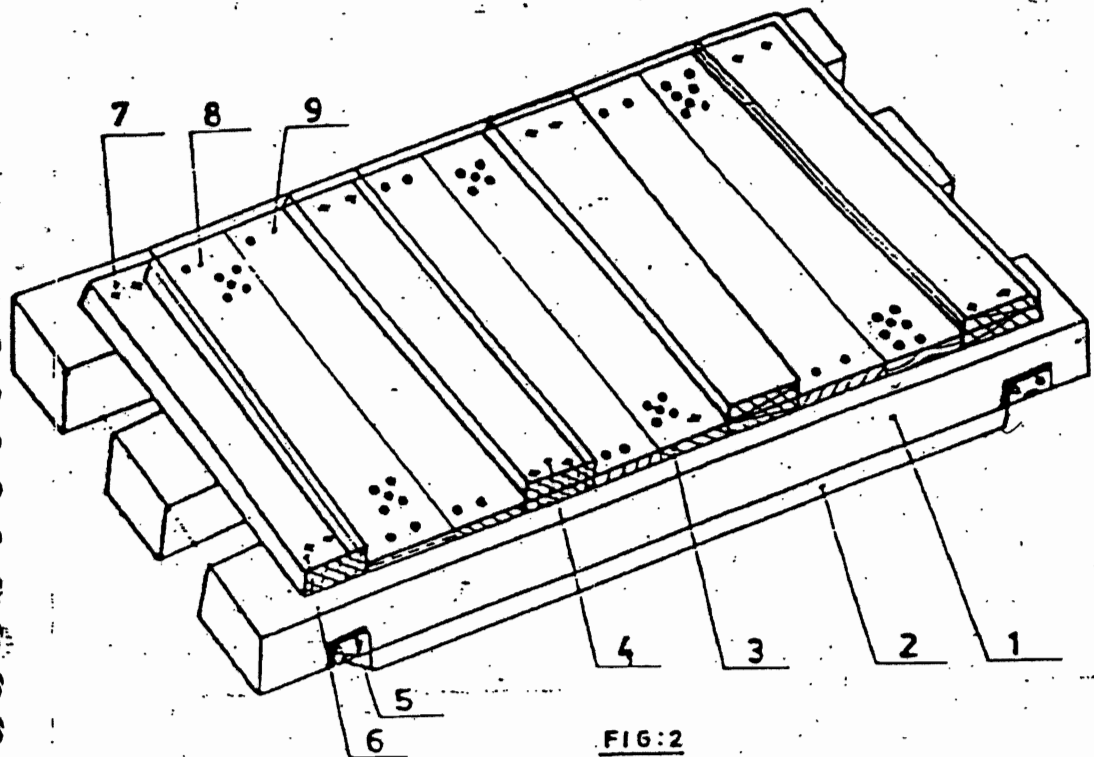


FIG:2

Nos. of slides: Minimum 2 Nos.  
For length more than 1800 mm or  
load more than 1000kg, Nos. of  
slides shall be minimum 3 Nos.  
For dimensions of slides, refer Table 1  
Cross section of end transverse bar; 100 x 100 mm.  
(minimum)

1. SLIDE
2. UNDER SLIDE BOARD
3. BOTTOM BOARD
4. CARRIER TRAVERSE BAR
5. SLING PLATE
6. TRAVERSE BAR
7. BOLT, NUT & WASHER
8. DRAINAGE HOLES
9. NAILS

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## TOP FRAME ARRANGEMENT

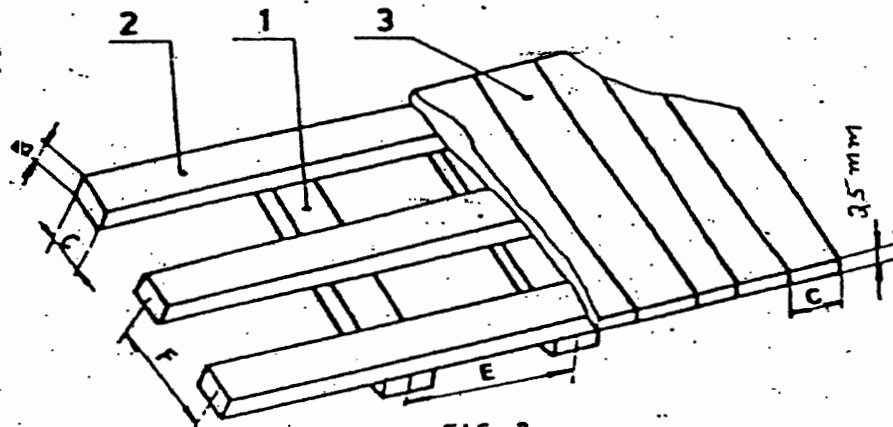
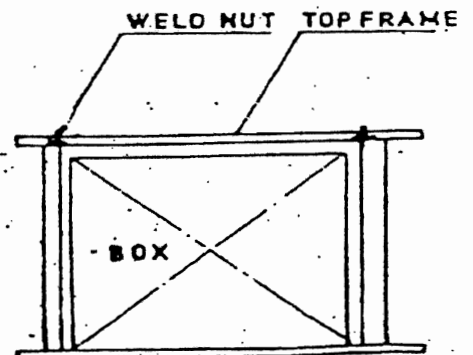
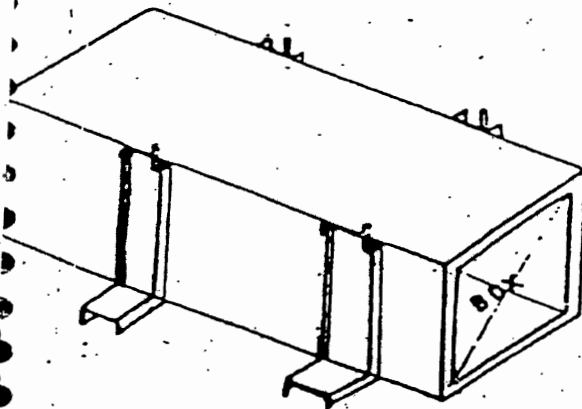


FIG-3

F : 700 to 1000 mm  
E : 500 to 900 mm  
30 x 100 mm.

- 1 - Traverse Bars
- 2 - Horizontal Soans
- 3 - Top Board

## ARRANGEMENT OF C-CLAMPS AROUND CASES



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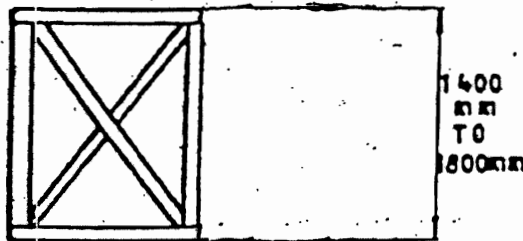
**ARRANGEMENT OF DIAGONAL BRACING AND  
HORIZONTAL SUPPORT**

FIG: 6

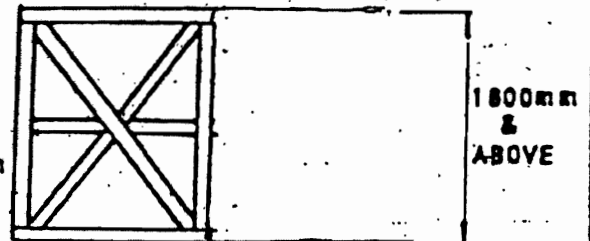


FIG: 8

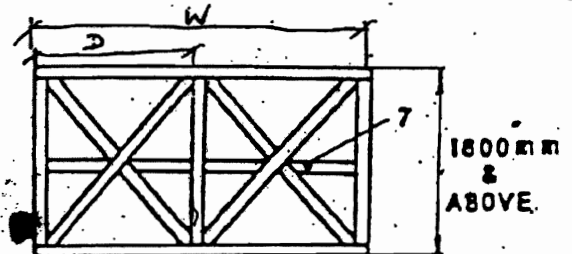


FIG: 7

7- Middle Horizontal Support

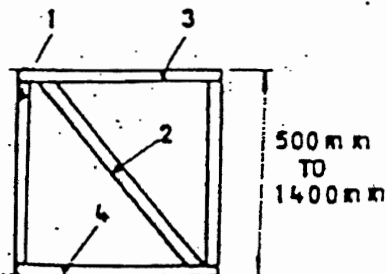


FIG: 5

1- Vertical Support

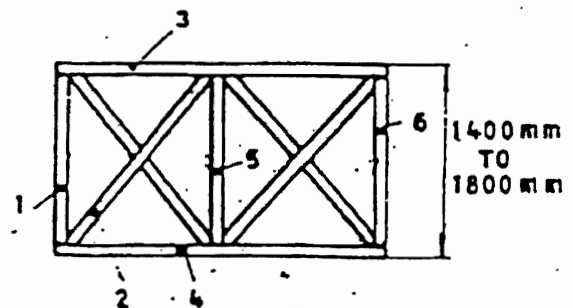


FIG: 7

1, 5, 6 - Vertical Support

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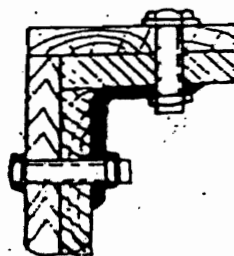
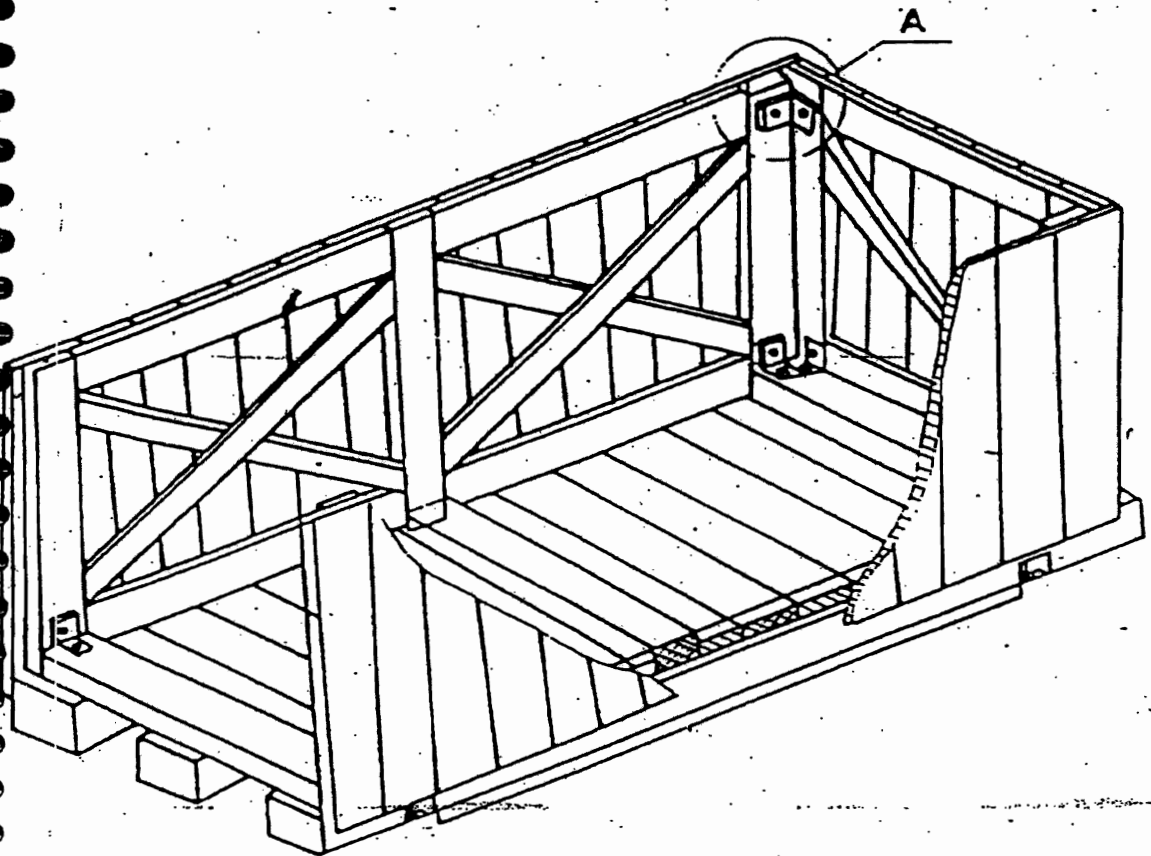
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## ARRANGEMENT OF PACKING CASE



DETAIL-A

HOLE DIAMETER  
MUST CONFORM  
TO BOLT DIA

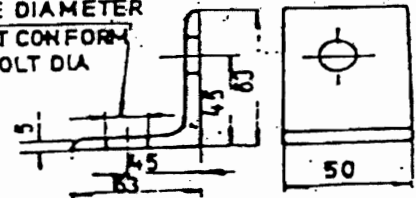


FIG:10

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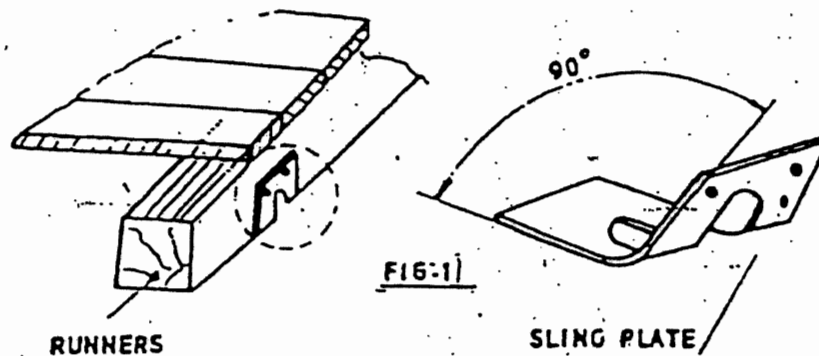
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**ARRANGEMENT OF SLING & PLATE ON  
CASES**

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**TABLE-1**

LOADS	LENGTHS OF SLIDES						
	600	800	1000	1200	1300	1500	2000
	Cross section b x c				<div style="border: 1px solid black; display: inline-block; width: 80px; height: 15px; vertical-align: middle;"></div> c b		
500	50 X 100	50 X 100	50 X 100	50 X 100	75 X 100	75 X 100	100 X 100
800	50 X 100	50 X 100	75 X 100	75 X 100	75 X 100	75 X 100	100 X 100
1000	75 X 100	75 X 100	75 X 100	100 X 100	100 X 100	100 X 110	100 X 150
1500	75 X 100	75 X 100	100 X 100	100 X 100	100 X 100	100 X 150	100 X 150
2000	75 X 100	100 X 100	100 X 100	100 X 150	100 X 150	100 X 150	150 X 150
2500	75 X 100	100 X 100	100 X 150	100 X 150	100 X 150	150 X 150	150 X 150
3000	100 X 100	100 X 150	150 X 150	150 X 150	150 X 150	150 X 150	150 X 150



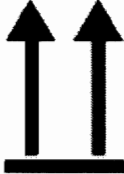




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**Table-2**

End and side panels	Width of the panel "W"	Distance between longitudinal support (Dimension "D")						
		600	800	1000	1200	1400	1600	1800
		Cross section b x c				Item 1 to 7		
Fig- 5 to Fig-9	600 to 1200	30	30	30	30	30	30	30
		X	X	X	X	X	X	X
	1201 to 1600	100	100	100	130	130	130	130
		30	30	30	30	30	30	30
	1601 to 2000	X	X	X	X	X	X	X
		130	130	130	130	130	130	130
	2001 to 3000	30	30	30	30	30	30	40
		X	X	X	X	X	X	X
	3001 to 4000	130	130	130	130	130	130	150
		40	40	40	40	40	40	40
		X	X	X	X	X	X	X
		150	150	150	150	150	150	150

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#### INDICATION MARKS ON CASES/BOXES/CRATES



Designation	Symbol	Explanation
Fragile, Handle with care		The symbol should be applied to easily broken cargoes. Cargoes marked with this symbol should be handled carefully and should never be tipped over or slung.
Use no hooks		Any other kind of point load should also be avoided with cargoes marked with this symbol. The symbol does not automatically prohibit the use of the plate hooks used for handling bagged cargo.
Top		The package must always be transported, handled and stored in such a way that the arrows always point upwards. Rolling, swinging, severe tipping or tumbling or other such handling must be avoided.
Keep away from heat (solar radiation)		Compliance with the symbol is best achieved if the cargo is kept under the coolest possible conditions. In any event, it must be kept away from additional sources of heat. It may be appropriate to enquire whether prevailing or anticipated temperatures may be harmful.
Protect from heat and radioactive sources		Stowage as for the preceding symbol. The cargo must additionally be protected from radioactivity.
Sling here		The symbol indicates merely where the cargo should be slung, but not the method of lifting. If the symbols are applied equidistant from the middle or center of gravity, the package will hang level if the slings are of identical length. If this is not the case, the slinging equipment must be shortened on one side.
Keep dry		Cargo bearing this symbol must be protected from excessive humidity and must accordingly be stored under cover. If particularly large or bulky packages cannot be stored in warehouses or sheds, they must be carefully covered with tarpaulins.

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Center of gravity		This symbol is intended to provide a clear indication of the position of the center of gravity. To be meaningful, this symbol should only be used where the center of gravity is not central. The meaning is unambiguous if the symbol is applied onto two upright surfaces at right angles to each other.
No hand truck here		The absence of this symbol on packages amounts to permission to use a hand truck on them.
Stacking limitation		The maximum stacking load must be stated as "... kg max.". Since such marking is sensible only on packages with little loading capacity, cargo bearing this symbol should be stowed in the uppermost layer.
Clamp here		Stating that the package may be clamped at the indicated point is logically equivalent to a prohibition of clamping anywhere else.
Temperature limitations		According to regulations, the symbol should either be provided with the suffix "...°C" for a specific temperature or, in the case of a temperature range, with an upper ("...°C max.") and lower ("...°C min.") temperature limit. The corresponding temperatures or temperature limits should also be noted on the consignment note.
Do not use forklift truck here		This symbol should only be applied to the sides where the forklift truck cannot be used. Absence of the symbol on other sides of the package amounts to permission to use forklift trucks on these sides.
Electrostatic sensitive device		Contact with packages bearing this symbol should be avoided at low levels of relative humidity, especially if insulating footwear is being worn or the ground/floor is nonconductive. Low levels of relative humidity must in particular be expected on hot, dry summer days and very cold winter days.



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Do not destroy barrier		A barrier layer which is (virtually) impermeable to water vapor and contains desiccants for corrosion protection is located beneath the outer packaging. This protection will be ineffective if the barrier layer is damaged. Since the symbol has not yet been approved by the ISO, puncturing of the outer shell must in particular be avoided for any packages bearing the words "Packed with desiccants".
Tear off here		This symbol is intended only for the receiver.

**FIG-12**

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BHEL-PEM-DELHI-INDIA	
CONSIGNEE	
MATERIAL	
CUSTOMER REF.	MO. NO.
DESPATCH ADVICE NOTE NO.	CASE NO.
DIMENSIONS(MM) LXBXH	NET WT -KGS
	GROSS WT -KGS
SPECIAL INSTRUCTIONS	HANDLE WITH CARE -- KEEP DRY DO NOT DROP -- DO NOT TILT

FIG-13: MARKING PLATE



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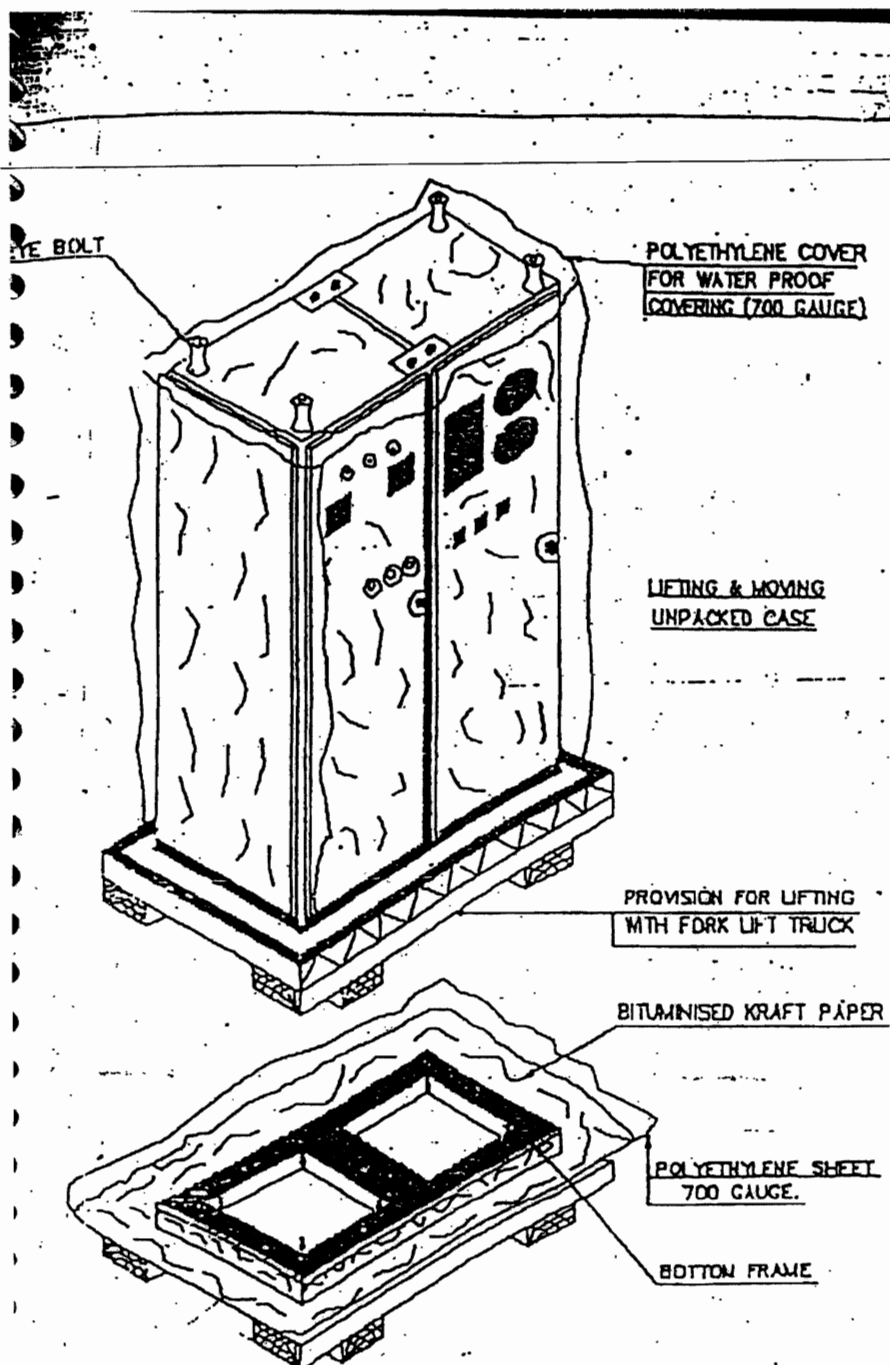


FIGURE-14



# TITLE

## TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING FOR EXPORT JOBS

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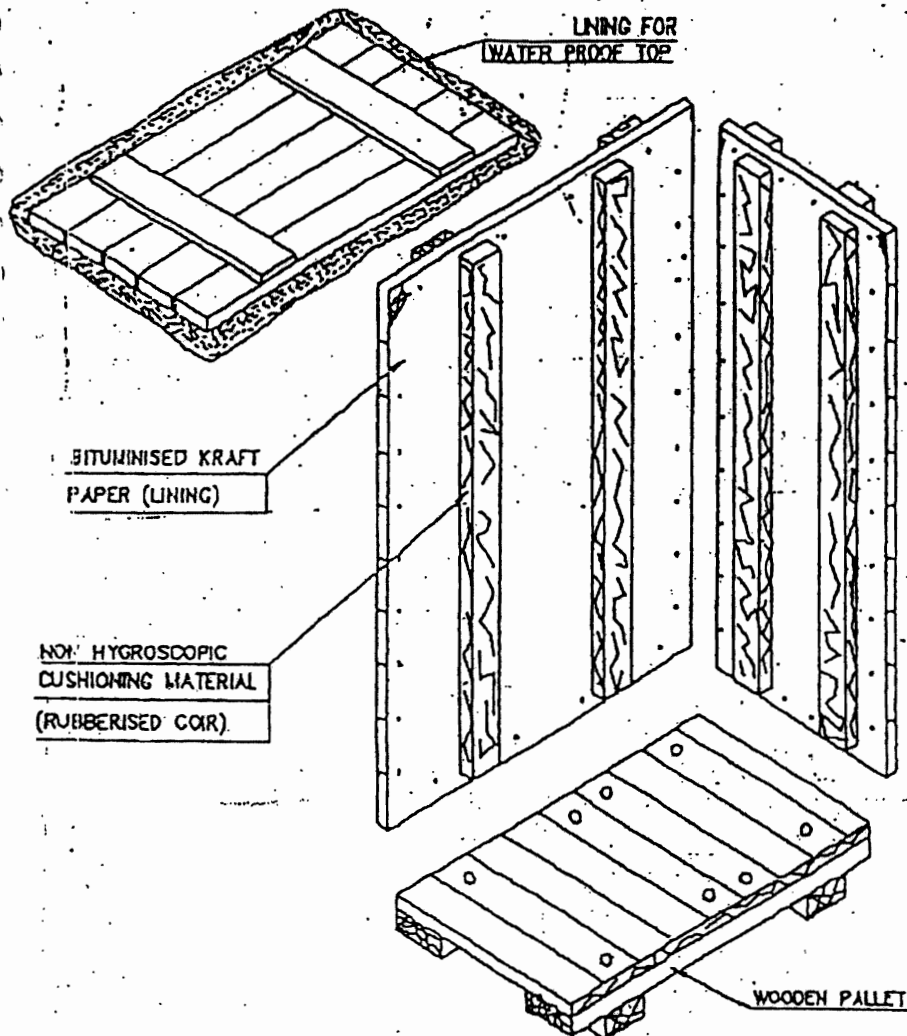

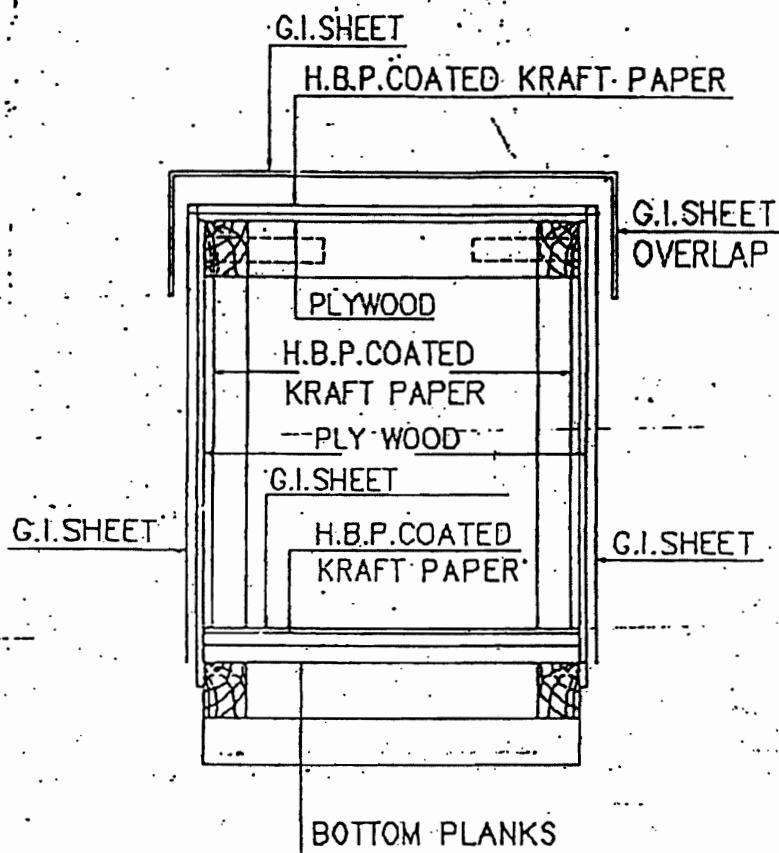



FIGURE-15

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**FIG-16 : CLOSED PACKING CASE WITH G.I.SHEET  
SHOWING LAYERS OF PACKING MATERIALS.**

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## 10.0 TYPICAL PACKING DETAILS/PROCEDURE FOR MECHANICAL ITEMS

### 10.1 INSULATION MATERIAL (MINERAL WOOL MATTRESSES)

This specification covers the requirements of seaworthy packing and marking for bonded mineral (rock) wool mattresses having metallic hexagonal wire netting as facing on one or both sides.

#### 10.1.1 TYPE OF CONSTRUCTION

Mattress shall be packed in Polythene (of 0.2 mm thickness) all around and sealed to prevent moisture absorption during transit and storage. Further it shall be wrapped with Bitumen coated Polythene bonded/lined Hessian and stitched and then packed in 5 ply DFC carton box.

Silica gel is used for this purpose to protect contents over sufficiently long time from corrosion. Silica gel shall be of indicating type conforming to IS:304-1979 packed in cotton bags placed at different positions inside the packing for absorbing moisture and shall not come into direct contact with the material inside the package. The quantity of silica gel shall be enough for storage period of one year. However, it shall not be less than 4 gms per litre volume of case subject to minimum of 400 gms per case.

Each mattress as well as the packages shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and wire netting details (i.e. material and size) shall be placed below the wire netting.

Following details shall be legibly written on the packages. The details shall also be typed on a sheet of paper & kept in a sealed Polythene cover, inside the packages


- a) Project Name
- b) Purchase Order No.
- c) Sl. No. of package
- d) Size of mattress (Thickness x Length x Width)
- e) Density
- f) Wire netting material and size
- g) Weight of the package

### 10.2 INSULATION MATERIAL (ALUMINIUM COIL)

Heavy Gauge Aluminium Coil Packaging are done by Eye-to-Sky packaging or by Eye to eye packaging as per the proven practice being followed by manufacturer of Aluminium sheets.

#### 10.2.1 Type of construction for Eye to Sky packaging

- a. Strapping of coil with polyester strap around circumference at one place.
- b. Putting paper I. D. Edge protector.
- c. Wrapping the coil with VCI stretch film after putting silica gel bags (4 nos.) Inside the coil.
- d. Wrapping the coil with HDPE film.
- e. Covering the coil including its build up & bore with masonite / particle board.
- f. Putting metallic I. D on coil.
- g. Putting O.D edge protector (paper) on coil.

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- h. Putting circumferential polyester strap (3 nos.) & eye polyester strap ( 4 nos.).
- i. After placing the coil on coil tilter ply wood (10mm thick) of suitable size along with wooden pallet is to be put at the bottom side of the coil.
- j. Coil is to be tilted to eye-to-sky position.
- k. Final strapping with metallic strap to unit coil and skid at 2 places with top cover of plywood.
- l. Fixing the coil with wooden blocks at 4 corners.
- m. Labeling 2 nos.(one metallic & one adhesivetype) For specification, net wt. & gross wt.

#### **10.2.2 Type of construction for Eye to Eye packaging**


- a. Strapping of coil with polyester strap around circumference at one place.
  - b. Putting paper I. D. Edge protector.
  - c. Wrapping the coil with VCI stretch film after putting silica gel bags (4 nos.) Inside the coil.
  - d. Wrapping the coil with HDPE film.
  - e. Covering the coil including its build up & bore with masonite / particle board.
  - f. Putting metallic I. D on coil.
  - g. Putting O.D edge protector (paper) on coil.
  - h. Putting circumferential polyester strap (3 nos.) & eye polyester strap ( 4 nos.).
  - i. Placing of coil on wooden skid Coil is to be tilted to eye-to-sky position.
  - j. Final strapping of coil and skid at 2 places with steel strap. Fixing the coil with wooden blocks at 4 corners.
- Labeling 2 nos.(one metallic & one adhesive type) For specification net wt. & gross wt.

#### **10.3 Packing Procedure for Online Tube Cleaning System and accessories**

This procedure is applicable for the shipment of Onload Tube Cleaning System and accessories by sea.

##### **10.3.1 Packing details:**

- The Packing case shall be made of treated rubber wood. The design of the case shall be as per Annexure IIIA & IIIB.
- The Equipments shall be placed on the wooden base of the Packing case and fastened if required to arrest the movement of the same.
- Equipment shall be covered by Polythene sheet and inside wall surfaces of the wooden cases also shall be covered by polythene sheet.
- All Nozzles shall be closed with plywood dummies.
- All electrical components assembled or loose shall be covered with polythene sheets along with silica gel pack.
- Silica gel desiccants shall be kept inside each case in sufficient quantities in order to absorb the moisture.

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- Thermocol packing shall be made for glass items like Ball vessel sight glass, Vpiece
- sight glass & pressure gauge.
- Silica gel desiccants shall be kept inside of each case to absorb the moisture.
- A Packing list covered in a polythene envelope shall be fixed inside and outside of each packing case.
- Shipping marks and consignee address shall be painted on the outer surface of the case.
- All handling instruction required for the case like top, sling, rain, handle with care etc, shall be marked on the case as per the symbol attached.
- Machined surface will be applied with Anti rust oil and covered by polyurethane sheet to protect from external oxidation.
- All valves will be closed with dummies to protect the internals and placed in the wooden case which will covered by polyurethane sheet.





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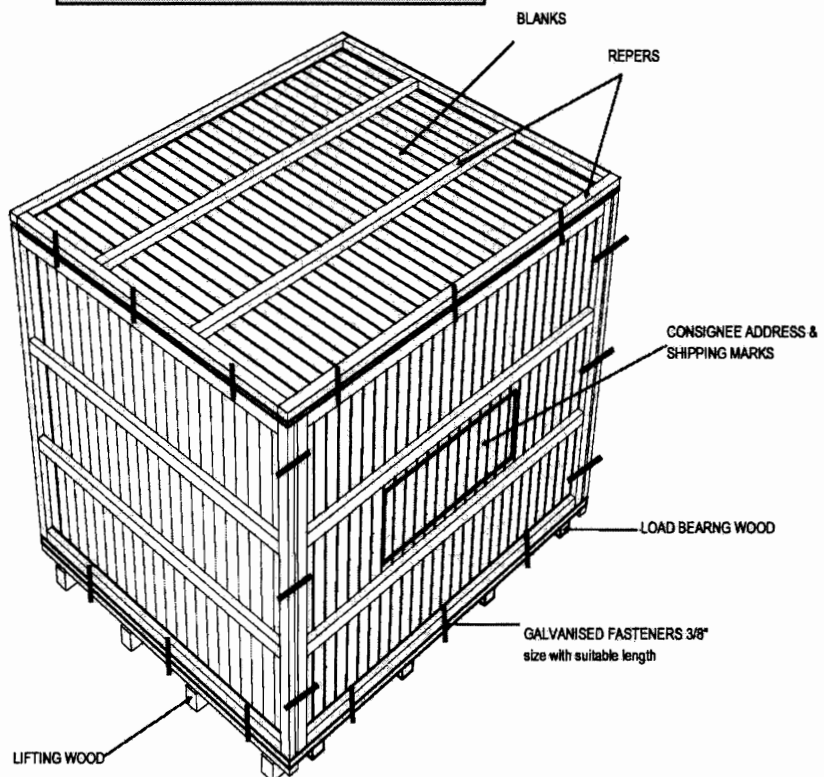
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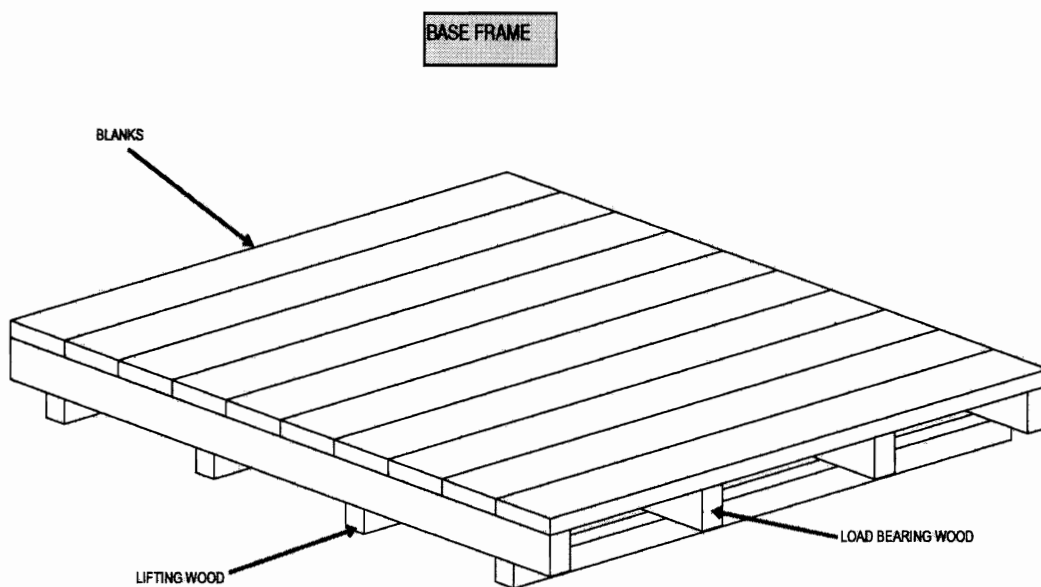
MODEL: FASTNERS TYPE (BASE, SIDE & TOP  
ATTACHED WITH BOLT, NUT & WASHER)

This Type of case to be used for  
following items:

1. BALL SEPERATOR
2. BALL COLECTOR SKID



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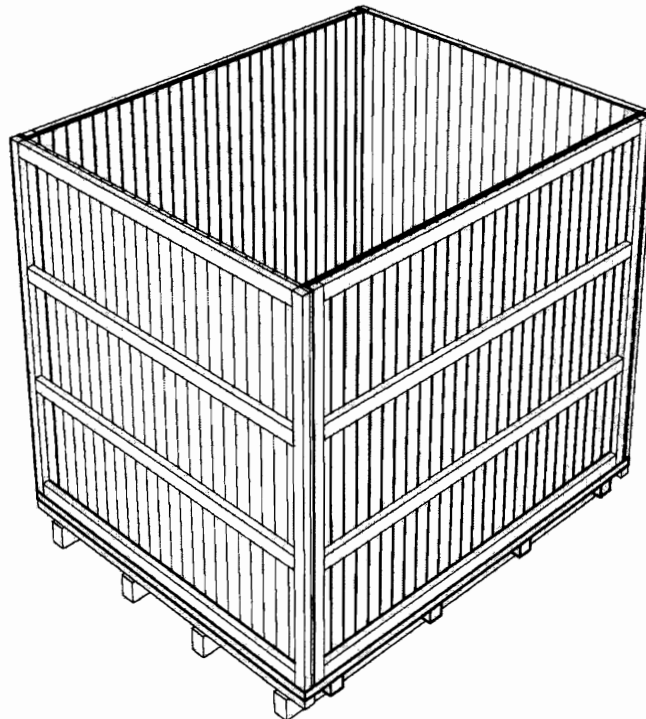
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MODEL: FASTNERS TYPE - WITHOUT TOP





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MODEL: NAILING TYPE  
(FRAME & INSIDE REEPER NAILED)

- THIS TYPE OF CASE TO BE USED FOR THE FOLLOWING ITEMS:
1. PUMP SKID
  2. CONTROL PANEL
  3. LOOSE ITEMS, TOOLS & TACKLES
  4. DPMS, BRM
  5. SPARES
  6. CLEANING BALLS
  7. CABLES & ACCESSORIES

Shipping marks & Consignee  
Address

BLANKS

LIFTING WOOD

BLANKS

REEPERS

BLANKS

REEPERS

LOAD BEARING WOOD

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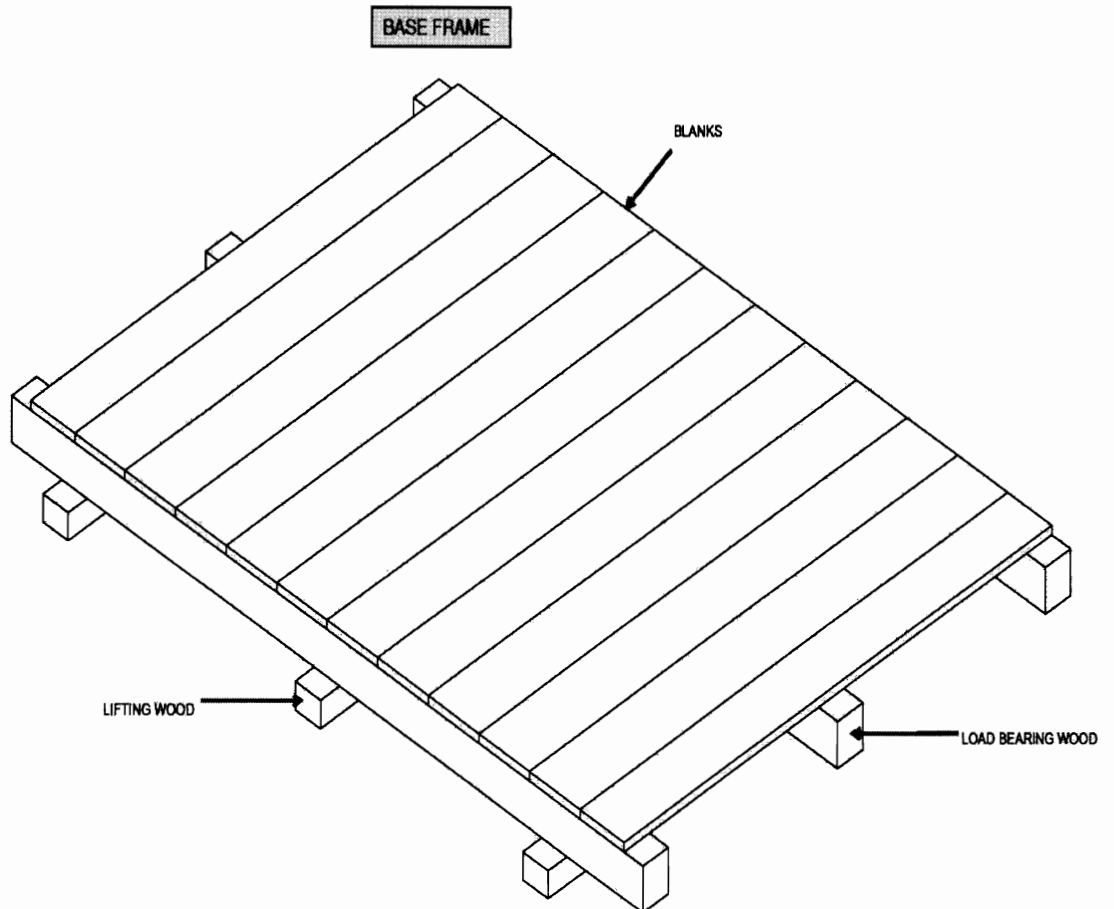
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# TITLE

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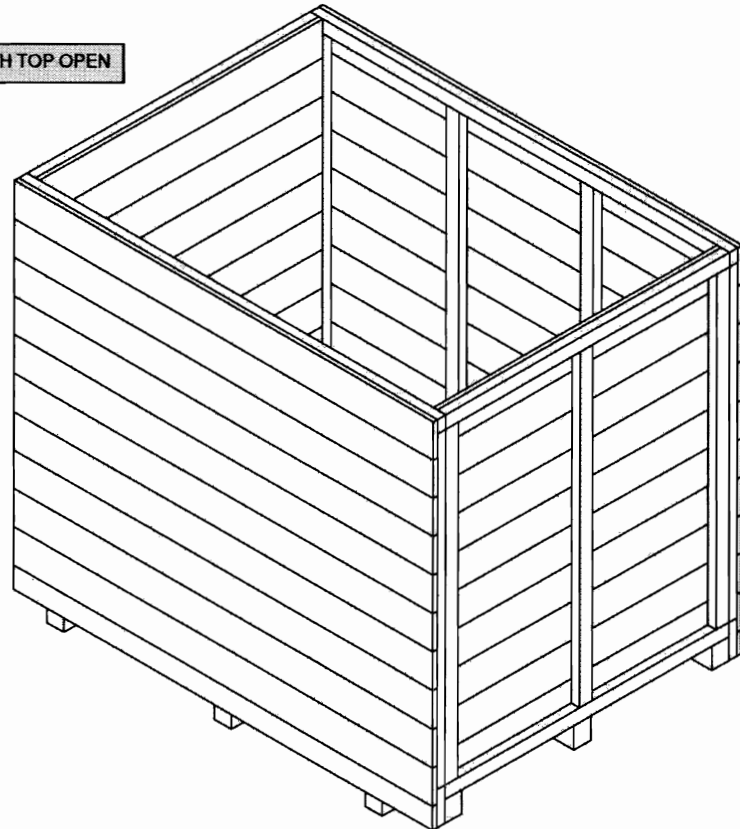
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NAILING TYPE MODEL WITH TOP OPEN



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#### 10.4 PACKING OF LOOSE ITEMS

Loose mechanical, electrical and C&I items e.g. valves, fittings, pressure/temperature gauges/switches, circuit breakers, relays etc shall be individually wrapped using polyethylene sheets/U foam/ thermocol sheets/air bubble sheets depending upon the items and then packed in wooden boxes. The left out spaces and top of the boxes shall be filled with rubberized coir to get proper cushioning effect, Special attention shall be paid to relays, instruments etc for arresting the movements of their operating mechanism during transportation.

The construction of wooden packing cases shall be as per clause 9.3.1 retaining its all features concerning strength of the box. The construction of wooden packing case for electrical and C&I items shall be as per fig-16.

Inner surface of 6 sides of the box shall be lined with bitumen coated hessian polyethylene kraft paper. Rubberized coir of min. 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of the boxes.

#### 11.0 PACKING OF ELECTRICAL ITEMS

##### 11.1 CABLES

**11.1.1 Type of Equipment**  
All type of cables..

##### 11.1.2 Type of Construction

New or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Over the cables polyethylene sheet shall be wrapped and then sealed properly. Cable drum can be put in wooden crates for ease in transportation and handling. (Wooden cable drum is also acceptable, however vendor to furnish constructional details for approval).



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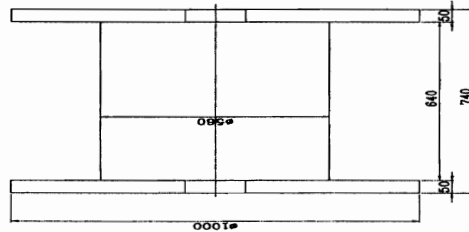
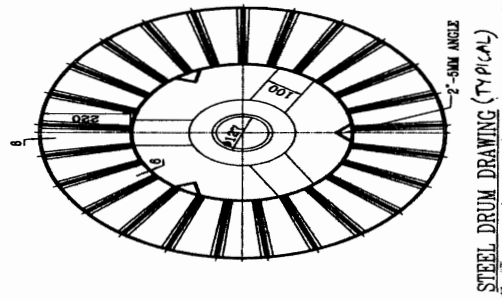
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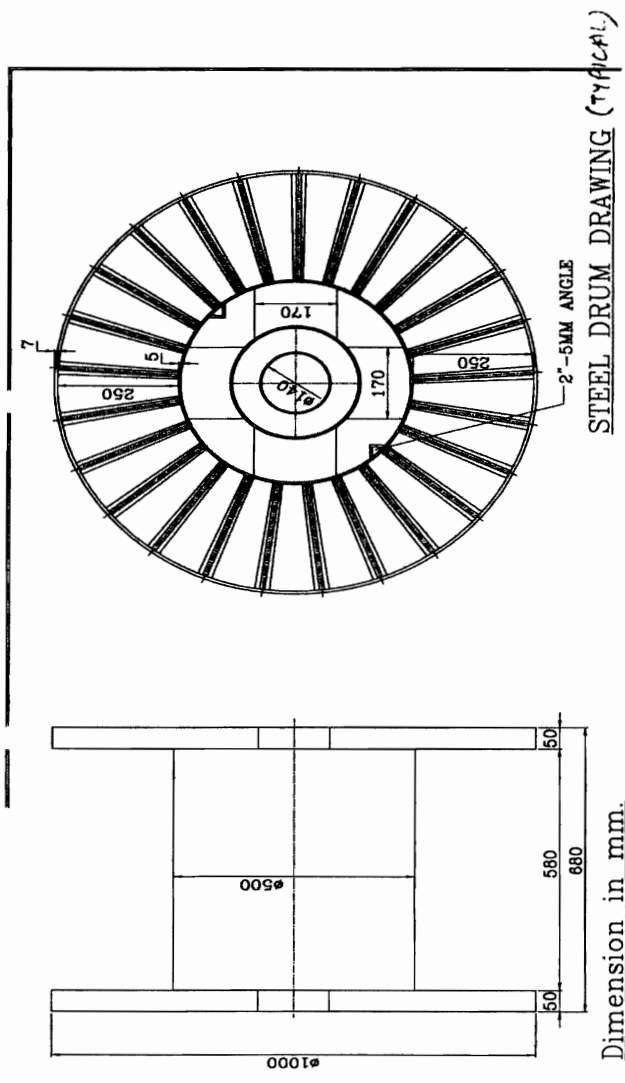
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## 11.2 PACKING OF CABLE TRAYS & ACCESSORIES AND CABLE TRAY SUPPORT MATERIAL

11.2.1 Cable trays can be packed in wooden boxes as per fig 1 to 11 or in steel boxes. Details of steel box construction is as indicated below.

- 1) All Dimensions are in "mm" unless otherwise stated.
- 2) Packing Box shall be fabricated using 50x50x6mm MS Angle, 50x3mm Flat, 2.5 mm thick C Channel, 1mm & 1.6mm Thick sheet.
- 3) Finish of Packing Box Shall be Galvanized.
- 4) Angle & Channel Section forming part of the Main frame shall be welded thoroughly with each other to give a rigid structure.
- 5) Sheet Section and Flat section shall be bolted/ Riveted/ Welded suitably to the Main frame stated in '4' above.

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- 6) Welding Portion on galvanized surfaces shall be painted with Zinc Rich Paint.
- 7) Dispatch details such as consignor/consignee address, contract and case details, 'country of origin, port of delivery, stacking instructions shall be written on one of the side of boxes. An anodized aluminium plate as per details and specifications given in page 3 of 5 shall be provided on the boxes
- 8) One copy of packing slip wrapped in polythylene bag covered with suitable aluminium .packing slip holder to be nailed on the external surface of the box. One more copy 9f the packing Slip wrapped in polythylene bag to be kept inside the box at the prominent place.
- 9) **INDICATION MARKS ON THE BOXES:** Markings shall be provided on the boxes indicating position of Boxes for handling, storage and nature of consignment. For guidelines referred page 4 of 5. The ink issued for this purpose as well as for marking dispatch instruction shall be indelible/non-washable marking ink.
- 10) Each item as mentioned in BOQ shall be packed & supplied as a set comprising of required numbers of associated fasteners & hardware etc



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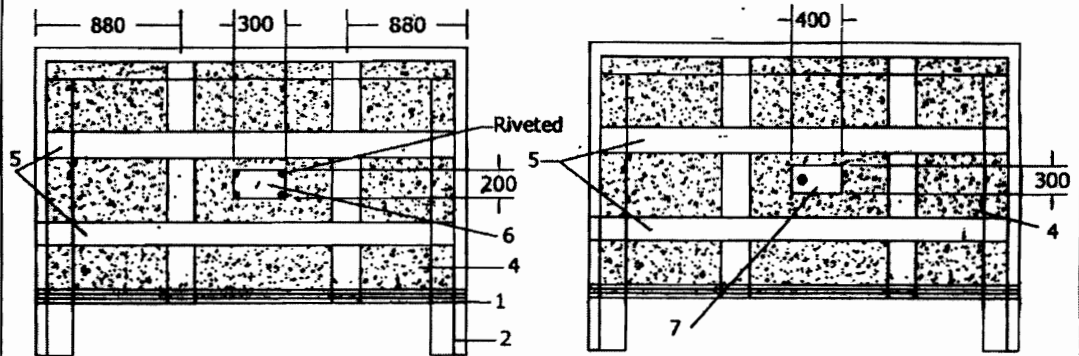
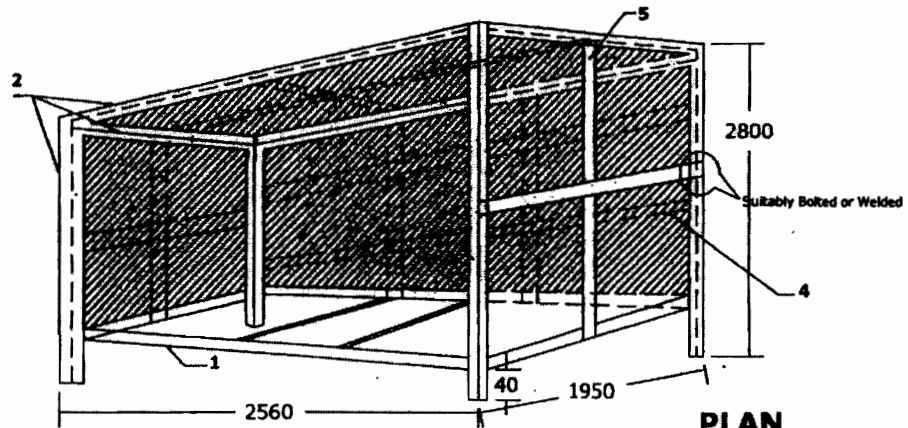
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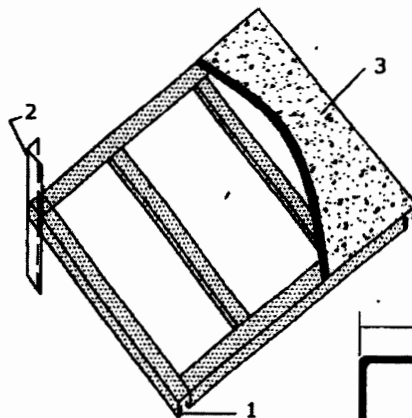
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### STEEL PACKING (TYPICAL DETAILS)



FRONT SIDE OF BOX

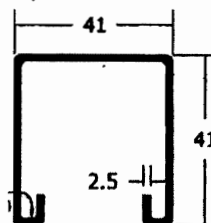
BACK SIDE OF BOX




BOTTOM FRAME ARRANGEMENT

#### Note:

1. "C" Channel to be used on Bottom Frame.
2. 50x50x6 Angle to be used Vertically on four sides of the Box and Horizontally on four sides on the top Frame.
3. 1.6mm thick sheet (plain) on Bottom Plate.
4. 1.0mm thick sheet to cover top & four sides of BOX.
5. 50x3 Flat as additional cross members to be used Horizontally & Vertically on top & Four Sides of Box.
6. Anodised Aluminium Plate for Marking.
7. Hinged Inspection Window.



DETAILS OF "C" CHANNEL

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### 11.3 PACKING FOR STATION LIGHTING SYSTEM

Aspects of packing specific to equipments / items of station lighting system are given here. All other instructions / aspects as per the main specification of export packing which are not covered here shall also be applicable.

#### 11.3.1 For LIGHTING TRANSFORMER, DISTRIBUTION BOARDS, LIGHTING PANELS,

- Construction of packing case for LIGHTING DISTRIBUTION BOARDS, LIGHTING PANELS, TRANSFORMER . shall be EITHER as per FIGURE 1,2,3,5,6,7,8,9,10,11 OR FIGURE 14,15,16.
- Each Panel/Transformer shall be individually covered with double polythene sheet of thickness 175 microns minimum.
- All the 6 inner surfaces of packing shall be nailed with bitumen coated hessian polythene craft paper. Wherever 2 pieces of craft paper are used, the joint shall have minimum overlap of 20mm.

For the top frame it shall be project on all sides by 100mm and shall be nailed on sides .

- The gap between the panels and packing case shall be filled with rubberized coir of thickness 50mm minimum and width 100mm. The distance between two consecutive supports of rubberized coir shall be less than 500mm.
- Silica get packed in cotton bags shall be placed at different positions inside the packing.
- Packing case shall be finally covered with GI sheet of thickness 0.4mm minimum.

#### 11.3.2 For LUMINARIES, RECEPTACLES. EMERGENCY LIGHT, 240/24V TRANSFORMER, CEILING FAN, SWITCH BOARDS, FLEXIBLE CONDUIT, WIRES, EARTH WIRE. JUNCTION BOXES, ERECTION COMMISSIONING SPARES, RECOMMENDED SPARES , ERECTION MATERIAL AND CONSUMABLES

- Construction of packing case for THE ABOVE MATERIAL shall be as per FIGURE 1to11.
- Items placed inside the case shall be covered with double polythene sheet of thickness 175 microns minimum.
- All the 6 inner surfaces of packing shall be nailed with bitumen coated hessian craft paper. wherever 2 pieces of craft paper are used, the joint shall have minimum overlap of 20mm. For the top frame it shall be project on all sides by 100mm and shall be nailed on sides.
- Silica get packed in cotton bags shall be placed at different positions inside the packing.

#### 11.3.3 For CONDUIT PIPE


As per international practice pipes are shipped in open bundles with metal strapping. Packing as per attached figure A shall be provided which is described as following:

- Each bundle shall be wrapped with 2 layers of 175 microns thick polythene sheet.
- Then bundle will be wrapped with bitumen coated hessian craft paper.
- Bundle shall be strapped with steel straps.
- An anodized aluminium packing description plate as per Figure No. 13 shall be provided.

#### 11.3.4 For POLES


Poles will be wrapped with 2 layers of minimum 175 microns thick polythene sheet and then with bitumen coated hessian craft paper, packed as per Figure – C i.e. bundling.

#### 11.3.5 For STRUCTURAL STEEL

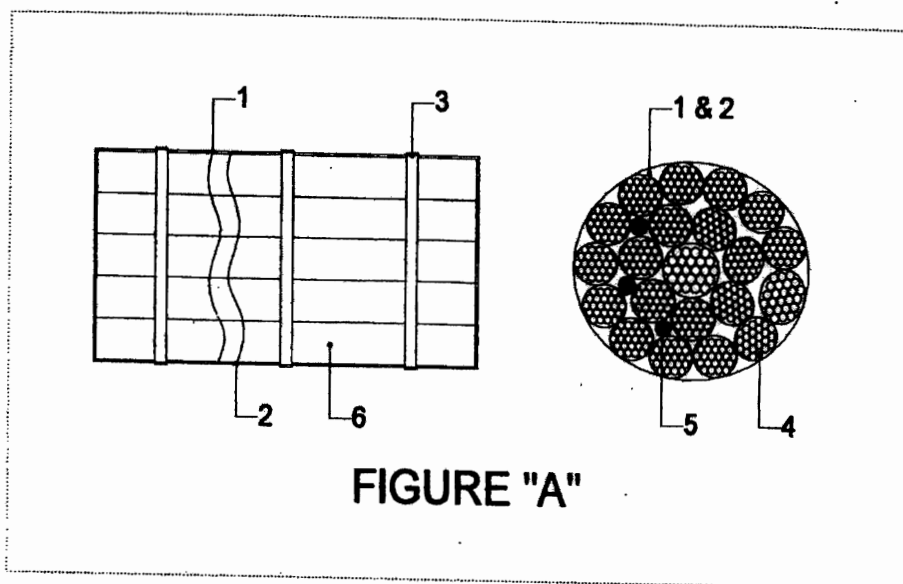
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Structural steel will be different sizes and shapes. Hence it will be packed as per Figure No. B and described as following :

- a) Each bundle shall be wrapped with 2 layers of 175 microns thick polythene sheet.
- b) Then bundle will be wrapped with bitumen coated hessian craft paper.
- c) Bundle shall be strapped with steel straps.
- d) An anodized aluminium packing description plate as per Figure No. 13 shall be provided.

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### **PACKING PROCEDURE FOR CONDUIT PIPE**



- 1) LAYER OF BITUMEN COATED HESSIAN KRAFT PAPER.
- 2) LAYER OF POLYTHENE SHEET.
- 3) METAL STRAPPING.
- 4) CONDUIT PIPES.
- 5) SILICA GEL POUCHES.
- 6) BUNDLES OF CONDUIT PIPES.

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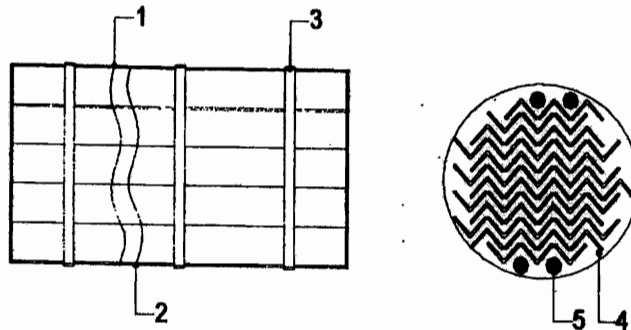
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**PACKING PROCEDURE FOR STRUCTURAL STEEL****FIGURE "B"**

- 1) LAYER OF BITUMEN COATED HESSIAN KRAFT PAPER.
- 2) LAYER OF POLYTHENE SHEET.
- 3) METAL STRAPPING.
- 4) STRUCTURAL STEEL.
- 5) SILICA GEL POUCHES.



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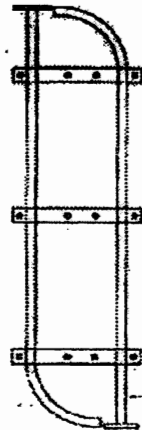
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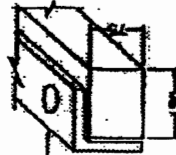
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## packing procedure for poles



POLES WRAPPED WITH POLYTHENE SHEET &  
EXTRUDING COATED HESSIAN CLOTH



TOP WOODEN BATTEN TO BE  
FIXED WITH 150x80x8 MM ON TOP  
OF IT FOR TIEING THE ROD  
25 MM DIA



BOTTOM WOODEN BATTEN TO BE  
FIXED ON 150x80x8 MM ANGLE

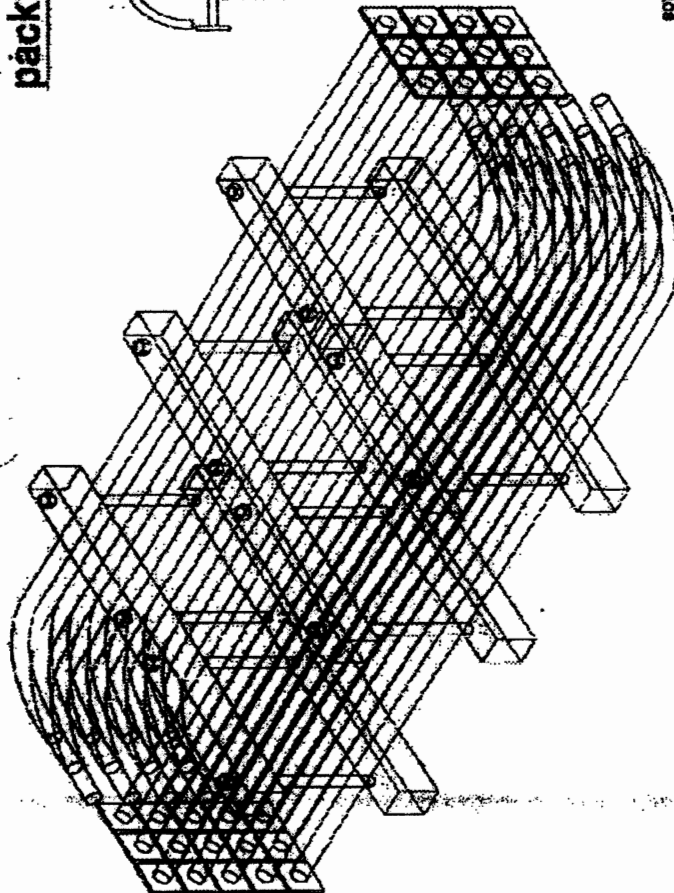



FIGURE "C"



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#### **11.4 PACKING FOR DC BATTERY**

The packing procedure for seaworthy packing of DC Battery is defined below, which is capable of withstanding impacts, compression, vibration, toppling, sea water spray, prevention against rust, temperature and extreme atmospheric conditions. Aspects of packing specific to equipments / items of DC Battery are given here. All other instructions / aspects as per the main specification of export packing which are not covered here shall also be applicable.

The packing procedure consists of various stages namely primary packing, cushioning, securing, desiccant, outside packing box, Runners/ sliders/ transverse bars of plywood, etc., provided for each movement.


- a) The packing boxes shall be made up of plywood boxes (thickness 9mm min.) with blocks at the bottom of the box for provision for handling the boxes using the forklift. The packing boxes sizes are generally standardized to half-euro size (capable of handling equipment's weight).
- b) Rubberized coir of 25mm thickness shall be provided as cushioning material at the bottom and thermocole of 20mm shall be provided inside on all four sides. Other than this polyethylene film wrap or cover also will be provided. Left out spaces to be filled with rubberized coir/ thermocol to get cushioning effect.
- c) Silica gel in dust free air permeable cotton/paper bag shall be placed in the packing boxes for storage period of 1 year as per IS 304 (1979)
- d) While packing the cells, transit caps (polypropylene) of red and blue shall be used for big size cells for ensuring that cells does not get damaged during the transport due to vibrations etc.
- e) The battery accessories shall be packed with suitable precautions as follows:
  - i) Copper connectors shall be packed after making bunches with lead wire seals to avoid misplacement.
  - ii) Hardware items shall be packed in polyethylene bags (Thickness  $\geq 0.175\text{mm}$ ) with item slip
  - iii) Battery rack shall be packed in dismantled condition, wrapped with polyethylene sheet
  - iv) For Ni-Cd type battery, electrolyte in solid form for dry cells shall be packed in cans with KOH, LiOH being packed separately.
  - f) Galvanized Steel straps are provided for binding the packing box sides.
  - g) The handling instructions shall be marked in indelible/ non-washable ink, indicating the upright position.

#### **11.5 PACKING OF SERVICE TRANSFORMERS(OIL FILLED) & ACCESSORIES**

This instruction is applicable for packing of transformers (oil filled), its accessories and components so as to ensure safe delivery to end user. Aspects of packing specific to equipments / items of transformers(oil filled) are given here. All other instructions / aspects as per the main specification of export packing which are not covered here shall also be applicable.

##### **11.5.01 PACKING DETAILS :**

- a) Items shall be packed in case / crates as per the shipping list.
- b) All fragile items and small items shall be packed in cases and to be marked as "Fragile, handle with care Fragile items".
- c) Fragile accessories are to be first packed in their original boxes (VENDOR's packing). Very

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- d small / delicate items such as glass thermometer, door keys shall be packed in separate box.
- d In case original box is found damaged, suitable alternate box or packing method using felt or foam sheet and polythene wrap to be used.
- e These boxes are then placed in identified wooden boxes. Inside of such boxes are lined with a layer of polythene sheet, packing wool / grass and another layer of polythene sheet before placing the boxes. All boxes are then wrapped with this polythene sheet before closing the box. Fragile items shall not be placed loose, one above the other inside the case.
- f All wiring cables, connection flats of non-ferrous materials, CTs, valves bellows shall also be packed.
- g Items like CTs, Oil communicating bushings, insulators, wired equipments and housings such as RTCC Panel, M. Box, Drive Mechanism, thermometers, gauges shall be wrapped in polythene from all around.
- h Buchholz relay and OSR relay openings will be blanked using covers, before putting them in the box
- i Items shall be carefully lowered and arranged inside the crate / case and each item shall be locked from all sides in such a way to avoid its movement in any way. Wooden stoppers and separators shall be provided for this and nailed to the crate / case wood.
- j Wooden planks and batons in contact with fragile items shall be provided with kit foam at the locations of contact.
- k Oil communication bushings shall be packed in separate case on V or U shape wooden felted supports, as in case of condenser bushings.
- l While placing and arranging the items inside the crates / cases, these shall be verified for correctness and then the packing note shall be signed. The cover top of the crate / case shall then be closed.
- m The main equipment like transformer tank shall be packed suitably to prevent any damage during transit / storage. Support structures like frame, header supports etc. shall be crated. Conservator headers shall also be crated. Radiators pipe work and other instruments & components shall be packed in cases. All the cases shall be lined with polythene from inside.

#### **11.6 ALTERNATIVE PACKING CASES FOR CONTROL PANELS AND SWITCH GEARS**

For Control and switch gear panels, construction of wooden packing cases may be provided as per fig 14 & 15 and as detailed below.

Thickness of planks for all sides, binding and jointing battens shall be at least 25 mm. Width of the plank shall be at least 125mm and that of binding and jointing planks shall be at least 100mm.


Top frame shall be suitable so that it does not collapse due to sandwiching between slings while lifting. Longitudinal and traverse bars for the bottom wooden pallet to be suitably selected.

Diagonal bracings shall be as per cl 9.3.1.3 and all other requirements shall be as per clauses 9.3.1.4 to 9.3.1.6.

#### **12.0 Containerization**

As required by BHEL, the VENDOR shall stuff the GOODS into 20 or 40 foot containers (dry, open top, flat racks, etc.).

The maximum inside dimensions of containers are to be considered:

	<b>TITLE</b>  <b>TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING FOR EXPORT JOBS</b>	<b>SPECIFICATION NO. PE-TS-888-100-A001</b>			
		<b>VOLUME II B</b>			
		<b>SECTION D</b>			
		<b>REV. NO. 0</b>	<b>DATE 10/08/2010</b>		
		<b>SHEET</b>	<b>51</b>	<b>OF</b>	<b>52</b>

- 40 foot containers: 11.80 m x 2.20 m x 2.05 m
- 20 foot containers: 5.80 m x 2.20 m x 2.05m
- 

The present definition of containerization is valid for sea containers only. Vendor to check the size of containers before start of packing of equipment.

#### **12.1 Protection of Cases/Crates**

Since shipping containers are in general not water tight, packing in contact with the floor of the container shall be raised in order to prevent it from being damaged by the accumulation of water.

#### **12.2 Mechanical Constraints**

The mechanical constraints for "general use" closed containers are of a different nature (height of "stacking" being limited inside the containers), the packing for the GOODS may be of a lighter structure. However, it is necessary that the packing be appropriate so as to protect the GOODS on site during the storage period, as required after discharging of the GOOD'S from the containers.

**Note:**

*It is the responsibility of the VENDOR to ensure that the cases/crates are stowed, secured and fastened inside the container. The VENDOR will take all necessary precautions to conform to the maximum weight allowed and the centre of gravity of the container. The securing and fastening of the cases/ crates can be carried out by nailing timbers on the bottom or on the vertical sides of the container.*

#### **13.0 Other Services to be provided by Vendor**

In addition to the packing and shipping documents, VENDOR must also carry out the following services, which shall be included in his quotation:

Carriage of VENDOR's sub-contracted equipment and material, which must be re-grouped in VENDOR's or PACKER's workshops, whilst waiting for packaging.

BHEL reserves the right to postpone the shipping of the GOODS. In this event, any storage and insurance costs during the first ninety (90) days shall be borne by the VENDOR.

Loading, including lifting, securing, lashing, and stowing, of all cases, crates, or packages onto means of transportation such as, but not limited to, trailers, containers, etc.

#### **14.0 Responsibilities and Guarantees**


VENDOR is responsible for the choice of category for packing according to the transport facilities used, and on the basis of the present document. In case of doubt or disagreement regarding the choice, VENDOR must inform BHEL prior to packing and await BHEL's approval. All phases of packaging, marking, loading, etc. will be subject to BHEL inspection.

BHEL reserves the right to reject the packing when the packing does not conform to these instructions and/or when the packing does not ensure perfect protection of the GOODS. VENDOR is responsible for the weights and dimensions declared, and the marking of the packages.

The documents must be in strict conformity with the packing contents.

The packing specified in these "Packing, Marking and Shipping Instructions" is guaranteed for a twelve (12) months storage period after delivery on site.

VENDOR is responsible for providing storage recommendation adapted to the GOODS. According to this guarantee, VENDOR is held responsible in the event of goods becoming

	<b>TITLE</b>  <b>TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING FOR EXPORT JOBS</b>	SPECIFICATION NO. <b>PE-TS-888-100-A001</b>	
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useless, damaged or broken, as a result of poor packing and/or stowing, or due to corrosion, subsequent to insufficient or inadequate protection. All direct or indirect costs resulting thereof, will be back-charged to VENDOR.

**LT MOTOR: PROJECT SPECIFIC DETAILS**  
**Panki FGD (Slurry Pumps)**

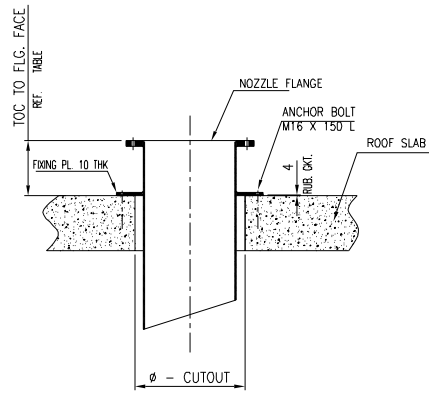
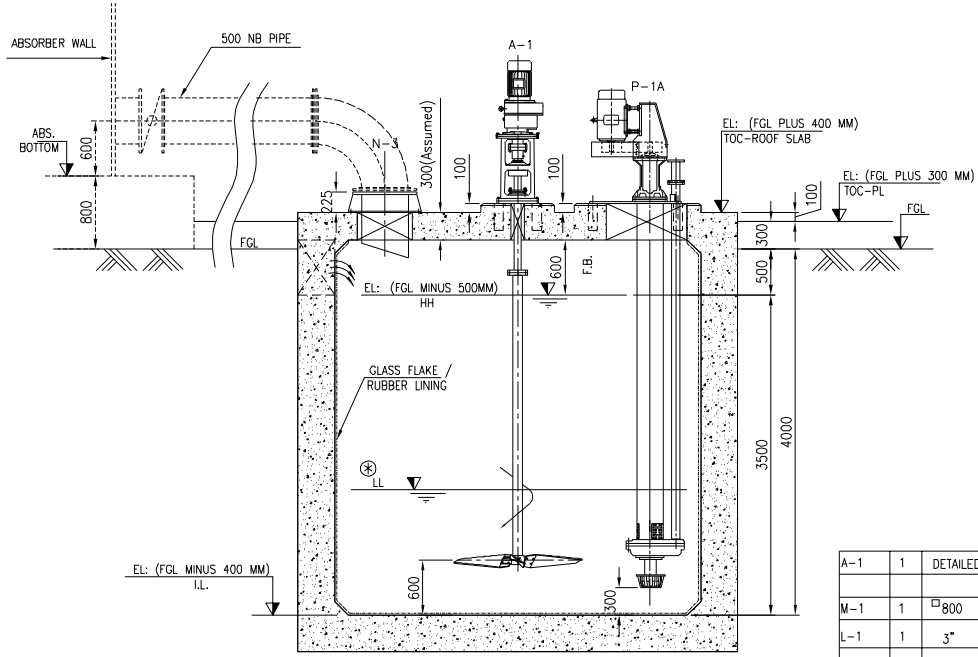
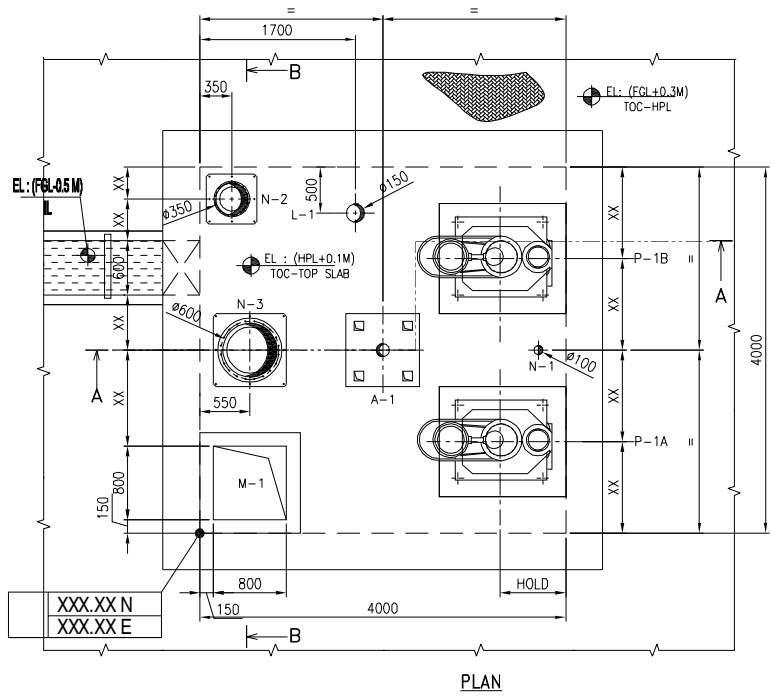
**INDENT NO: RFW11279, RFW11279, RFW11279**

**ANNEXURE: R4U2: I**

**Customer No: R4U2**

<b>ENERGY EFFICIENT</b>	IE3
<b>SUPPLY</b>	As per Cl. 2.5 in specification TECI: LT MOTOR: REV 05
<b>STARTING CURRENT</b>	As per IS 12615
<b>RATIO OF LOCKED ROTOR KVA TO KW</b>	
i) 50KW to 110KW	10
ii) 110KW to 200KW	9
<b>MIN. SPACING BETWEEN GLAND PLATE AND CENTER STUD(IN MM)</b>	
upto 3KW	As per manufacturer's practice
above 3KW and upto 7KW	85
above 7KW and upto 13KW	115
above 13KW and upto 24KW	167
above 24KW and upto 37KW	196
above 37KW and upto 55KW	249
above 55kw and upto 90KW	277
above 90KW and upto 125KW	331
above 125KW and upto 200KW	203
<b>PHASE TO PHASE/PHASE TO EARTH AIR CLEARANCE(IN MM) IN TERMINAL BOX</b>	
upto 110	10
above 110kw and upto 150KW	12.5
above 150KW	19
<b>ADDITIONAL DATA TO BE INCLUDED IN DATASHEET</b>	
GRADE OF BALANCING OF MOTOR	
STANDARD CONTINUOUS RATING AT 40DEG.C AMBIENT	
DERATED RATING OF MOTOR AT 50DEG.C(DESIGN POINT)	
NO LOAD CURRENT OF MOTOR AT RATED VOLTAGE AND FREQUENCY	
STARTING TORQUE VALUE IN KGM	
LOCKED ROTOR KVA @ RATED KW	
POWER FACTOR AND EFFICIENCY AT 75% LOAD	
POWER FACTOR AND EFFICIENCY AT 50% LOAD	
<b>SPACE HEATER TERMINAL</b>	Separate terminal box shall be provided(if applicable)
<b>PAINTING</b>	631 ASPER IS 5

Annexure : R4U2 : J

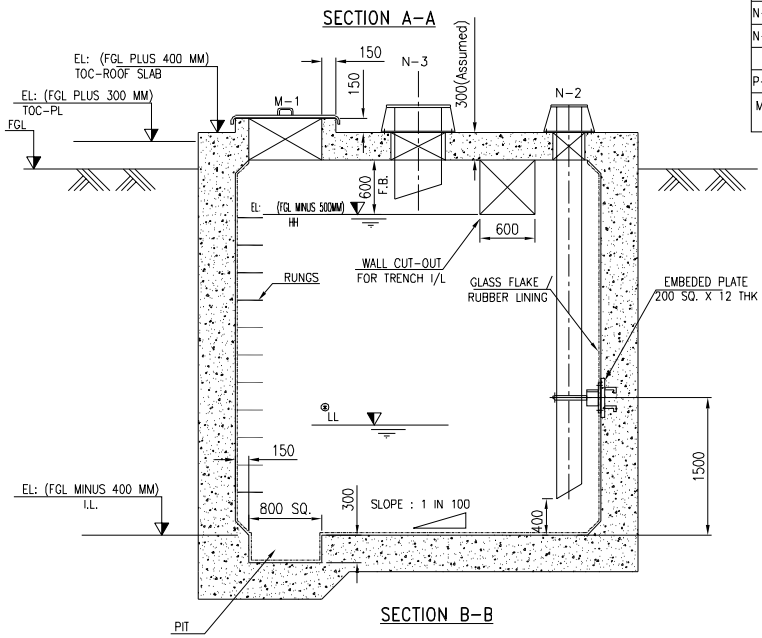


TYP. NOZZLE FIXING DETAIL

A-1	1	DETAILED	—	—	AGITATOR CONN.	--	DETAILED	
M-1	1	800	—	—	MANHOLE	--	800	WITH COVER
L-1	1	3"	ASME 150 <sup>LB</sup> SO	FF	LEVEL TRANSMITTER	200	Ø150	
N-3	1	20"	ASME 150 <sup>LB</sup> SO	FF	LIQUID INLET(ABS. DRAIN)	225	Ø600	
N-2	1	10"	ASME 150 <sup>LB</sup> SO	FF	LIQUID INLET(OVER FLOW)	200	Ø350	EXTENDED INSIDE
N-1	1	2"	ASME 150 <sup>LB</sup> SO	FF	PUMP DRAIN	200	Ø100	
P-1 A/B	2	DETAILED	—	—	PUMP	--	DETAILED	
MARK	Nos.	SIZE	RATING	FACING	SERVICE	TOC TO FLG. FACE	SLAB CUTOUT SIZE	REMARKS

- NOTES :
1. ALL DIMENSION ARE IN MILLIMETER AND ELEVATION ARE IN METER.
  2. SUITABLE DYNAMIC LOAD SHALL BE CONSIDERED FOR ROTARY EQPT . FDN. DESIGN.
  3. SUMP BOTTOM FLOOR SLOPE SHALL BE MAINTAINED TOWARDS PIT.
  4. SUMP INSIDE SURFACE SHALL BE GLASS FLAKE LINED.
  5. DIMENSION MARKED WITH 'XX' SHALL BE FURNISHED INLINE WITH LAYOUT, PUMP GAD REQUIREMENT.
  6. LL LEVEL SHALL FIXED BY BOI GROUP (BASED ON AGITATOR / PUMP REQUIREMENT)
  7. A-1(AGITATOR SLAB CUTOUT) AND P-1 A/B(PUMP SLAB CUTOUT) WILL BE BASED ON VENDOR DETAILS TO BE OBTAINED FROM BOI GROUP.
  8. M-1, L-1, N-2, N-1 WILL BE STANDARD CUTOUTS AS PER THE SIZES MENTIONED ABOVE.
  9. N-3(ABS. DRAIN CUTOUT) TO BE TAKEN BASED ON THE ABS. DRAIN PIPE SIZE IN ABS. P&ID FROM PROCESS GROUP.

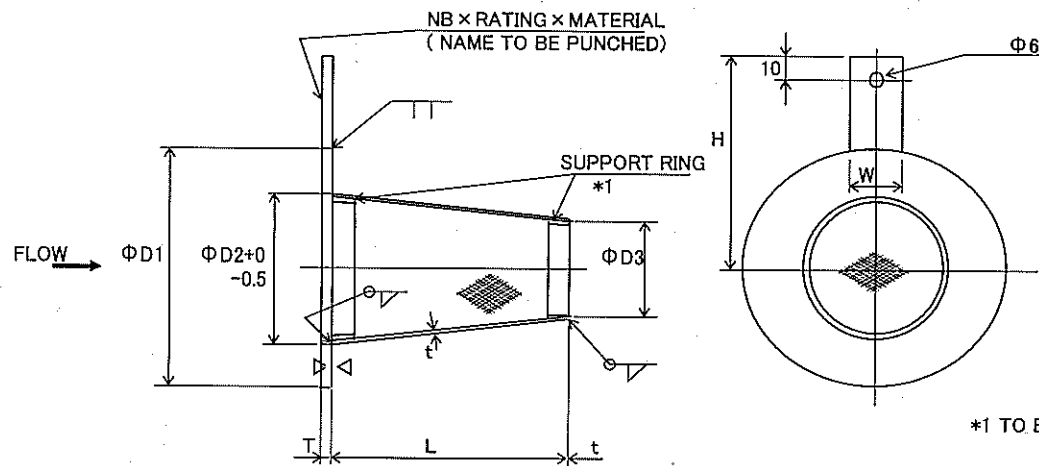
- LEGEND :
- FGL - FINISHED GRADED LEVEL
  - FFL - FINISHED FLOOR LEVEL
  - PL - PAVED LEVEL
  - L - INVERT LEVEL
  - STURDY DRAIN CHANNEL
  - PAVED LEVEL



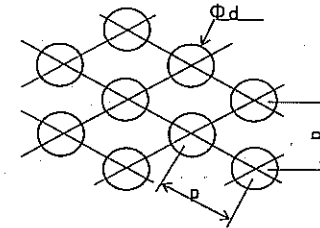
GENERAL ARRANGEMENT DRAWING OF ABSORBER AREA DRAIN SUMP

**Annexure : R4U2 : K**

### DIMENSIONAL LIST FOR TEMPORARY STRAINER



\*1 TO BE DETERMINED BY VENDOR

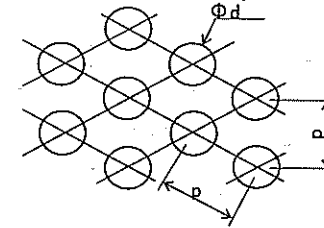
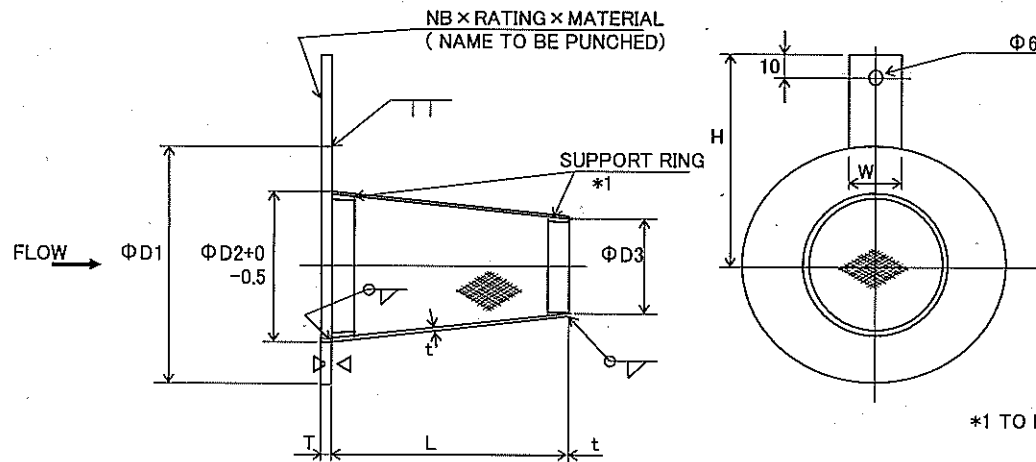


## PUNCHING METAL DETAIL

	d	p
$700A \geq$	6	8
$750A \leq$	12	15

[illegible]

### DIMENSIONAL LIST FOR TEMPORARY STRAINER



PUNCHING METAL DETAIL

\*1 TO BE DETERMINED BY VENDOR

	d	p
$700A \geq$	6	8
$750A \leq$	12	15

◇ 追加

NOMINAL SIZE		D1		D2	D3	H		L	t	T	W
(A)	(B)	GB 1.6MPa									
25	1	71		15	15	107		80	2.3	3.2	25
40	1 1/2	92		25	18	117		80	2.3	3.2	25
50	2	107		35	22	130		80	2.3	3.2	25
65	2 1/2	127		50	35	142		80	2.3	3.2	25
80	3	142		80	37	148		100	2.3	3.2	25
100	4	162		80	50	167		100	2.3	3.2	25
125	5	192		105	55	197		110	2.3	3.2	25
150	6	218		125	65	209		130	2.3	3.2	25
200	8	273		175	95	241		180	2.3	3.2	25
250	10	329		225	130	278		220	2.3	4.5	32
300	12	384		275	165	316		270	2.3	4.5	32
350	14	444		300	190	342		300	2.3	4.5	32
400	16	495		340	220	374		300	2.3	4.5	32
450	18	555		390	240	393		300	2.3	4.5	32
500	20	617		430	270	426		350	3.2	6	32

[illegible]



テンポラリーストレナー数量表

[illegible]

注：本表に記載の数量は見積用とし、発注数量は当社資材より発行される注文書によること。

Enqslno	Materialcode	Description	Lot no	Qty	Unit	Dely dt	Destination	Bidder response
1	RFW112790001	LIMESTONE SLURRY FEED PUMP WITH MOTOR & ACC., FLOW-47M3/HR & HEAD:35 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	2	ST	24-Mar-22	Stores/BHEL Site Office	
2	RFW112790002	GYPSUM BLEED PUMP WITH MOTOR & ACC., FLOW 98M3/HR & HEAD 60 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	2	ST	24-Mar-22	Stores/BHEL Site Office	
3	RFW112790003	FILTRATE WATER TANK PUMP WITH MOTOR & ACC. FLOW 81M3/HR & HEAD 25 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	2	ST	24-Mar-22	Stores/BHEL Site Office	
4	RFW112790004	SECONDARY HYDROCYCLONE FEED TANK PUMP WITH MOTOR & ACC. FLOW 57M3/HR & HEAD: 45 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	2	ST	24-Mar-22	Stores/BHEL Site Office	
5	RFW112790005	AUXILIARY ABSORBENT TANK PUMP WITH MOTOR & ACC. FLOW 75 M3/HR & HEAD 25 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	2	ST	24-Mar-22	Stores/BHEL Site Office	
6	RFW112790006	ABSORBER AREA DRAIN SUMP PUMP WITH MOTOR & ACC. FLOW 160 M3/HR & HEAD 30 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	1	ST	24-Mar-22	Stores/BHEL Site Office	
7	RFW112790007	GYPSUM AREA DRAIN SUMP PUMP WITH MOTOR & ACC. FLOW 50 M3/HR & HEAD 25 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	1	ST	24-Mar-22	Stores/BHEL Site Office	
8	RFW112790008	LIMESTONE AREA DRAIN SUMP PUMP WITH MOTOR & ACC. FLOW 50 M3/HR & HEAD 25 METER OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	1	ST	24-Mar-22	Stores/BHEL Site Office	
9	RFW112790009	WASTE WATER TANK PUMP WITH MOTOR & ACC. FLOW 26 M3/HR AND HEAD 35M OF SLURRY COLUMN. AS PER TECH. SPEC. ROS:9081, REV:00 & RELEVANT ANNEXURES.	1	2	ST	24-Mar-22	Stores/BHEL Site Office	
10	RFW112800001	SUPERVISION FOR ERECTION & COMMISSIONING OF SLURRY PUMPS WITH MOTOR AND ACC. AS PER TECH. SPEC. ROS:9081, REV:00 & RELVE NT ANNEXURES PANKI (1X 660MW) PROJECT.	1	1	LT	24-Mar-22	At Site	
11	RFW112810001	MANDATORY SPARES FOR SLURRY PUMPS WITH M OTOR AND ACC AS PER TECH. SPEC.ROS:9081, REV:00 & RELEVANT ANNEXURES AT PANKI P ROJECT.	1	1	ST	31-Jul-22	BAP Ranipet Stores	

Sl. No	Annexure-C for Commercial Terms and Conditions	SUPPLIER COMMENTS: REQUESTED TO OFFER EITHER CONFIRMED OR ACCEPTED OR REMARKS IF ANY DEVIATION IS TAKEN
1	<p><b>Terms of Delivery and Location for Indian Supplier:</b> Destination for main supply is STORES/BHEL SITE OFFICE Panki. (Cost, Packing, Forwarding ,Freight &amp; Insurance etc., are in Supplier's scope i.e. included in the quoted prices.), non acceptance of terms of delivery is laible to rejection.</p> <p><b>Terms of Delivery and Location for Foreign Supplies Supplier:</b> Destination is CFR Chennai port(Cost, Packing, Forwarding ,Freight &amp; Insurance etc., are in Supplier's scope i.e. included in the quoted prices.), non acceptance of terms of delivery is laible to rejection.</p> <p>Evaluation will be done on grand total Package basis and Total cost to BHEL.</p>	
2	Drawings, Data sheets, vendor list etc are to be submitted along with tender documents and soft copy to be uploaded. Specific confirmation to be given.	
3	Packing drawing should be submitted along with technical documents. This will also to be evaluated and approved.	
4	Quoted currency should be evaluated in Indian Rupee( INR) only on total cost to BHEL.	
5	<b>Delivery Period:</b> Delivery Period: To mention clearly the exact delivery period from date of drawing,data sheet, MQP approval and manufacturing clearance as it attracts contractual penalty on delays.Delivery is the essence of the contract.	
6	<p><b>Terms of payment for Indeginous suppliers:</b></p> <p><b>1. Main supply:</b> 90 % payment will be made directly thru' EFT within 45 days for MSE Vendors and 90 days for Non-MSE vendors from the date of receipt and acceptance of materials at BHEL Site with submission of PBG.</p> <p>If the site is not ready for 2 years from the date of supply, then this balance 10% payment for the supply portion may be released within 45 days with the equivalent value of BG, valid for 2 years or till completion of E&amp;C, whichever occurs earlier.</p> <p><b>2. Supervision of E&amp;C:</b></p> <p>100% Supervision charges for erection and commisiong (E&amp;C) will be paid within 45 days for MSE /90days for non-MSE on successful completion of E&amp;C agaisnt submiision of invoice with E&amp;C completion certificate issued by BHEL site officials.</p> <p><b>3. Mandatory spares:</b></p> <p>100% within 45 days for MSE vendor and 90 days for Non MSE vendor for enquiry Sl.No 3 &amp; 4 agaisnt receipt and acceptance of material at Stores/BHEL/Ranipet-6.</p> <p>If any supplier is asking for payment terms other than the above specified, then suitable loading on cost will be considered. Loading of any deviation in the payment terms w.r.t tender terms will be "MCLR rate of State Bank of India (SBI) (as applicable on the date of bid opening: Techno-commercial bid opening in case of two part bids) + 6%, will be considered for loading for the periods of relaxation sought by bidders. (For detials PI ref Annexure-B-General Terms and conditions.). All bank charges are to seller's account.</p> <p>(4). No advance payment is applicable.</p> <p>(5). No LC payment term is applicable.</p>	
	<p><b>Terms of Payment for Foreign Suppliers:</b></p> <p><b>1. Main Supply:</b>"90% thru' irrevocable &amp; unconfirmed LC with 60 days usance period from the date of submission of negotiable documents. LC will be establied within 3 months prior to PO delivery date through any one of our Bankers listed elsewhere in the tender conditions for 90% value (less Agency Commission, ifany ) valid upto the PO delivery period and 21 days thereafter for negotiation.</p> <p>If the site is not ready for 2 years from the date of supply, then this balance 10% payment for the supply portion may be released within 45 days with the equivalent value of BG, valid for 2 years or till completion of E&amp;C, whichever occurs earlier.</p> <p><b>2. Supervision of E&amp;C:</b></p> <p>100% Supervision charges for erection and commisiong (E&amp;C) will be paid within 60 days on successful completion of E&amp;C agaisnt submiision of invoice with E&amp;C completion certificate issued by BHEL site officials.</p> <p><b>3. Mandatory Spares :</b>100% payment will be made directly thru' irrevocable &amp; unconfirmed LC with 60 days usance period from the date of submission of negotiable documents.</p> <p>All bank charges in India to BHEL's account and all bank charges outside India are to Supplier's account.</p> <p>4 . No advance payment is applicable.</p> <p>BHEL reserves the right to load the price of foreign suppliers in order to bring them on common platform as per Indigenou Suppliers on the account of differential payment terms to Indigenou Suppliers. Loading of payment terms will be "MCLR rate of State Bank of India (SBI) (as applicable on the date of bid opening: Techno-commercial bid opening in case of two part bids) + 6%, will be considered for loading for the periods of relaxation compared to 60 days usance period.</p> <p>Other than BHEL preferred payment term, any demurrage or any penalty arrising out of delay in submission of documents or any other financial implications encountered by the act of bidder/s or supplir/s during the clearance of the goods at customs/ports, will be borne by the bidder/supplier and will be deducted from the supply invoice.</p>	

7	<p><b>Contract Execution Bank Guarantee (CEBG):</b> The Supplier shall submit a BG for 2% of the contract value valid for the agreed delivery period + 3 Months.</p> <p>Attached CEBG Format is to be signed and submitted along with Annexure-C as a token of acceptance. Please note that no deviation is allowed.</p> <p>If not accepted, offer is liable to rejection.</p> <p>Suppliers who are already registered with BHEL and having a vendor performance rating of A or A+ grade would be exempted from submission of CEBG</p>	
8	<p><b>PERFORMANCE BANK GUARANTEE (PBG): 10% OF ORDER VALUE is required as PBG</b> for a period of 27 months from the date of SRV/Site Acknowledgement (including 3 months retention period).</p>	
9	<p><b>OFFER Validity:</b> Minimum 120 days shall be offered from the date of Techno Commercial Bid opening (Part-I). The specific acceptance for this offer validity is must. Not providing bid validity minimum 120 days is liable to rejection.</p>	
10	<p><b>Clientele List:</b> Supplier to submit detailed clientele list with their full address including detail of contact person with phone no., fax no. &amp; e-mail ID as per respective clause of Annexure - B (General terms and Conditions).</p>	
11	<p><b>Price bid opening through Sealed Bid:</b> The price bid finalisation shall be done through sealed bid and for more details please refer Annexure-B (General terms and Conditions).</p>	
12	<p><b>Test Certificate:</b> To be submitted with Chemical and Mechanical properties and dimensions as per the Standards and Technical Delivery Conditions as mentioned in Technical Specification.</p> <p>The Test Certificate shall be as per Annexure Q.</p>	
13	<p><b>QP:</b> Specific conformation to Submission of manufacturer/vendor quality plan for our review and approval and shall be as per annexure Q.</p>	
14	<p><b>Guarantee Certificate :</b> Please conform furnishing guarantee certificate in BHEL format for 18 months from the date of commissioning or 24 months from the date of last despatch whichever is earlier.</p>	
15	<p><b>Warranty</b> shall be as per technical specification</p>	
16	<p><b>Inspection before despatch:</b> Inspection before despatch at supplier's works by BHEL / BHEL appointed Inspection agency / Customer / Customer appointed inspection agency.</p> <p>Other details shall be as per Annexure Q.</p>	
17	<p><b>Liquidated Damages (LD) :</b> The applicable LD shall be at the rate of 0.5% per week to maximum of 10% PO Value. Delivery being the essence of BHEL's contract requirements, in the event that a Supplier does not accept the above LD condition, the offer would be loaded to the extent of the shortfall with respect to upper limit specified above. Date of material receipt at our stores/ at Site Office will be considered as the 'Delivery date as mentioned in purchase order for Indian Suppliers.</p> <p>In case of foreign suppliers, LD will be considered from the date of bill of lading.</p>	
18	<p><b>Risk Purchase Clause:</b> As per clause-I of Annexure-B page no 17, Supplier Confirmation is Required.</p> <p><b>Non acceptance to risk purchase clause may leads to rejection of offer.</b></p> <p><b>Hence bidders are requested to accept risk purchase clause and no clarification on this will be entertained.</b></p>	
19	<p><b>GST</b> in % (FOR INDIGENOUS SUPPLIER): To be indicated by the supplier. GST invoice is required for availing Input Tax Credit and conformation to pass on ITC.</p>	
20	<p><b>GSTIN</b> of the supplier/Works.</p>	
21	<p><b>HSN Code(S)</b> of the items offered.</p>	
22	<p><b>Firm Price:</b> Prices shall be kept firm till completion of supplies and acceptance of materials at BHEL Project Sites.</p>	
23	<p>Supplier Registration Form- Online submission is to be done and soft copy of the same to be uploaded along with Technical Bid by new vendors.</p>	
24	<p><b>MSE / Non MSE Status with support documents.</b></p>	
25	<p>Approximate weight and cubage of the consignment.</p>	
26	<p>Contact details of bidders: Contact persons Name/Designation/Mobile No/Email ID/Fax No/Phone No etc. should be furnished.</p>	
27	<p>Pointwise conformation/acceptance or comments to our technical specification is must and Each page shall be signed BY THE BIDDER and affixed the official seal.</p>	
28	<p>Deduction of Income Tax:</p> <p>(i) TDS shall be deducted, as applicable, for the supervision of Erection &amp; Commissioning Charges.</p> <p>(ii) TDS return shall be filed and TDS certificates shall be issued by BHEL .</p>	
29	<p>For this public procurement (preference to make in India), order 2017 dt 15.06.2017, 28.05.2018 &amp; 04.06.2020 and subsequent order issued by the respective nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/WO against this NIT.</p> <p>In the event of any nodal ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.</p>	

30	Class I local supplier: Minimum Local content shall be 50%. Class II local supplier: Minimum Local content shall be between 20% to 50%. Non-Local supplier: Minimum Local content shall be below 20% Please furnish details of location where this value addition has been done ( .....).	
31	Margin of purchase preference to make in India shall be 20%.	
32	False declaration will be in breach of the code of integrity under Rule 175 (i)(h) of the General Finance Rule for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the General Finance Rules along with such other actions as may be permissible under Law.	
33	Vendor shall duly filled and submit the MII local content delcaration form as given in the tender.	
34	Vendor shall duly filled and submit the eligibility criteria form as given in the tender.	
35	Vendors, from the countries sharing land border with India will eligible for bidding, if vendor registered with competent authority (ref.DoE OM no. F.18/37/2020-PPD Dated 08.02.2021). The certificate to be submitted along with offer	
36	6 sets of O&M Manual to be submitted along with supply of material. Soft copy of O&M manual to be furnished as a part of offer.	

Sl.No	Annexure - F for Foreign Company / Principal / Mill / Manufacturers	Supplier Comments with necessary supporting documents
1	Name and Address of the Company	
2	Contact Details of Company : Contact person / Designation / Mobile No / Email ID / Fax No / Phone No etc.,	
3	Is the company already registered with any of the BHEL units?. If so details may please be given.	
4	Nature of Business and line of products with respective HSN	
5	Production Capacity per Annum with detailed Manufacturing / Testing Facilities. If required supporting documents shall be uploaded	
6	Report from third party business rating agencies like Dun & Brandstreet, Credit Reform etc.,. For any new supplier this document is mandatory and without which submitted offer is liable for rejection.	
7	Experience list / Performance Certificate for Offered / Similar products : Requested to attach list of present customers with name, address and contact details i.e. email/Phone No etc., for offered / similar type and size of item and equipment with whom you have continuous business since last three years.	
8	Framework Confidentiality Agreement cum Undertaking to be submitted along with offer.	
9	If Foreign Company/Principal/Mill/Manufacturers refuses to deal directly with BHEL (to be put on record) and insists on availing the services of an Indian Agent, deed of agency agreement between the Foreign Company / Principal / Mill / Manufacturers and Indian agent should necessarily be submitted. If not submitted offer is liable for rejection.	
10	In cases other than Indian Agents, valid authorisation certificates are to be submitted. However such authorisation certificates will be examined for technical suitability ,quality, guarantee, warranty, after sales support etc., If not submitted, offer is liable for rejection.	
11	For a document in language other than English, a self-attested English translated document to be attached	
12	Dealer / Trader / Distributor / Stockist / Channel Partners / Holding Company / Non-Manufacturer needs to submit an Authorization Certificate, clearly indicating the validity period as well as rights granted by respective Foreign Company / Principal / Mill / Manufacturers to them. i.e. to negotiate / quote / supply / after sales service etc	
13	Quality - Requested to enclose copy of certificate for Quality Management System (QMS) obtained and Table of Contents of quality manual.	
14	If not certified for ISO 9001, requested to enclose copy of Company owned Quality Management System or written down procedure	
15	Banker's Certificate- Requested to enclose banker's certificate certifying credit worthiness.	

**ANNEXURE –B**  
**GENERAL TERMS & CONDITIONS**  
**(FOR GUIDANCE TO THE SUPPLIERS)**

**A] Submission of Offer**

**a) Invitation for bid**

Tenders are invited through electronic mode from eligible suppliers in case of open tenders and from suppliers to whom the enquiry is addressed in case of Limited / Single Tender.

The offers shall be posted into the system before the date and time specified in the tender.

The offer shall be sent on single part / two part / three part basis as specified in the main tender document.

Bids shall be submitted through e-Procurement portal, <https://bhel.abcprocure.com> of M/s e-Procurement Technologies, Ahmedabad who is our solution provider.

**b) Hardware and Software requirements for participating in e-tender**

Requirement for participating in e-Procurement is as under:

- i) A Computer with internet connectivity (Internet Explorer 9.0 (32.bit Browser only) & above)
- ii) Digital Signature Certificate (Class 3- SHA2-2048 BIT- with both Signing and Encryption component separately).
- iii) JAVA (Version 1.8 Update 45).
- iv) Steps for Hardware and software configuration is detailed at <https://bhel.abcprocure.com/EPROC/> under title “Minimum system requirements and Settings Document for BHEL User and Bidders”. **c) Instructions for Registered Suppliers**

For all types of tenders (Single / Limited / Open) an automated email alert regarding issue of the Tender will be sent by the e-procurement portal to all Suppliers registered with BHEL, Ranipet for the item/s for which the tender is issued.

In case of open tenders, Registered suppliers with registered DSC will have to login with their user id/password & DSC and search for the Open Tender. To participate in event and to submit bid, a bidder needs to agree the terms and conditions.

Registered suppliers without DSC will have get their profiles approved by mapping DSC after login.

To know the procedure for obtaining Digital Signature Certificate (DSC), suppliers who are not having the DSC are advised to visit our website [www.bhel.com](http://www.bhel.com) →Tender Notifications →Sample Checklist. **d) Instructions for new suppliers wishing to bid against open tenders**

New, unregistered suppliers wanting to bid against open tender/s will have to first register themselves in <https://bhel.abcprocure.com> as new supplier by clicking the “Register” button.

After entering the Income Tax Permanent Account Number (PAN) details and pressing “Enter”, they have to select the respective BHEL Unit for which they want to participate in the Open Tender and also fill up other relevant Company information as a one-time activity. On successful registration, your profile will be approved by the authorized officer and you can login to portal and can participate in the procurement event.

To participate in a tender, you need to login to the portal. You must be an approved registered user. If you are not a registered user, you can register yourself by clicking upon the “Register” link. You need to have a valid vendor code and password to login to the portal. Enter your Vendor code, password and click on Login button after Login, you need to select your digital signing and encryption certificates certificate. The DSC will be approved by M/s e-Procurement Technologies/ Authorised officer of BHEL.

As required by the tender, the necessary documents have to be filled-in online, in the provided template. Additional documents required are to be scanned and uploaded as .pdf file. Suppliers are advised to take note that the maximum space that is provided for uploading the documents that are to be attached is 300 MB. However the size of an individual document cannot exceed 10 MB. For any clarification on submission of offer on line, attention of the Supplier/s is invited to our document “Bidder Manual for BHEL Bidders” hosted in the home-page of the e-procurement portal. During normal business hours, helpline maintained by the service provider M/s e-Procurement Technologies is available for clarifying any doubts of supplier/s. The helpline numbers are +91-79-40270599/508/560/590/513 and email id is: [Bhel.Support@abcProcure.com](mailto:Bhel.Support@abcProcure.com) . Bidder can also refer to “Bidder Manual for BHEL Bidders” hosted in the home-page of the e-procurement portal <https://bhel.abcprocure.com>.

Typical documents that would be required as part of tender submission would be a)

**Complete technical Offer** with details, catalogues, as applicable.

- b) **Un-priced bid** (i.e. Bid without the Price) as per given format, if any.
- c) **Filled-in BHEL’s Standard Terms & Conditions** as per Annexure enclosed with the Tender Document,
- d) **Deviation summary** submitted in two parts – giving the summary of technical deviations separately and the commercial deviations separately, if any and
- e) **Supporting documents** to substantiate equivalent material specifications / sections, where quoted for.
- f) Where asked for, **Client list** with their full address including detail of contact person with phone no., fax no. & e-mail ID (if any) to whom the same / similar items are supplied in the past two years. The date of supply may also be indicated, against each client.
- g) Suppliers can also upload their credentials by way of submission of Performance certificate/s issued by their customer/s detailing the quantity supplied and specification along with the un-priced PO copies and proof of supply along with the offer.

**Technical acceptance of offer by BHEL shall be based on the evaluation of offer and the submitted documents.**

- h) **Bidders who are not already registered with BHEL Ranipet** are requested to submit the Supplier Registration Form (SRF) online (<http://supplier.bhel.in/>) for evaluating and registering as an approved vendor. The Supplier Development Cell (SDC) of BHEL, Ranipet would process the SRF for evaluation / registering the Supplier. Don’t send hardcopies of SRF to BHEL-Ranipet, **only** online submission is accepted. This registration process is a separate / parallel activity and do not mix-up with submission offers.



**Note**

- (i) The materials offered, shall conform to the specification and scope attached in the tender.
- (ii) In case the offered materials are not conforming to the Enquiry material Specification, such offers would not be considered for evaluation and would be rejected.

Where equivalent specifications are offered, considering such offers will be at the sole discretion of BHEL. Wherever alternative standards / specifications are offered by Bidder, the Bidder shall provide sufficient documentary evidence to ensure equivalence to the designated standards / specifications, failing which the offer would be considered as not technically acceptable and hence shall stand rejected.

- (iii) All taxes and duties payable as extra to the quoted price should be specifically stated in offers (as appearing in the online template).

Offer/s from within India shall be submitted along with the applicable HS Number and the applicable Goods & services Tax (GST) for each quoted item, failing which the purchaser will not be liable for payment of such taxes and duties. Our GST No: **33AAACB4146P2ZL**.

- (iv) The un-priced bid shall be used to indicate relevant commercial terms such as scope of freight and insurance, applicability of duties and taxes etc. All Commercial terms are to be indicated clearly in the offer.

- (vi) No changes shall be entertained once the bid is opened unless otherwise specifically agreed to in writing by BHEL.

- (vii) Money values other than for those items appearing in the un-priced bid template shall not be indicated anywhere in the un-priced bid.

- (viii) Time required for inspection (at Supplier's works), should be clearly given in terms of numbers of working days.

- (x) **Offers sent by FAX / E-mail:** would not be entertained.

- (xi) Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.

- (xii) Registration process for items required by BHEL is always open at <https://supplier.bhel.in>. Prospective suppliers (including MSEs & owned by SCs/STs) may visit this site and apply for registration in the respective Unit.

**Price Bid** in conformance with the specification and terms as given in the Un-Priced bid document.

**Caution on submission of price bids thru EPS:**

*The suppliers are severely cautioned to note that the price bid document accepts the price in figures only. It does not allow the supplier to write the value by words. Therefore all care shall be exercised by the supplier while filling in the figures. Once the price bid is opened no option is available for the supplier to retract the offer under any grounds. If a supplier, for any reason whatsoever approaches BHEL with a request for change in the price, it would be treated as going back on the offer submitted. In such cases, action would be initiated by BHEL for suspending further business dealings with such suppliers as per policy of BHEL which prevails at that point of time.*



**Foreign / Overseas suppliers are hereby informed that offers with differential currencies are not permitted for a given tender document.**

**Note**

- (i) The price break-up should be in line with technical specification / scope of the tender. (Cost of material, packing charges, forwarding charges, freight and insurance charges shall be shown appropriately, as applicable).
- (ii) Unless otherwise specified as a part of the tender condition, No Price Variation Clause will be entertained and No advance payment will be made by BHEL.
- (iii) In case, there is a discrepancy in the term quoted in techno-commercial bid and price bid, the term as per the techno-commercial bid (Part I) shall hold good and the commercial term quoted in the Price Bid (Part II) shall not be considered.
- (iv) In their own interest, all Tenderers are advised to double check their prices, applicable duties and taxes.
- (v) The quotation should be valid at least for a period of 90 days from the tender opening date.
- (vi) Indian bidders should submit the prices in Indian Rupees only.
- (vii) Foreign bidders may submit their bid in foreign currency. The currency for quoting shall be selected from the drop-down menu provided.
- (x) Indian Suppliers shall quote on FOR Destination basis only. Destination is BHEL, Ranipet Stores or BHEL Project Site as specified in the tender requirement. Foreign Suppliers shall quote on CFR Chennai Seaport Delivery and Insurance will be in BHEL's scope. No other delivery terms shall be acceptable. Shipment shall be arranged by the Seller on *Liner in / Liner out basis*. As per Government of India guidelines, BHEL Ranipet being a Government of India Undertaking the Bill of Lading shall be made with the Shipper as "Government of India". This shall be specifically confirmed by the Bidder.
- (xi) Where the cargo is containerized, Container washing charges, stuffing charges and / or any other such charges would be to the account of the supplier, where the containers are to be stuffed at the works of the supplier.

**B] Opening of Offers**

- a) **Tenders can be submitted up to 1400 Hours on tender opening due date. Part I will be opened on the same day at 1430 Hours. Results of the tender opening will be available for viewing for upto 7 days from the date of opening.**
- b) **Requests by Bidders for extension of due date will not be entertained by BHEL.**
- c) Price Bid opening will be done through e-mode / Reverse Auction method ( English method) which will be decided after techno-commercial bid evaluation is completed. All tenderers would have to specifically give their acceptance for this in their bid/s.

**Note**

- (i) Bids including all enclosures and supporting documents like catalogues, pamphlets, etc., shall be provided in ENGLISH language only.

(ii) In exceptional circumstances, at its option, BHEL may consider extending the due date/s for the tender openings for reasons such as (but not limited to) paucity of offers etc. However, sufficient notice would be given by BHEL for such extension.

(iii) Deviations shall be summarized and provided in a “Deviation Statement”, listing the points and the deviation against each point.

(iv) BHEL reserves the right to increase or decrease the tendered quantity and to order on more than one vendor at the lowest acceptable price to BHEL. In ordering on more than one source, the ratio of quantity split will be as specified in the tender terms.

If not explicitly specified, BHEL reserves the right to split the quantity of the enquiry as follows: 70% quantity being ordered on the original lowest bidder (L1) and balance 30% on the next higher bidder/s excluding H1, who accepts the L1 price. However, the final decision to split the order rests with BHEL only.

In the event that the other than L1 suppliers do not accept the L1 price, then the balance will be reverted to the original L1 and the original L1 shall be bound to accept the balance of the enquiry quantity kept reserved for order splitting. This decision would be given by BHEL within 60 days of the price bid opening.

Notwithstanding the quantum of split that may be indicated in the main body of the enquiry, bidders are advised to note that the splitting of the orders will be decided by BHEL after the evaluation of the techno-commercial and price bids.

(v) Offers for part quantities on item level basis are not acceptable to BHEL. While tenderers can quote for some or all the tendered items, no supplier shall quote for partial quantity of any given enquiry item. Such partial offer would not be considered in the enquiry for that item. Suppliers are to note that the evaluation unless otherwise specified will be on item level and not for the tendered items as a whole.

### **C] Evaluation of Offers**

a) The price bids including the impact price (if any) of the technically acceptable offers alone shall be opened.

b) Offers with pre-conditions (like conditional discounts) for price are liable to be not considered / rejected. For evaluation such conditions would be removed and only the base offer would be considered for evaluation and comparison.

d) In the event of any change in scope / quantity arising out of the discussions, offerers would be given a chance to submit their revised offer / Impact bids. The option for the revised offer / impact offer will be triggered by BHEL. The Supplier then will have the facility to feed-in the revised price / impact price as per the provision given by BHEL. The impact price can be positive or negative (or nil). The impact price option shall contain only the price addition / deletion for such change in the scope / quantities, over and above the original scope and price quoted. The original price quoted would remain unchanged. The total price would then be computed by the arithmetic addition of the original price and the impact price. Where BHEL gives the option of submitting the revised offer, the impact would be computed as the arithmetic difference of the revised price and the original price.

- e) For evaluating the overseas offers, CFR Chennai Sea Port price quoted will be taken into account. The cost to BHEL will be arrived at by loading the applicable customs duty project wise, insurance charges, inland transportation charges to BHEL stores and LC charges etc., f) Deleted.
- g) BHEL reserves the right to reject without assigning any reasons / load any offer with factors other than already specified for such offers having deviations to BHEL Specifications, Standard Terms & Conditions at its discretion. The decision of BHEL in this regard shall be final.
- h) BHEL reserves the right to reject an offer due to unsatisfactory performance during tender finalisation / execution of a contract at any of BHEL projects / units in the past or if unsatisfactory performance report is received from the party/s referenced by the supplier at any time during tender finalisation.
- i) BHEL reserves the right to operate Purchase / Price preference to Government of India Undertakings, which shall be given as per the guidelines of Government of India given from time to time and / or relax the Terms and Conditions of the tender.
- j) For the purpose of comparing prices, tender prices shall be converted to Indian rupees and the conversion shall be made by using the TT Selling rate of State Bank of India (SBI) prevailing on the date of opening of Techno-Commercial / Unpriced bids. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken. This exchange rate will be followed till placement of order. Tenderers may please note that even if an impact price is taken as in (d) for purpose of price evaluation and arriving at the rank; the exchange rate will be taken as explained above.
- k) Unless otherwise specified, evaluation will be on individual line item basis only and ordering will be on respective L1 vendors.
- l) BHEL reserves the right to conduct negotiations on the “Price” and “Other Commercial Terms and Conditions” with the lowest ranked offerer at any time after the bid opening but before the release of the Purchase Order and If so required by BHEL, Supplier may have to share their costing sheet with BHEL.
- m) Bidders are required to confirm in writing in their techno-commercial document that other than themselves (the bidder) none of its group companies, concerns or affiliates etc., are participating in the tender either directly or indirectly or through any other agency under the same proprietor / common partner(s)/ common Directors. If during the evaluation of the bids it is found that the bidder has submitted the offer in violation of this condition then all the offers received from the group companies would stand rejected. If such relationship is found at a later date where the Purchase Order has been issued, then BHEL would cancel the Purchase Order and initiate suitable action/s under the contract/s including but not limited to invoking the Risk Purchase clause of the order and other applicable legal provisions / guidelines of BHEL including guidelines on suspension of business dealings. (Please see clause L sub-clause c).
- n) For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017, 28.05.2018, 29.05.2019 & 04.06.2020 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/ PO/ WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.”

**Preference to Make in India** including counter offering will be as per the Public Procurement (Preference to Make in India), Order 2017 available in the following links <https://dipp.gov.in/public-procurements>

[http://dipp.nic.in/sites/default/files/publicProcurement\\_MakeinIndia\\_15June2017.pdf](http://dipp.nic.in/sites/default/files/publicProcurement_MakeinIndia_15June2017.pdf)

[http://dipp.nic.in/sites/default/files/Revised-PPP-MII-Order-2017\\_28052018.pdf](http://dipp.nic.in/sites/default/files/Revised-PPP-MII-Order-2017_28052018.pdf)

[https://dipp.gov.in/sites/default/files/PPP-MII%20Order%20dt%2029th%20May%2019\\_0.pdf](https://dipp.gov.in/sites/default/files/PPP-MII%20Order%20dt%2029th%20May%2019_0.pdf)

<https://dipp.gov.in/sites/default/files/PPP%20MII%20Order%20dated%204th%20June%202020.pdf>

#### **D] Execution of the Order**

a) BHEL will have the option to pre-inspect the materials at Supplier's works by BHEL's own inspector or by third party agency appointed by BHEL or BHEL's end customer/s. The mere act of the pre-dispatch inspection (PDI) does not absolve the Supplier from giving the specifications as agreed upon in the Purchase Order. In the case of inspection being carried out by a third party inspector (TPI) as per the extant practice, the TPI would forward the Inspection Report (IR) along with Test Certificates and other related documents to the Quality Assurance (QA) Department of BHEL. The QA department after scrutinising the report/s submitted by the TPI would issue the Material Dispatch Clearance Certificate (MDCC). Suppliers are hereby informed that materials should be dispatched only after getting the MDCC, failing which the materials may be rejected on receipt at BHEL Stores.

b) In the case of overseas suppliers Inspection call for carrying out the inspection shall be given 30 days before the scheduled contract delivery date. The Inspection date/s given by the Supplier shall be on firm basis. For local Suppliers the Notice period of Inspection shall be 10 working days.

c) Deviations, if any pointed out by the visiting Inspection team of BHEL shall be corrected and the items as per specification shall be dispatched on or before the contract delivery date after getting the MDCC.

d) The final inspection for acceptance will, however be carried out at BHEL's works at Ranipet.

**e) The contract delivery date is the date of receipt at BHEL Stores for suppliers in India, applicable in the case of FOR Destination Contracts.**

**For ex-works contracts or FOR dispatching station indigenous contracts, the date of the Lorry way bill issued by the authorised transport carriers of BHEL / Railway Receipt / Courier Way bill / Airway bill or any such dispatch documents of carriage approved by BHEL would be considered as the Contract Delivery Date. In the case of CFR contracts with overseas suppliers, the B/L date shall be taken as the Contract Delivery Date**

**f)** Travel & other local stay cost for the Inspectors sent by BHEL will be to BHEL account, but other Inspection Charges, if any shall be to the account of the Seller only.

**g)** The supplier shall arrange for packing suitably in all respects for normal transport by sea / rail / road and Materials shall be suitably protected against effect of tropical salt laden atmosphere in the event of shipment being delayed at ports / store yards and as per BHEL TDC.

**h)** Foreign suppliers shall dispatch on CFR agreed Sea-Port basis, according to the contract conditions. Indian suppliers shall dispatch on free delivery (door-delivery) at BHEL stores basis only. Unloading the materials at BHEL Stores would be to the account of BHEL only.

**i)** In the event of any short supply, it shall be the responsibility of the supplier to deliver such short supplied/ missing items on Free-of-Cost basis at BHEL stores, including customs clearances at Indian Ports in the case of foreign suppliers.

**k) Terms of payment:**

k.1) For Indigenous Suppliers: Unless otherwise agreed to by BHEL, the standard payment terms of BHEL shall be: For non-MSE suppliers 100% payment made directly through EFT within 90 days from the date of receipt and acceptance of materials at BHEL Stores, Ranipet or 90 days from the date of acknowledgement of receipt of materials at destination specified. If any supplier asks for payment terms other than the above specified, then suitable loading on cost will be considered. **Loading of any deviation in the payment terms**

**w.r.t tender terms will be “Base rate of State Bank of India (SBI) (as applicable on the date of bid opening: Techno-commercial bid opening in case of two part bids) + 6%, will be considered for loading for the periods of relaxation sought by bidders.**

k.2) For MSE vendors (under Micro & Small category alone) 100% payment will be made within 45 days from the date of receipt and acceptance of materials at BHEL Stores, Ranipet or 45 days from the date of acknowledgement of receipt of materials at destination specified. Vendors to get themselves registered in Udyam registration Portal. The existing Micro & Small vendors are to submit copy of CA certificate along with Udyog Adhar Registration Certificate.

**l) NOTE:**

Where the destination specified is other than BHEL Stores Ranipet, for claiming payment, Supplier has to submit proof of receipt of the materials at the destination by furnishing a copy of the acknowledged despatch document (LR/RR/Courier receipt etc.) .

If the Bidder is bidding for the first time and wants to be considered as an MSE then, the Bidder shall submit document evidencing that they are an MSE along with a certificate from a Chartered Accountant certifying the status of their Unit / Works clearly specifying the address of the works which is to be considered as MSE and send the same to BHEL, Ranipet either before the tender opening date or upload it as a part of the tender document in the e-procurement portal. Where the document is submitted electronically a hard copy shall invariably be sent within a reasonable period (not exceeding 30 days) from the bid opening date for the purpose of BHEL's records. If the hard copy is not received within this specified time, then the supplier would be treated as a non-MSE. BHEL will not be responsible for any postal / courier / delivery delays.

For approved vendors the status as on the date of the bid opening as available with BHEL Ranipet's records shall be used for reckoning the status of the Bidder as an MSE or otherwise.

Offer/s received without these documents will be treated as non-MSE and order finalization will be done based on this premise. Documents submitted after Bid-opening will not be considered in this tender. This provision for MSE will apply subject to the condition that the participating MSE meets the tender requirements.



For approved suppliers, in case of any change in the MSE status, it shall be the responsibility of the Bidder to notify the change as a part of the Bid document. If at a later date it comes to the knowledge of BHEL, Ranipet that the change in the status has not been intimated by the Bidder and the order is obtained under the premise of an MSE then BHEL would cancel the pending order against this tender and take necessary steps for suspension of the business dealing with the Bidder as per the procurement policy of BHEL. Similarly if a supplier claims MSE status after the Part I bid opening, then the same would not be considered in the tender.

In case after the bid opening it is seen that no MSE has become L1, then depending on the nature of the item, if it is not possible to split the tendered items / quantities on account of reasons like customer contract requirements of supplying one make for a given project or technical reasons like the tendered item being a system etc. then BHEL would not counter offer the L1 prices even though there may be MSE bidders within the +15% band of L1.

Other concessions for MSEs / Reserved sectors (Also for women owned MSEs and MSEs owned by SC/STs)

In addition to the concessions specified above, MSE suppliers will be eligible for such other concessions as per the MSME Act 2006 and any other benefits / concessions that may be announced by the Government of India from time to time.. However, such concessions as applicable at the time of tender opening alone will be applicable. Any concessions advised after tender opening will not be considered for the current tender.

Items that are reserved for MSE and for any other items for which reservations for Indian manufacturers are notified by the Govt. Of India, such concessions as prevailing on the date of tender opening shall apply as a part of this tender conditions. ii) Foreign Suppliers “100% thru’ irrevocable & unconfirmed LC at sight within 3 weeks from the PO date through any one of our Bankers listed elsewhere in the tender conditions for 100% value (less Agency

Commission, if any ) valid up to the PO delivery period and 15 days thereafter for negotiation. All bank charges in India to BHEL's account and all other charges outside India to Supplier's account. **BHEL would load the price of foreign suppliers in order to bring them on common platform as per Indigenous Suppliers on the account of differential payment terms to Indigenous Suppliers. Loading of payment terms will be “Base rate of State Bank of India (SBI) (as applicable on the date of bid opening: Techno-commercial bid opening in case of two part bids) + 6%, will be considered for loading for the periods of relaxation compared to indigenous suppliers i.e. 90 days.**

m) Any incidence of tax like Income tax, Goods & Services Tax (GST) and Withholding any other similar tax / duties /levies imposed by the Government of India, or the State Government, where the BHEL Unit is located, deductible at Source, during the tenure of the Order shall be deducted by BHEL and necessary certification of the deduction (Tax deduction at Source) would be given. This is subject to the supplier fulfilling the necessary documentation as specified by the Government of India. (e.g. Tax Residency Certificate, PAN Number etc.)

n) The Guarantee period shall start from the “Date of receipt and acceptance of the materials at BHEL Stores.”

#### **E] Liquidated Damages Clause:**

BHEL will levy penalty as Liquidated Damages (LD), for delay in delivery. The damages shall be at the rate of ½% per week or part thereof subject to a maximum of 10% PLUS applicable Goods & Services Tax



(GST). The contract delivery date for purpose of L.D is the date of receipt at BHEL Stores for suppliers in India for F.O.R. Destination Contract and the date of dispatch clearance given by BHEL for overseas suppliers. For ex-works or F.O.R dispatching station contracts, the date of the dispatch document will be reckoned as the date of delivery for computing the LD. Supplier shall deduct the applicable LD from the first payment when raising the claim for the same. The applicable LD if any would be communicated by BHEL along with the dispatch clearance. It is taken by BHEL that Foreign Suppliers have confirmed their acceptance to BHEL for opening the LC for value which is the value of the order reduced by the applicable LD. The LD would apply on the undelivered portion only. In case of reasons attributable to BHEL for the delay in delivery (for e.g. delay in arranging the pre-inspection) then the delivery time would be reset to the extent of the time delay attributable to BHEL, with waiver of the LD. Delivery being the essence of BHEL's contract requirements, unless otherwise specified the LD would apply on the undelivered portion of the contracted items. **In the event that a Supplier does not accept the LD condition above, the offer would be loaded to the extent of the shortfall with respect to upper limit specified above.**

## **F) Miscellaneous**

### **i) Role of Principals and Agents:**

BHEL will deal directly with indigenous manufacturers only.

BHEL strongly discourages the engagement of Agents in India by foreign principals, to deal with BHEL, in BHEL's tenders.

BHEL will not enter into any correspondence with an Indian Agent.

The Indian Agent will not be extended the privilege given to the principals, such as that of attending the tender openings, attending technical discussions, commercial discussions or price negotiations and such like.

In case, in spite of the above, a foreign principal insists on engaging an Indian Agent, It is made clear by BHEL that:

It is the sole responsibility of the foreign principal to ensure the Agent does not represent any other foreign principal in a given tender.

An undertaking to this effect shall be given by the foreign principal that his / her Agent does not represent any other foreign principal in the tender. This document shall form a part of the techno-commercial offer.

A Principal shall authorise only one Agent to quote against each BHEL's tender. In the event a Principal authorises more than one agent to quote against a BHEL's tender, then all such offers will be rejected by BHEL in that tender. Principals are also advised to include BHEL's tender Number / Reference in their authorisation issued to the Agent.

If at any stage of the tender, BHEL finds that an Indian Agent has represented more than one foreign principal, all such offers of and all the foreign principals would be disqualified summarily in the tender inquiry.

BHEL will only give an intimation of notice of the disqualification. No correspondence would be entertained by BHEL, on their decision. Such decision of BHEL shall be irrevocable, firm and final and shall be binding on the tenderer.





BHEL, due to business reasons would ban, would have banned Indian agents from dealing with BHEL.

Any foreign principal who engages such a banned agent, or an employee of the banned agency, or any other person connected with the banned agency, at any time during the tender proceedings, would be disqualified from the tender proceedings. The decision of BHEL in this regard shall be final and be binding on the OEM.

Hence in their own interests, prospective tenderers may check with BHEL, the status of their proposed agent vis-à-vis BHEL.

In view of the requirement of BHEL, it is strongly suggested that in their own interest, foreign principals may desist from engaging any Indian agent and deal with BHEL directly and it is stressed that any Main producer proposing to deal with BHEL by engaging and through an Indian Agent does so at their own risk.

BHEL shall in no way be responsible for any consequences that may arise to the foreign principal on account of the antecedents / actions of their Indian Agent.

**In the event of the foreign principal engaging an Indian Agent:**

**a) The Supplier shall furnish an authenticated copy of the Agency Agreement with his agent detailing the precise relationship between them and their mutual interest in the business along with techno commercial bid.**

**b) The Supplier shall furnish original authorization letter for the Indian Agent. The letter shall contain name, contact person, complete postal address including phone, fax and e-mail ID. It shall also spell out the type of services to be rendered by Indian Agent.**

**c) Indian Agent & Agency commission:** An Indian Agent can represent only one Foreign Manufacturer against a particular Tender. The CFR price quoted by the foreign bidder shall include the agency commission. However, the agency commission component payable to their Indian Agents shall be shown separately in the Offer, either as a lump-sum or as a percentage of the quoted price. This will be paid by BHEL in Indian Rupees, on satisfactory receipt & acceptance of the materials. For calculation of Rupee equivalent of Agency Commission, exchange rate as prevailing on the date of Purchase Order will be taken and

**d) For all discussions, technical clarification and negotiations etc. only the principal would be authorized for interaction with BHEL. The Agent shall not be a party to the discussions / negotiations and would not be normally allowed to participate.**

**ii) Terms & Conditions of Letter of Credit (L/C) for overseas suppliers (indicated for acceptance).**

**a) Unconfirmed irrevocable Letter of Credit at Sight only will be opened by BHEL. Confirmation of L/C is not preferred by BHEL. Also L.C will be opened in Lots in line with the staggered delivery.**

**b) All Bank charges out side India are to the Supplier's account and within India to BHEL's account.**

**c) In case of L/C extension caused by delays attributable to the Supplier, the L/C extension / commitment charges are to be borne by the Supplier.**



### **iii) Other terms & conditions for letter of credit: - Documents for negotiation**

- a) Signed Commercial invoice in quadruplicate, for a value not exceeding the draft amount, quoting the import Licence No and certifying goods evidencing shipment of the merchandise are as per Applicant's Purchase Order. The amount of invoice after deducting Indian Agent's commission, if any, should not exceed the Credit amount. (The Indian agent's commission, if any, is payable in India in Indian rupees only.)
- b) Certificate of Country of Origin, from the country of manufacture, issued by the Chamber of Commerce.
- c) One set of Original and two sets of Non-negotiable copies of 'signed', 'unmarked', 'clean on board' Ocean Bill of Lading, showing Shipper as "Government of India" Account M/s. Bharat Heavy Electrical Ltd, Unit: BHEL, Ranipet as consignee (The opening bank should not be notified as consignee), marked freight payable / prepaid at destination.
- d) Packing list in 4 copies in English, indicating Size wise Number of bundles / pieces shipped and weight.
- e) Certified copy of the fax / e-mail sent by the beneficiary to the applicant giving the following particulars of shipment, as the insurance is to be arranged by the Applicant in India: (a) Purchase Order Number & date; (b) Bill of Lading Number & date (c) Name of vessel; (d) Port of Loading; (e) Number of bundles / pieces and weight; (f) Invoice Number, date and value (g) Purchase Order item number's despatched. The cable / fax is to be sent within 2 working days of shipment.
- f) Beneficiary's certificate showing the relevant airmail / courier reference no. and date that the following clauses have been complied with:
  - 1] Beneficiary to forward by Registered Airmail / Courier one complete set of original documents and one set of non-negotiable documents within 3 working days of obtaining shipping documents to Regional Manager (ROD), Bharat Heavy Electricals Ltd, 6th Floor, EVR Periyar Bldg. No 690 (Old 474), Anna Salai, Nandanam, Chennai-600035. India. (Phone: +91-24330931, 24330253; e-mail: bhpwar@bhel.in)
  - 2] Beneficiary to courier at his cost 3 copies of complete set of non-negotiable documents to the Officer who released the Purchase Order.
  - 3] Declaration by the Supplier certifying that the contents in each case are not less than those entered in the invoices / packing list and that the invoicing for the supplies effected is strictly in accordance with agreed rates as stipulated in the Purchase Order.
  - 4] Declaration to the effect that all other documents as per purchase order has been couriered to the Purchase order releasing authority
  - 5) The carrying steamer should be seaworthy, less than 25 years of age and approved by Lloyds / Classification Societies / General Insurance Corporation of India from time to time and
  - 6) Copy of Dispatch Clearance / Instruction issued by BHEL.

### **iv) Documents to be sent directly to the Purchaser prior to shipment**

- a) Manufacturer's Original Internal Inspection / Test certificate in triplicate.
- b) Manufacturer's Original Guarantee certificate as per Purchase Order. The material shall be guaranteed for a period of 12 months from the date of acceptance of the materials at BHEL stores or 18 months from the

date of dispatch whichever is earlier. The acceptance would be evidenced by the Stores Receipt Voucher (SRV) which will be raised by BHEL.

- c) Inspection / Test Certificate issued by BHEL / Inspection agency specified in the Purchase Order. In the event that Inspection prior to dispatch is not carried out by the Engineers of BHEL, the Inspection certificate of the third party so authorized by BHEL and
- d) Any other documentation as specified in the Purchase Order.

**v) Conditions for transportation:**

- a) All shipping documents shall show the Purchase Order Number & Date, Import Licence Number & Date, and Letter of Credit Number & Date. b) Transhipment is to be avoided.
- c) Loading on deck is not permitted. The transport document must not contain a provision that goods may be carried on deck.
- d) A transport document which is produced or appearing to have been produced by reprographic, automated or computerized systems or as carbon copy will be accepted as an original document provided that it is marked as original and is ink-signed.
- e) The transport document must contain all the conditions of carriage on the original document.
- f) The transport document must not indicate the place of destination as being different from the port of discharge.
- g) The transport document must not contain the indication 'intended' or similar qualification in relation to the vessel or other means of transport or port of loading or port of discharge.
- h) The transport document must be issued by the carrier or his agent and not by any freight forwarder.
- i) Transport documents bearing reference by stamp or otherwise, to costs additional to the freight charges are not acceptable.
- j) The Bills of Exchange must be dated and presentation of documents for negotiation must not be later than 15 days after the date of shipment and in any case not later than the expiry date of the Credit.
- l) Indian suppliers shall dispatch the materials on freight prepaid and on door-delivery basis (FOR Destination – Destination: BHEL Stores) and
- m) In the event there is a delay by the Supplier in negotiating / submitting the document, any demurrage / wharfage arising out of the same shall be to the account of the Supplier and shall be deducted from the final payment. Also, in such cases, the Supplier shall authorize the Steamer / Shipping agent / transporter to freely release the consignment to BHEL by providing a “Surrender Bill of Lading”. Over-seas Suppliers have to give a No-Objection Certificate to BHEL, authorizing BHEL to get the Delivery Order from the Steamer Agent without producing the Original Bill of Lading. This is required to ensure avoidance of incidence of demurrage at Chennai Sea-port that may arise in case of delayed presentation of documents by the Seller.

### **G) Reverse auction (RA) / on-line bidding on internet:**

1. Decision to go for RA would be taken before floating of the tender. In case it is decided to go for RA, same shall be declared upfront in NIT by inserting the following clause:  
“BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on [www.bhel.com](http://www.bhel.com)) for this tender. RA shall be conducted among all the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.”
2. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit ‘Process compliance form’ (to the designated service provider) as well as ‘Online sealed bid’ in the Reverse Auction. Non-submission of ‘Process compliance form’ or ‘Online sealed bid’ by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for “Suspension of Business Dealings with Suppliers/ Contractors (as available on [www.bhel.com](http://www.bhel.com)).”
3. The philosophy followed for reverse auction shall be English Reverse (No ties).
4. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
9. Reverse auction will be conducted on scheduled date & time.

### **Note: Decision to go for RA or not will be on case to case basis and shall be informed in the NIT conditions .**

1. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
2. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, to the Service provider within two working days of Auction without fail.
3. Bidders are be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction“, which will be communicated before the Reverse Auction.
4. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

5. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
  6. The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with their offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, would also be opened after the RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. It is considered that the bidder having submitted their offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rate/s.
  7. If it is found that L1 bidder has quoted higher in the online sealed bid in comparison to the envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on [www.bhel.com](http://www.bhel.com)).”
  8. The calculation sheet e.g. excel sheet (which will help to arrive at ‘Total Cost to BHEL’) will be communicated to respective bidders of RA by BHEL. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Goods & Services Tax (GST) and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.]
  9. This calculation sheet will be finalized based on the evaluation criteria specified in the NIT.
  10. Suppliers are required to submit their best price bid in a separate sealed cover along with techno commercial bid. After evaluation of Techno-Commercial Bids:
    - a) In case BHEL decides not to conduct RA, the envelope (sealed electronic price bid) sealed price bids of all techno-commercially qualified bidders, along with price impact, if any, would be opened and processed as per extant the internal Purchase/ Works Policy as applicable to BHEL.
    - b) In case BHEL decides to conduct RA, business rules of RA will be sent to service provider. (See Annexure for Model General Business Rules of RA.)
  12. Generally the start price for the RA would be the lowest of
    - a) Lowest envelope (sealed electronic price bid) sealed bid and
    - b) Internal Estimate of BHEL
- Note: Wherever more than one lowest online sealed bids are identical and lower than the estimate, the start price, would be that price arrived by reducing the lowest online sealed bid by maximum of one decrement.*
21. The start price & bid decrement will be decided by RA committee of BHEL and the same would be communicated to the service provider, to start the bidding process.
  22. Only those bidders who have submitted the ‘Process compliance form’ duly signed and within the scheduled time would be eligible to participate further in RA process.

23. RA will be conducted if three or more bidders are techno- commercially qualified . In case of more than four techno commercially qualified bidders , H1 bidder (whose quote is highest in sealed envelope (eps) price bids) will not be allowed to participate in further RA process. However there will be no H1 removal in case , H1 bidder happens to be MSE or qualifying under PPP-MII , order 2017 irrespective of the number of bidder qualifying techno commercially.
24. In case multiple H1 bidders, all H1 bidders (excluding MSEs and bidders qualifying under PPP- M11 Order 2017) shall be removed provided three bidders remain in fray, else no H1 removal.
25. If the lowest sealed envelope (eps) price bids is the starting price, then the lowest bidder in sealed envelope (eps) price bids shall be shown as current L1 automatically by the system. System would have the provision to indicate this bid as current L1 for further bidding.
26. If the start price is lower than the lowest sealed envelope (eps) price bids , on acceptance of such start price by any bidder, this bid would be indicated as current L1 for further bidding.
27. In case of no further bidding, RA will be deemed to have been successful with current L1 bidder.
28. All bidders who had given their bids would be able to see their rank and L1 price and their ranking L1, L2 etc. on the screen. Once the RA is done, the ranking status would be based on the last quoted price irrespective of quote received in RA or sealed envelope (eps) price bid.
29. RA shall be treated as failed in the following scenarios:
- a) In cases where the start price is (a) estimate or (b) one decrement (maximum) lower than the lowest of the online sealed bids and no bidder accepts the start price.
  - b) In cases where the number of online sealed bids are less than three.
- Wherever, the evaluation is done for individual line items, RA shall be treated as failed only for those line item(s) for which any of the above a) or b) satisfies.
29. In cases of failure of RA, retendering shall be resorted to without conducting RA in the subsequent tender
30. Whenever the evaluation is done on total cost basis, after RA, prices of individual line items shall be reduced on pro-rata basis.
31. In case of splitting requirement, H1 bidder(s) who were removed from participation in RA may also be considered for counter offer if the pre-stated (NIT) number of suppliers do not accept the counter offer. However the principle of splitting to N-1 bidder shall be maintained in line with extant Purchase Policy / Work Policy
32. In case BHEL decides not to go for Reverse Auction for the tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL would be opened as per BHEL's standard practice.
33. In case of enquiry through e-Procurement, the sealed electronic price bid (e-bid) would be treated as sealed envelope price bid.



**Note: In order to bring more transparency and to address any queries of Bidders on Reverse Auction, an abridged version of BHEL's "Common Guidelines for conducting Reverse Auction (RA)" has been hosted in BHEL's web site [www.bhel.com](http://www.bhel.com) under the links "Supplier Registration Page" and "Tender Notification". All Bidders are requested to visit the link and familiarize themselves with BHEL's RA procedures and guidelines before submission of their bid/s. Submission of Bid shall mean that the Bidder has read and understood BHEL's RA procedures and the bid is in agreement with the same.**

#### **H] Force Majeure**

If at any time during the currency of this contract, the performance in whole or in part, by either party of any obligations under this contract shall be prevented or delayed by reason, of any war, hostilities, acts of the public enemy, civil commotion, sabotage, fires, explosions, epidemics, quarantine, restrictions or acts of GOD (hereinafter referred to as events), then provided notice of happening of any such events is given by either party to other within ten days from the date of occurrence thereof, neither party shall reason of such events be entitled to terminate this contract nor shall either party have any such non performance and delay is resumed as soon as practicable after such events has come to an end or ceased to exist. If the performance in whole or part of any obligation under this contract is prevented or delayed by reason or any such event claims for extension of time shall be granted for period considered reasonable by the purchaser subject to prompt notification by the seller to the purchaser of the particulars of the events and supply to the purchaser if required of any supporting evidence. Any waiver of time in respect of partial installment shall not be deemed to be a waiver of time in respect of remaining deliveries.

#### **I] Cancellation of Order:**

In the event of non-performance of the contract by the Supplier, BHEL reserves the right to cancel the order with issue of a written notice. BHEL would provide a curing period of 30 days, for the Supplier to rectify the situation. If the Supplier fails to rectify the reason/s that led to the issue of cancellation notice by BHEL, then the cancellation order would be issued automatically by BHEL, without further recourse to the Seller. BHEL will not pay any cancellation charges or any other charges / damages to the Supplier, arising out such cancellation. In the event of the non-performance of the supply contract, by the Supplier, the rights of BHEL include, in addition to cancelling the order, to take alternate purchase action at the cost and risk of the supplier. The additional expenditure to be incurred by BHEL in such alternate purchase would be to the account of the supplier. (Risk Purchase). This remedy would be in addition to the invoking of the CEBG on grounds of failure of the Supplier in executing the Contract and any other legal remedies." BHEL reserves the right to initiate the alternate purchase action at the cost and risk of the erring supplier by issue of a simple notice of intention for the alternate purchase action duly sent by any electronic means and / or by a letter. The cancellation of the order would not be a pre-condition for initiation of the alternate purchase action.

#### **J] Contract Execution Bank Guarantee:**

To demonstrate the fidelity of the successful bidder, in executing the Contract, on receipt of the Letter of Intent / Purchase Order, the Supplier shall arrange to provide a contract execution bank guarantee (CEBG). The format of the CEBG is a part of this enquiry. The format may be downloaded and necessary stamping may be obtained from the Banker towards submission of the CEBG. The indigenous suppliers have to provide the CEBG from any one of the Nationalized Banks, listed in the annexure to these terms. Overseas suppliers can submit the CEBG from any of the reputed International / National Bankers. However the



CEBG is to be confirmed by any of the Bankers listed by us. In the event of failure by the Supplier to execute the contract either fully or partially, BHEL would encash the entire CEBG. The CEBG shall be valid for the period covering the agreed delivery date of the order with a further claim period of 3 months on the last specified delivery date. In the event of the failure of delivery BHEL would proceed with encashing the CEBG without reference to the Supplier. In the event of BHEL granting extension of the delivery dates, then the CEBG validity shall also be got extended by the Supplier to the extent of the extended delivery times together with the claim period as specified elsewhere. **The CEBG shall be for a value of 2% of the Purchase order.**

**Suppliers who are all already registered with BHEL and having a vendor performance rating of A or A+ grade would be exempted from submission of CEBG.**

#### **Performance Bank Guarantee**

Where ever so required, the Supplier shall arrange to provide a Performance bank guarantee (PBG). The indigenous suppliers have to provide the PBG from any one of the Nationalized Banks, listed in the tender terms. Overseas suppliers can submit the PBG from any of the reputed International / National Bankers. However the PBG shall be confirmed by any of the Bankers listed by us. The PBG shall guarantee the performance of the equipment / materials / items supplied and shall cover the guarantee period. The PBG shall have a claim period of 3 months in addition to the guarantee period. In the event of failure of the supplies made within the guarantee period, BHEL would encash the entire PBG. **The PBG shall be for a value of 10% of the Purchase order.**

**The supplier/s have to get the PBG format (pre-printed) from BHEL and get the same stamped by the Banker. Change of PBG terms either by the supplier's Banker or by the supplier, after servicing of the order is not acceptable. Similarly PBG prepared by the supplier (typed by them) will also not be acceptable to BHEL. The pre-printed form issued by BHEL shall be used for making the PBG.**

#### **K] Post-order submission of documents for approval**

In the event of the release of Letter of Intent (LoI) / Purchase order/s (PO) against this tender, Bidders have to submit the applicable documents as called for in the tender / LoI / PO/s, such as drawings, data sheets, design calculations etc. These documents for approval have to be submitted within the agreed timelines between BHEL and Bidder. Normally the time period for submission for approval is 15 days from the date of receipt of the LoI / PO by the supplier. The actual time period within which the documents have to be submitted for approval would be specified in the LoI / PO.

Such documents would be subjected to evaluation and approval by BHEL and / or by BHEL's customer / Consultant / Customer's Consultant. Bidders have to give their specific acceptance for this.

After approval of such documents and after getting clearance from BHEL, only the items ordered can be taken up for manufacture.

Any changes required by BHEL / Customer etc. in the documents submitted for approval shall be incorporated by the Bidder and no extra cost would be payable by BHEL for such changes.

In the event that the Bidder does not carry out the required corrections, then the LoI / PO would be liable for cancellation by BHEL and BHEL would resort to alternate purchase action at the risk and cost of the Bidder under the Risk Purchase Condition of the Purchase Order.

*Note: After receiving the LoI / PO, supplier shall also forward the acknowledgement / acceptance of the LoI / PO by signing and returning the second copy of the LoI / PO as the token of acceptance.*





## **L] Others**

a) In case of any contradiction in the terms and conditions given here and elsewhere in the other documents of the tender, it shall be the responsibility of the tenderer to get it clarified from BHEL. The officer authorized to provide such clarifications is the tender issuing officer.

b) Alterations to the conditions of the Tender can be done only by the authorized officer, at any time before the date and time of tender opening and would be duly communicated through a corrigendum. c)

### **Suspension of Business dealings with Suppliers:**

(i) Before submitting offer, prospective bidders are advised to visit our web-site [www.bhel.com](http://www.bhel.com) / supplier registration to familiarize themselves with BHEL's policy and procedures of Suspension of Business Dealings with Suppliers.

Submission of offer shall be deemed to be evidence of the Bidder to have read and understood the above said policy.

### **ii) Treatment of Banned / Under-performing Vendors:**

Any supplier who has been put on "Hold" or "Banned" from having business dealings with BHEL, Ranipet or any other unit of BHEL shall not submit their offer against this tender. If any such offers are received they would be summarily rejected and sent back. During the processing of tender, if any unit of BHEL puts a supplier on "Ban" then further processing of the offer will not be taken up and in case an order is placed, BHEL, Ranipet may resort at their discretion to cancel the PO either fully or partially.

If any of the supplier who is supplying similar material to BHEL, Ranipet has a Vendor Performance Rating (VPR) score of 'C' or below, then offer given by such parties will not be considered for ordering in this tender.

If any of the Bidders have unexecuted order/s with BHEL and if in such orders, the deliveries have been delayed beyond a reasonable period (say 30 days of agreed delivery period), the offer of such Bidders will also be liable for rejection.

Offers of such of those bidders against whom action for suspension of business dealings has been initiated by BHEL, Ranipet or any other Units/Division of BHEL will also not be considered in this tender.

### **d) Fraud Prevention Policy:**

The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

### **e) Applicability of Integrity Pact:-**

IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.



Sl.No	IEM	Email
1.	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid(Part-I, in case of two/three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the IEM(s).All correspondence with the IEMs shall be done through email only.

Note:

*No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:*

*For all clarifications/ issues related to the tender, please contact:*

Name: (1) ..... (2) .....

Dep't: ..... Address:

.....

.....

Phone:(Landline/Mobile) (1) ..... (2) .....

Email:

Fax:

Integrity Pact are applicable for all the BHEL enquiries whose estimated value is equal to or more than Rupees 05 Crores.

Copy of Integrity Pact with applicable nominated IEM is attached along with the tender documents for ready reference of Suppliers.

f) If any Supplier attempts to bribe, or pay commission, gift or any advantage or bring in undue influence either by himself or on his behalf any one including a stranger to the tender, in addition to instituting legal proceedings as per the extant laws prevailing, will disqualify the supplier from this tender and all future tenders of BHEL. Decision of the Purchaser would be final in this matter.

g) The laws governing this transaction shall be the laws in India.

h) Wherever not specified, Inco terms 2010 shall be used to interpret the Commercial terms and conditions and

i) In the event of an order, Supplier shall agree to settlement of disputes or differences, if any, by way of arbitration, in accordance with the "Rule of Arbitration" of the Indian Council of Arbitration.

*The language in the tender documents downloaded by the Bidders shall at no point of time be changed, altered or modified in any manner by the Tenderer. If such changes are made by any tenderer, it shall be considered as tampering with BHEL's terms and the offer shall be summarily rejected, whenever it is noticed by BHEL. Such Bidders would be disqualified from the Bidding Process and their offers would be forfeited / Bank Guarantees invoked. They would also not be allowed to participate in future tenders of BHEL.*

**M. Conditions for rejection of offers:**

**Following is the list of situations which would lead to rejection of offer/s.**

**This list is not exhaustive but only indicative.**

BHEL reserve the right to reject one or all offers without assigning any reason. The decision of BHEL will be final in this regard.

1. *If the offer fails to meet the technical requirements/specifications of the tendered item/s.*
2. *If the offer does not meet the commercial terms & conditions, such as but not limited to delivery period specified in the tender, Delivery terms, payment terms, Liquidated damages, Risk Purchase, cancellation clause etc., including the load factors specified in the tender.*
3. *If the bidder fails to respond to clarification sought, within a reasonable period. In case of doubts / lack of clarity on the technical and commercial offer of the bidder, BHEL will seek clarifications. Bidders are required to respond completely to such BHEL's queries within 3 working days unless otherwise agreed to in writing by BHEL for period beyond 3 days. If supplier fails to respond within 3 working days or maximum 2 working days on a reminder thereon, the offer of such bidders will be automatically dis-qualified in the tender without further recourse to informing the bidder.*
4. *If any of the conditions listed below are applicable to the bidder, the offer is liable to be rejected:*

If any

- Debt recovery / Winding up Proceedings are initiated against the Company in Courts / Debt Recovery Tribunals (DRTs),
  - Proceedings are there against the Company in National Company Law Tribunal (NCLT) with respect to Insolvency and Bankruptcy Code (IBC) or otherwise,
  - Any proceedings are there against the Company under the "Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFAESI) Act,
  - Any restructuring proceedings are underway for the Company under Corporate Debt Restructuring (CDR), Strategic Debt Restructuring (SDR) or otherwise,
  - Divestment / demerger proceedings are underway for the Company under the Companies Act.
  - If action under guidelines of suspension of business dealings (Ref AA/MM/SB/01 Rev 02 dt 22.07.2016) and its latest revisions has been initiated against the company/bidder.
5. *Failure to sign & accept the Integrity Pact (where applicable). Bidders are hereby informed that the contents of the Integrity Pact are firm and fixed and cannot be changed.*

The above list is not exhaustive but is indicative only.

**N. Special Note:**

BHEL is a Government of India Undertaking. Its procurement practices are governed by the (Internal) Purchase Policy issued by the management of the company and as per Annexure B applicable at the time of finalising the order against this tender.

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**Record of Revisions:**

Revision No.	Revision Date	Modification
01	17.08.2016	Payment terms for Foreign suppliers modified wrt loading- Clause k.ii
02	29.08.2016	Treatment of banned vendors – Para 3 added - Clause L.ii
03	14.09.2016	Opening of offers – clause B – sub clause ‘b’ included and existing clause ‘b’ renamed as ‘c’.
04	14.09.2016	Opening of offers – Note – sub clause (ii) modified
05	12.10.2016	Clause N. Special Note added
06	22.10.2016	Clause G Reverse Auction modified. Annexure on General Business Rules for Reverse Auction appended Role of Principals added under ‘Miscellaneous’
07	20.01.2017	Clause L (e) is modified. Clause L (f ,g ,h) renumbered.
08	24.02.2017	Clause F(c) modified.
09	08.07.2017	Clause M, Point 4 is added – regarding the financial health of the Bidder - as a criterion for disqualification.
10	20.07.2017	Duties and Taxes replaced with GST; Applicability of GST for LD inserted in Clause E; Treatment of poor performing current vendors inserted in clause L.c.(ii)
11	25.07.2017	Clause A.Note (iii) CST etc., replaced with GST; Clause C.f Deleted;
12	15.09.2017	Clause M, Point 5 inserted regarding Integrity Pact
13	21.03.2018	Clause A, Point xi inserted regarding Overwriting in Price Bids
14	28.05.2018	Clause A, a),b),c),d) amended for M/s E-Procurement technologies, <a href="https://bhel.abcprocure.com">https://bhel.abcprocure.com</a> . Clause A, (f, g, h) – modified. Clause M, Point 4, - regarding suspension of business dealings inserted.
15	23.07.2018	Clause L,(e)- Applicability of Integrity Pact – modified.
16	31.08.2018	Clause C,(n)- Preference to Make in India – added.
17	04.12.2018	Clause C,(n)- Preference to Make in India & Clause K.2 Note - MSE concessions– modified.
18	13.02.2019	Clause C,(n)- Preference to Make in India – modified. Page no 9 Clause o – Extended credit period - removed.
19	24.09.2019	Clause C,(n) - Preference to Make in India – modified. Clause L,(e) - New IEMs Updated
20	11.03.2020	Clause L,(e) – IEM’s address removed



21	11.06.2020	Clause G – Reverse Auction modified
22	22.07.2020	Clause C,(n) - Preference to Make in India – modified. Clause k (2) - MSE registration modified

## ANNEXURE

### Model General Business Rules for Reverse Auction

This has reference to tender no {tender number....date...}. BHEL shall finalise the Rates for the supply of {item name} through Reverse Auction mode. BHEL has made arrangement with M/s. {Service provider}, who shall be BHEL's authorized service provider for the same. Bidders should go through the instructions given below and submit acceptance of the same.

The technical & commercial terms are as per (a) BHEL Tender Enq. No. {...} dated {...}, (b) Bidders' technical & commercial bid (in case of two part bid) and (c) subsequent correspondences between BHEL and the bidders, if any.

#### 1. Procedure of Reverse Auctioning

- i. Online Sealed Bid: This duration of online sealed bid will be {...} minutes. All bidders to submit their online sealed bids during this period.
- ii. Online Reverse Auction: The 'opening price' i.e. start price for RA and 'bid decrement' will be decided by BHEL.
- iii. If BHEL decides the lowest online sealed bid as the starting price, then the lowest bidder in online sealed bid shall be shown as current L1 automatically by the system and no acceptance of that price is required. System shall have the provision to indicate this bid as current L1.
- iv. Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become "L1" and this continues as an iterative process.
- v. After the completion of the online reverse auction, the Closing Price (CP) shall be available for further processing.

#### 2. Schedule for Reverse Auction: The Reverse Auction is tentatively scheduled on {date}:

and the duration of online sealed bid will be {...} minutes. All bidders to submit their online sealed bids during this period. - **Online Sealed Bid:-**

- {Start Time:
- Close Time: }

#### - **Online Reverse Auction:-**

- {Start Time:
- Close Time: }

#### 3. Auction extension time:

If a bidder places a bid in the last {...} minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another {...} minutes, for the entire auction (i.e. for all the items in the auction), from the time that bid comes in. Please note that the autoextension will take place only if a bid comes in those last {...} minutes and if that bid gets accepted as the lowest bid. If the bid does not get accepted as the lowest bid, the auto-extension will not take place even if that bid might have come in the last {...} minutes. In case, there is no bid in the last {...} minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc. The above process will continue till completion of Reverse Auction.

Complaints/ Grievances, if any, regarding denial of service or any related issue should be given in writing thru e-mail/ fax to M/s. {Service provider} with a copy to BHEL within 15 minutes prior to initial closing time of Online Reverse Auction.

4. **Bid price:** The Bidder has to quote the {.....} Price inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, GST, Freight (bidder to provide original Freight paid receipt), insurance charges, etc. including loading (if indicated by BHEL due to deviations in technical/ commercial terms) for the Items specified. Details are as shown in Excel Sheet for calculation of total cost to BHEL (To be specified by Unit as per NIT conditions).

**5. Bidding currency and unit of measurement:**

Bidding will be conducted in *Indian Rupees per Unit* of the material as per the specifications {...}

In case of foreign currency bids, exchange rate (TT selling rate of State Bank of India) as on scheduled date of tender opening (Part-I bid) shall be considered for conversion in Indian Rupees. If the relevant day happens to be a Bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.

6. **Validity of bids:** Price shall be valid for {... days} from the date of reverse auction. These shall not be subjected to any change whatsoever.

7. **Lowest bid of a bidder:** In case the bidder submits more than one bid, the lowest bid at the end of Online Reverse Auction will be considered as the bidder's final offer to execute the work.

8. Bidders shall be assigned a **Unique User Name & Password** by M/s. {Service provider}. Bidders are advised to change the Password and edit the information in the Registration Page after the receipt of initial Password from M/s. {Service provider} to ensure confidentiality. All bids made from the Login ID given to the bidders will be deemed to have been made by the bidders/ bidders' company.

9. Post auction procedure: BHEL will proceed with the Lowest Bid in the Reverse Auction for further processing.

10. Any commercial/ technical loading shall be intimated to bidders prior to RA. The excel sheet provided in this regard shall cover all these aspects. Commercial/ technical loading if any, shall be added by the respective bidder in its price during online sealed bid & Online Reverse Auction. Modalities of loading & de-loading shall be separately intimated to the bidders. The responsibility for correctness of total cost to BHEL shall lie with the bidders.

11. Computerized reverse auction shall be conducted by BHEL (through M/s. {Service Provider}), on prespecified date, while the bidders shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by bidders themselves.

During the RA process if a bidder is not able to bid and requests for extension of time by FAX/ email/ phone then time extension of additional 15 minutes will be given by the service provider provided such requests come before 5 minutes of auction closing time. However, only one such request per bidder can be entertained. Despite this extension if bidder fails to upload his prices due to extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders' responsibility/ decision to send fax communication immediately to M/s. {Service provider}, furnishing the price the bidder wants to bid online with a request to the service provider to upload the faxed price online so that the service provider will upload that price online on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable/ legible form and also the Bidder should simultaneously check up with service provider about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be uploaded by the service provider only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time /reverse auction. It shall also be noted that the service provider should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of the Service

provider at the time of receipt of the fax message from the bidders, the service provider will not be uploading the prices and either BHEL or the service provider are not responsible for this unforeseen circumstances. In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements/alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. {Service provider} is responsible for such eventualities.

**12. Proxy bids:** Proxy bidding feature is a pro-bidder feature to safeguard the bidder's interest of any internet failure or to avoid last minute rush. The proxy feature allows bidders to place an automated bid in the system directly in an auction and bid without having to enter a new amount each time a competing bidder submits a new offer. The bid amount that a bidder enters is the minimum that the bidder is willing to offer. Here the software bids on behalf of the bidder. This obviates the need for the bidder participating in the bidding process until the proxy bid amount is decrementally reached by other bidders. When proxy bid amount is reached, the bidder (who has submitted the proxy bid) has an option to start participating in the bidding process.

The proxy amount is the minimum amount that the bidder is willing to offer. During the course of bidding, the bidder cannot delete or change the amount of a proxy bid. Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing bidder bids, regardless of the fact whether the competing bids are submitted as proxy or standard bids. However, it may please be noted that if a manual bid and proxy bid are submitted at the same instant manual bid will be recognized as the L1 at that instant. In case of more than one proxy bid, the system shall bid till it crosses the threshold value of 'each lowest proxy bid' and thereafter allow the competition to decide the final L1 price. Proxy bids are fed into the system directly by the respective bidders. As such this information is privy only to the respective bidder(s).

**13.** Bidders are advised to get fully trained and clear all their doubts such as refreshing of screen, quantity being auctioned, tender value being auctioned etc. from M/s. {Service provider}.

**14.** M/s. {Service provider}, shall arrange to demonstrate/ train the bidder or bidder's nominated person(s), without any cost to bidders. M/s. {Service provider}, shall also explain the bidders, all the business rules related to the Reverse Auction. Bidders are required to submit their acceptance to the terms/ conditions/modalities before participating in the Reverse Auction in the process compliance form as enclosed. Without this, the bidder will not be eligible to participate in the event.

**15.** Successful bidder shall be required to submit the final prices (L1) in prescribed format (Annexure-VI) for price breakup including that of line items, if required, quoted during the Online Reverse Auction, duly signed and stamped as token of acceptance without any new condition (other than those already agreed to before start of auction), after the completion of auction to M/s. {Service provider} besides BHEL within two working days of Auction without fail.

**16.** Any variation between the final bid value and that in the confirmatory signed price breakup

Document will be considered as tampering the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)).

**17.** Bidders' bid will be taken as an offer to execute the work/ supplies of the item as per enquiry

No. {...} dt. {...}. Bids once made by the bidder, cannot be cancelled/ withdrawn and bidder shall be bound to execute the work as mentioned above at bidder's final bid price. Should bidder back out and not execute the contract as per the rates quoted, BHEL shall take action as per extant guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)).





18. Bidders shall be able to view the following on their screen along with the necessary fields during Online Reverse Auction:
- a. Leading (Running Lowest) Bid in the Auction (only total price of package).
  - b. Bid Placed by the bidder.
  - c. Start Price.
  - d. Decrement value.
  - e. Rank of their own bid during bidding as well as at the close of auction
19. BHEL's decision on award of contract shall be final and binding on all the Bidders.
20. BHEL reserves the right to extend, reschedule or cancel the Reverse Auction process at any time, before ordering, without assigning any reason, with intimation to bidders.
21. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. In such cases, the decision of BHEL shall be binding on the bidders.
22. Other terms and conditions shall be as per bidder's techno-commercial offers and other correspondences, if any, till date.
23. If there is any clash between this business document and the FAQ available, if any, in the website of M/s. *{Service provider}*, the terms & conditions given in this business document will supersede the information contained in the FAQs. Any changes made by BHEL/ service provider (due to unforeseen contingencies) after the first posting shall be deemed to have been accepted if the bidder continues to access the portal after that time..
24. Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)), shall be initiated by BHEL.



**RA price confirmation and breakup**  
(To be submitted by L1 bidder after completion of RA)

To

- M/s. Service provider
- Postal address

CC: M/s BHEL

BOILER AUXILIARIES PLANT  
INDIRA GANDHI INDUSTRIAL COMPLEX  
RANIPET – 632406  
TAMILNADU  
INDIA.

Sub: Final price quoted during Reverse Auction and price breakup

Dear Sir,

We confirm that we have quoted.

**Rs.{ \_\_\_\_\_ in value & in words \_\_\_\_\_ } for item(s) covered under tender enquiry No. {...} dt.{...}**

Total price of the items covered under above cited enquiries is inclusive of {Packing & forwarding, GST, freight and insurance charges up to {.....}  
District, {.....} State and Type Test Charges etc., [exclusive of Goods & Services tax (GST)],  
other as  
per NIT}

as our final landed prices as quoted during the Reverse Auction conducted today {date} which will be valid for a period of { \_\_\_\_ in nos. & in words \_\_\_\_ } days.

The price break-up including that of line items is as given below.

Total

=====  
- Rs.in value & in words  
=====

Thanking you and looking forward to the valuable order from BHEL.

Yours sincerely, For

\_\_\_\_\_  
Name:  
Company:  
Date: Seal:

## List of Consortium Banks

Sl. No	Nationalised Banks	Sl. No	Public Sector Banks
1	State Bank of India	18	IDBI
2	Allahabad bank		
3	Andhra bank	Sl. No	Private banks
4	Bank of Baroda	19	Axis Bank
5	Canara Bank	20	HDFC
6	Corporation bank	21	ICICI
7	Central bank	22	The Federal Bank Limited
8	Indian Bank	23	Kotak Mahindra Bank
9	Indian Oversea Bank	24	Indusind Bank
10	Oriental bank of Commerce	25	Yes Bank
11	Punjab National Bank		
12	Punjab & Sindh Bank	Sl. No	Foreign banks
13	Syndicate Bank	26	CITI Bank N.A
14	UCO Bank	27	Deutsche Bank AG
15	Union Bank of India	28	HSBC
16	United Bank of India	29	Standard Chartered Bank
17	Vijaya Bank	30	J P Morgan

## Payment Mechanism at BHEL, Ranipet

(Effective for all tenders issued by BHEL Ranipet from 01 July 2011 onwards unless otherwise notified of change/s in writing given by an authorized official of BHEL, Ranipet)

BHEL, Ranipet's payment mechanism will be as follows: (All Bidders are requested to read this carefully and take note of it before submitting their offer)

All bills of Suppliers processed for payment by BHEL, Ranipet shall pass through the following mile stones:

- (1) Receipt of materials at BHEL, Ranipet Stores (evidenced by the Day-Book Number and Date generated at BHEL Stores, Ranipet) or Receipt of materials at Project Site / Destination specified in the Purchase Order (as evidenced by the acknowledgement given by the Consignee).
- (2) Acceptance of the supplied materials at BHEL Stores, Ranipet. (Proof of evidence: Stores Receipt voucher - Short form "SRV", raised by BHEL Stores, Ranipet referenced by the SRV Number and Date)
- (3) Receipt and Registration of the Bills / Invoices of the Supplier at BHEL, Ranipet Accounts Department. (evidenced by the ABS Number and Date)
- (4) Receipt of clarifications, if any that may be required by BHEL, Ranipet Accounts or Purchase Department, from the Supplier. (As evidenced by the IOM Inward Date)
- (5) Bill processing and passing.
- (6) Payment release.

All these events are transparently available in the SCM web-site of BHEL, Ranipet, { <http://bapscm.bhelrpt.co.in/purc> } which can be viewed by all registered suppliers with a password.

Allowed Time frames:

- A] From DB to SRV: 10 Days
- B] From SRV to ABS: 15 Days
- C] From ABS to Bill Pass: 07 Days (if Stage 4 above is not applicable)

OR

From IOM to Bill Pass: 07 Days (if Stage 4 above is applicable)

- D] From Bill Pass to Payment Release: As per payment terms of the Purchase order.

All Suppliers payment/s would be released based on seniority of receipt of the processed bills at the payment section of BHEL, Ranipet Accounts Department.

The seniority would be based on the sequence of milestone events listed above.

In the sequence of the bill processing the preceding mile-stone seniority will be void, if the subsequent event occurs beyond the permitted time frame between two successive events.

Thus for example:

Start seniority would be with the DB date.

If the SRV date is greater than 10 days of the DB date, then the seniority of the DB date would be replaced by the SRV date.

If the ABS date is greater than 15 days of the SRV date, then the seniority would be reckoned by the ABS date.

If the Bill pass date is greater than 07 days of the ABS date then the seniority would be the date of inward receipt of the IOM.

The logics of these sequence is that SRV, ABS, IOM inward entry are dependent entirely on submission of correct documentation by Suppliers, as called for in the Purchase Order. If the documents are correctly submitted each of the milestone listed above will occur within BHEL, Ranipet within the timelines specified above.

Hence, in their own interest all Suppliers are requested to take note of this process and comply with the same.

Caution: Suppliers' payments would get delayed / affected if they fail to adhere to the submission of the documents specified in the Purchase Order / Contract, since the listed milestone events occurrence are contingent upon the availability of the requisite documents.