2X800 MW SINGRAULI STPP STAGE III EPC

TECHNICAL SPECIFICATION
FOR
DOUBLE GIRDER EOT CRANES FOR TG HALL 265/25T

SPECIFICATION No. PE-TS-512-501-A501

REV NO. 00

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

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PROJECT INFORMATION

SL.NO	DESCRIPTION	DETAILS
1	**CUSTOMER**	**NTPC Ltd.**
2	**CUSTOMER CONSULTANT**	**NA**
3	**LOCATION**	The project is located in Sonebhadra District of Uttar Pradesh
4	**DATA**	
4.1	THE BASIC WIND SPEED “Vb” AT TEN METERS ABOVE THE MEAN GROUND LEVEL.	47 METERS PER SECOND
4.2	THE RISK COEFFICIENT “K1”	1.07
4.3	CATEGORY OFTERRAIN	CATEGORY 2
4.4	OTHER FACTORS	IN LINE WITH IS 875
4.5	SEISMIC ZONE	ZONE-II AS PER IS:1893
4.6	DESIGN AMBIENT TEMPERATURE	50 DEG. CELCIUS
5	**ELECTRICAL DATA**	
5.1	RATED VOLTAGE	415 V
5.2	FREQUENCY	50 Hz
5.3	PERMISSIBLE VARIATIONS FOR	
a.	VOLTAGE	+/-10 %
b.	FREQUENCY	(-)5 to (+)3 %
c.	COMBINED VOLTAGE & FREQUENCY	10 %
5.4	SYSTEM FAULT LEVEL AT RATED VOLTAGE FOR 1 SEC	50 kA
5.5	SHORT TIME RATING FOR TERMINAL BOXES FOR 0.25 SEC	50 kA

SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing Of	
a)	Main Supply	YES
b)	Commissioning Spares	YES
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	NO
7	Supervision of Erection & Commissioning	YES
8	Performance Guarantee (PG) Test	YES
9	Mandatory Spares	YES
10	O & M Service	NO
11	O & M Spares	YES
12	Storage	NO

EXCLUSIONS

1	Supply feeder and cable from feeder / MCC to isolating switch.
2	Steel Gantry girder.
3	Dead load for load/ overload testing at site.
	Note
1	Load testing sling and cradle and any other item required by the vendor during the load testing shall be arranged by the vendor. Slings & cradle will be allowed to be taken back by the vendor, after completion of the test at site.

	GENERAL TECHNICAL REQUIREMENT
1.0	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2.0	The equipment shall comply with all applicable safety codes and statutory regulations of India as well as of the locality where the equipment is to be installed.
3.0	In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.
4.0	The equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
5.0	Drawing/document submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drg/doc approval and training for the same. Bidder to ensure proper internet connectivity at their end.
6.0	The first revision drawings/ documents submitted by vendor shall be complete in all respects.Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer's place as per the requirement for across the table discussions/ finalizations/ submissions of drawings.
7.0	In case of any change in codes, standards & regulations between the date of bid opening (23.12.2023) and the date when vendors proceed with fabrication, the Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Employer such changes and advise Employer of the resulting effect.
8.0	Bidder shall carry out the type tests as listed in the Quality Plan. OR Bidder shall furnish Type Test Certificate of specified Type Test as per quality plan for applicable equipment which has been carried out within last five years from 23.12.2023. These reports should be for the tests conducted on the equipment same (model / type / size / rating) to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. In absence of valid Type Test report vendor to conduct the same without any commercial & delivery implication to BHEL.
9.0	Bidder shall submit stamped QP on compliance route in the event of order. In case, the bidder is supplying the item from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.
10.0	Sub vendor list is attached. Any additional sub - vendors proposed by biddder during contract stage shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.
11	Document approval by BHEL / Customer shall not absolve the supplier of their contractual obligations of completing the work as per specification requirement without any commercial and delivery impact.
12	**Mandatory Spares**
12.1	One (1) Set is defined as 100% requirement for one crane for the entire cranes of similar size & capacity.
12.2	All essential spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is not applicable for particular equipment then equivalant applicable spare have been offered / shall be supplied without any financial implication.
12.3	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the above list.
12.4	Any item which is quoted as "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Bidder without any commercial implications. The Bidder shall note that if there in any change/ variation in equipment/ system during detail engineering which causes any change/ variation in the essential spares quantity, the same shall be supplied without any commercial implications. The price indicated for the mandatory spares shall be considered for the purpose of evaluation.

12.5	Interchangeability and Packings: All spares supplied under this contract shall be strictly interchangeable with parts for which they are intended for replacements. These spares should include all mounted accessories like components, boards, add or items, fitting, connectors etc. and be complete in all respects so that the replacement of the main items by these spares does not require any additional item. The vendors must conform the pair to pair compatibility of each electrical spares modules with the modules should be supplied in the original package. All electronic modules should be pre set and/or preprogrammed for ready use at site. Alternatively, suitable instruction sheet indicating the details of required PCB jumper position, BCD which is setting, EPROM/PROM listing etc should be packed along with each module. Also a caution mark sign should be put on all such module which needs pre setting/pre programming before putting them in to service. The spare shall be treated and properly packed for long term storage.
12.6	Identification: Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.
13.0	The type of bearings for various parts as per IS:3177 (latest). Bearing life not less than 10,000 working hours.
14.0	The crane shall be complete with trolley and truck, wheels and axles, Drive mechanisms, Hoisting Drums, Brakes, Creep Speed Arrangement, Lifting tackles, Buffers Electric Motors, Controls, Switch Board and cabling, horns, warning lights, Limit switches etc. Any item not mentioned herein but required to make the system complete for the satisfactory performance of the crane shall also be included.
15.0	Trolley stops of spring type to be mounted independently on bridge rails to prevent trolley from running off.
16.0	Buffers to be designed to bring the loaded crane to rest from a speed of 50% of the rated speed.
17.0	Suitable guard to push forward or off the rail track any object placed across to be provided. Suitable guards to live electrical wirings downshop lead.
18.0	Necessary access ladders shall be provided for access on to crane bridge platform form the gantry girder level, from crane bridge platform to trolley platform and from operating floor of pump to gantry girder level.
19.0	The lifting tackle shall consist of a safety type lower pulley block, hook, necessary sheave and flexible steel wire ropes. The lower block sheaves and ropes shall be of adequate design and size to handle the specified loads.
20.0	Each crane shall have a permanent inscription of English on each side, readily visible from the ground level, stating the safe working loads in tonnes for both the hooks, year of manufacture, crane serial number and manufacturer's name.
21	**SHOP TEST PROCEDURE FOR GEAR BOX**
21.1	Gear Box Running Test: The gear boxes shall be run under no-load condition at the rated speed for minimum four hours in each direction and the following are to be checked:
a	All bolts at the joints remain tight.
b	All gear mesh lines are getting enough lubrication.
c	All bearings are getting enough lubrication.
d	Bearing temperatures after running for four hours shall not exceed 50 deg. Centigrade or 15 deg. centigrade above ambient whichever is higher. Temperature shall be checked after every hour.
e	Vibration : Maximum limit 125 microns (peak to peak)
f	Sound: The gearbox shall not emit unusual sound as obtained under conditions of hard meshing, high spots etc. Maximum sound level shall be 85 dBA at a distance of 1000 mm and 91 dBA at a distance of 300 mm.
g	There shall be no Oil leakage at parting lines, bearing housings or inspection covers.
21.2	**In addition to the above specific points, the following general points shall be ensured:**
a	Inspection pockets are provided as required.
b	Gear box casings are provided with at least two fit bolts/dowels at the parting line.
c	Dip sticks with minimum / maximum level markings are provided.
d	Drain plugs are provided at convenient locations preferably at vertical wall of the housing.
e	Breathers are provided.
f	Lifting lugs or eye bolts ar provided as required.
g	Wherever bearings have splash lubrication, oil retainers are provided.

h	Gear boxes are painted as per specification outside and inside. Inside surfaces shall be painted with Oil proof paint.
i	In case of vertical gear boxes having more than two stage reduction, forced lubrication is also provided.
j	Name plate should provide information eg. Ratio, KW rating, Bearing details and manufacturers name.
22	**STAGE INSPECTION OF EOT CRANES AT WORKS:** Stage inspection of various components of crane shall be guided by the MQP attached with this specification. However, following shall be ensured and read in conjunction with relevant clause of MQP w.r.t. stage inspection:
a	For tensile testing of hooks/ forgings, samples shall be drawn from the full cross section of the shank diameter of hooks/ forgings Samples forged to reduced cross section for testing purposes is not acceptable. Hooks shall be manufactured from Blooms, billets, rounds by forging with forging ratio of at least 3:1. Hooks manufactured from plates are not acceptable.
b	Radiographs shall be inspected to a sensitivity of 2%.
c	Gear boxes shall be checked at No load for backlash, tooth contact, noise, temperature rise and vibration.
d	Acceptance and routine tests (HV and insulation) for all electrical and electro-mechanical components and system as per governing specification.
23	**Testing at site under supervision of bidder**: Completely assembled crane at site shall be check for misalignment of gears, shafts and other items. The test shall be carried out with actual panel, RRC, Master Controller etc.
a	Deflection test of bridge girder at rated load. Crane shall rest on centerline of LT wheels.
b	Load test and Overload test (running of CT and Hoisting mechanism at 125% of the rated load). Capability of crane to lift the overload from mid-air shall be demonstrated. Electrical tests for brakes, panel, electrical equipment etc. as per IS - 3177
c	All other tests as per IS-3177.
d	Speed test at rated load for hoisting, CT and LT mechanism.
e	Brake test.
24	**Services to be provided by the bidder**
a	Packing, forwarding and transportation to site.
b	Supply of cradle and sling on returnable basis for load testing of EOT cranes .
25	**GENERAL REQUIREMENT FOR SUPERVISION OF ERECTION & COMMISSIONING, SUPERVISION OF PERFORMANCE GUARANTEE TESTS AND VISITS DURING WARRANTY PERIOD FOR HEALTHINESS CHECK.**
a	Bidder shall be informed at least 10 days in advance for the requirement of visit at site.
b	Visiting team shall consist of one or two expert of bidder as deemed necessary by them.
c	Visit during material verification for MRC shall be free of cost by bidder at site.
d	Supervision of E&C and supervision of load testing scope shall include scope for supervision of operation in tandem(including Software installation and testing for smooth synchronized running of both EOT cranes).
e	During supervision of E&C or Load/ overload testing of crane or during Guarantee period, if any missing item is noticed which is not supplied (i.e. not part of packing list) and required for safe commissioning or operation of equipment, same shall be supplied by bidder on immediate basis without any cost implication to BHEL.
f	Bidder has to visit site for healthiness check as per technical specification and system requirement. Please refer minimum requirements of healthiness check in specification . Replacement of all the parts found faulty or malfunctioning from start of erection to load testing activity and during Guarantee period (36 months from date of load testing of respective cranes at site) shall be in Crane supplier scope.

TECHNICAL DATA SHEET A

Sr. No.		DESCRIPTION	TECHNICAL PARTICULARS	
1.0.0		**General**		
1.1.0		**Basic Details**		
	a.	EOT Crane	265/25T Double Girder EOT crane	
	b.	Location	TG Hall Building (Indoor)	
1.2.0	a.	**Design, fabrication and testing of the crane confirm to standard / code number**	Mechanical and Electrical as per IS: 3177-2020 & Structure design in accordance to IS 807:2006 / IS 800:1984.	
	b.	**Minimum thickness of Structural members**	a) Load carrying members: 8 mm b) Tubes with both ends sealed: 4.9 mm (6 SWG) c) Tubes with unsealed ends: 8mm d) Chequered plates: 6 mm O/P e) Web thickness - 10mm. f) Diaphragm/stiffner thickness - 8mm	
	c.	**MAXIMUM SPAN/DEPTH RATIO FOR GIRDER:**	Plate girders : 18	
1.3.0		**Number of crane**	Two (2) nos.	
1.4.0		**Crane classification**	M5 (Mechanical, Structural and Electrical) as per IS: 3177-2020, IS: 807-2006 and 13834 (part-5)-1993	
1.5.0		**Suitable for outdoor or indoor duty**	Indoor	
1.6.0		**Capacity**		
1.6.1		**Main hoist**		
	a.	Rated SWL – tonnes	265T	
	b.	Test load SWL – tonnes	Rated SWL and over load test : 125% of SWL (Safe Working Load)	
	c.	Lift	30 m	
1.6.2		**Aux. hoists**		
	a.	Rated SWL – tonnes	25T	
	b.	Test load SWL – tonnes	Rated SWL and over load test : 125% of SWL	
	c.	Lift	36 m	
1.7.0		**Span**	29 m	
1.8.0		Operation from	Cabin + Pendent Push Button+ Radio remote control	
2.0		**CRANE PERFORMANCE**		
2.1.0		**Crane speed with full load**	Full speed m/min	Creep speed m/min
	a.	Main hoist	1.6	0.16 (10% of main speed thru' VVVF drives)
	b.	Aux. hoist	7.5	0.75 (10% of main speed thru' VVVF drives)
	c.	Trolley travel (CT)	15	1.5 (10% of main speed thru' VVVF drives)
	d.	Longitudinal bridge travel (LT)	30	3.0 (10% of main speed thru' VVVF drives)
2.2.0		**Acceleration values for LT motion (bridge travel) and CT motion (trolley travel)**	As per IS: 3177 (2020)	
2.3.0		**Hook Approaches from C.L. of rails**		
	a.	Main hook (non cabin side)	Refer "CRANE CLEARANCE DIAGRAM OF TG HALL EOT CRANES" under compliance drawings.	
	b.	Aux. Hook (non cabin side)		
	c.	Main hook (cabin side)		
	d.	Aux. Hook (cabin side)		
2.4.0		**Hand Rail Pipes**	32 mm NB Medium class of IS: 1161 having top and bottom rail at height of 1050 mm and 600 mm and vertical post spacing not exceeding 1500 mm with provision of kick plate (100 mm high and 6mm thick)	
3.0.0		**COMPONENT DETAILS**		
3.1.0		**Bridge girder**		
	a.	Type & Quantity	Box type construction shall ensure non-accumulation of water/oil inside the box. . Material: Mild steel, grade 'Br' of IS 2062 in 100% killed, normalised and ultrasonically tested quality or high strength steel of IS 8500 as appropriate.	
	b.	Stress consideration	Following to be consider as per IS 807: Static load (dead load), loads due to working load multiplied by dynamic coefficiendt, two most unfavourable horizontal effects excluding buffer forces.All these loads must then be multiplied by amplifying coefficient	
	c.	Maximum Limit for Vertical Deflection	Maximum vertical deflection of the girder produced by the weight of the trolley and the rated load (excluding impact factor) shall not exceed 1/800 of the span of the crane.	
	d.	Type of connection to end carriage	By fitted bolts	

	e.	Nut & bolts	As per IS:1363, IS:1364 and IS:1367. High Tension Friction grip bolts as per IS: 3757. High Tension Friction grip nuts as per IS: 6623.	
3.2.0		**Type of platform required on the bridge**	Chequered plate platform 6mm thick over plain as per IS : 3502	
	a.	Length	Full span length	
	b.	Walkways	Access walkways of not less than 800 mm (clear) with hand railing of height of 1100 mm along the both side of bridge girder and cross over walkways.	
	c.	Type of access from gantry girder level to crane bridge	Rung ladder at ends from gantry girder level walkway to crane bridges walkway	
	d	Type of access to maintenance cage from crane bridges walkway	Rung ladder	
	e	Type of access to Cabin from crane bridges walkway	By Staircase	
	f	Provided at both ends	Yes	
3.3.0		**End carriage span (wheel base)**	As per IS 807 (latest edition)	
3.4.0		**Trolley**	The trolley frame shall be built up from heavy steel plates, angles and channels adequately braced to resist vertical, lateral and torsional strains, welded to form a rigid one piece frame. Alternatively, it may be of cast steel construction and should be covered by flooring as far as possible.	
			On bottom of trolley frame, on each side a double spring bumper shall be provided to engage stops at each end of the bridge.	
			800 mm (clear) with hand railing of height of 1100 mm along the cross over walkways on trolley.	
	a.	Type	Fabricated	
	b.	Method of fabrication	Fusion welded	
	c.	Material	Mild steel, grade 'B' of IS 2062 in 100% killed normalised and ultrasonically tested quality or high strength steel of IS 8500 as appropriate.	
	d.	Other requirements	Upper pulley block shall be approachable for maintenance.	
	e.	Whether jacking pads for lifting trolley provided or not	Yes	
3.5.0		**Rope drums**	**Main hoist**	**Aux hoist**
	a.	Material (Indicate IS)	Seamless pipe ASTM A -106 Gr. B or fabricated rolled section to IS: 2062 Gr. Br & stress relieved	
	b.	Flange / flangeless	Flanged	
	c.	Numbers provided	One for each hoist	
	d.	Type of grooves	Identical Right hand and Left hand & other details shall be as per IS 3177:2020	
3.6.0		**Rope details**	**Main hoist**	**Aux hoist**
	a.	Construction	Extra flexible plough steel , 6 x 36 or 6x37 construction	
	b.	Standard conforming to	IS: 2266 (latest edition)	
	c.	Factor of safety	As per IS-3177 : 2020	
	d.	Type of core	Steel	Steel
3.7.0		**Sheaves details**	Main hoist	Aux hoist
	a.	Material	Fe 410 IS: 2062 Gr. Br / CS Gr. 280-520 IS: 1030 Design as per IS: 3177- 2020	
	b.	Type of guards provided	Fabricated from rolled steel plate	
3.8.0		**COUPLINGS & SHAFTING**		
3.8.1		**Coupling details (between motor and gear box)**	**(for Main hoist, Aux hoist, Cross Travel and long travel)**	
	a.	Type	Flexible shock absorbing coupling	
	b.	Guards and enclosures	Provided	
	c.	Coupling material and hardness	All couplings shall be of cast, wrought or from forged steel, tooth portion to be heat treated to hardness HB241-280	
3.8.2		**Coupling details (between gear box and wheels)**	**Cross Travel (CT)**	**Long Travel (LT)**
	a.	Type	Flexible geared type	
	b.	Guards and enclosures provided	Yes	
3.8.3		**Coupling details (between gear box and rope drum)**	**Main hoist**	**Aux hoist**
	a.	Type	One of the following arrangements will be adopted for connecting the rope drum with the gear-box. 1.Flexible joint, incorporating flexible geared coupling housed within the drum. 2.Fully flexible geared coupling between the drum & gearbox.	
	b.	Guards and enclosures provided	Yes	

3.8.4		**Shafting (Output)**	**Cross Travel**	**Long Travel**
	a.	Factor of Safety	As per IS: 3177-2020	
	b.	Arrangement of lubrication	Grease cups / Nipple	
	c.	Type of lubricant	Grease	
3.9.0		**Gear box details**		
3.9.1		**Hoist Motions**	**MH and MH Micro**	**AH and AH Micro**
	a.	Type of mounting of gear box	Horizontal / Vertical	
	b.	Classification	Suitable for M5 duty	
	c.	Type of gears	For MH and AH: Helical / Spur For MH Micro and AH Micro: Through VVVF drive	
	d.	Type of lubrication (grease / splash / pump lubrication)	Splash Lubrication	
	e.	Hardness (BHN) – gear	220 BHN (minimum)	
	f.	Hardness (BHN) – pinion	270 BHN (minimum)	
	g.	Difference in Gear and pinion hardness	Min 20 BHN	
	h.	Materials (gear/pinions)	Main Gears En 9/ 55C8/ IS2707 Gr. 1or 2. Pinions En 19/EN 24. Hardness conforming to IS: 3177-2020 Gears to be hardened, tempered & heat treated as per IS 4460	
	i.	Casings	Fabricated Fe 410w IS: 2062 Gr Br & stress relieved	
	j.	Noise level	85 db	
	k.	Standard conforming to	IS: 4460 / AGMA	
3.9.2		**Travel Motions**	**CT and CT Micro**	**LT and LT Micro**
	a.	Type of mounting gear box	Vertical/ Horizontal	
	b.	Classification	M5 duty	
	c.	Type of gears	For CT and LT: Helical / Spur For CT Micro and LT Micro: Through VVVF drive	
	d.	Type of lubrication (grease / splash / pump lubrication)	Splash Lubrication	
	e.	Hardness (BHN) – gear	220 BHN (minimum)	
	f.	Hardness (BHN) – pinion	270 BHN (minimum)	
	g.	Difference in Gear and pinion hardness	Min 20 BHN	
	h.	Materials (gear / pinions)	Main Gears En 9/ 55C8/ IS2707 Gr. 1or 2. Pinions En 19/EN 24. Hardness conforming to IS: 3177-2020 Gears to be hardened, tempered & heat treated as per IS 4460	
	i.	Casings	Fabricated Fe 410w IS: 2062 Gr Br & stress relieved	
	j.	Noise level	85 db	
	k.	Standard conforming to	IS: 4460 / AGMA	
3.10.0		**Wheels details**	**Cross Travel**	**Long Travel**
	a.	Material	Grade C55Mn75 of IS 1570 (Part 1 and Part 2/Sec 2) or 42CrMo4 or equivalent as per IS 3177-2020. UTS required for selection of PL value as indicated in Table 6 of IS 3177 shall be witnessed by BHEL.	
	b.	Hardness	300 – 350 BHN	
	c.	Depth of hardness	10 mm (min)	
	d.	Process of hardening	Volume hardening	
	e.	Type	Double flanged	
	f.	Min.Numbers provided	4 nos.	8 nos.
	g.	Specification conforming to	IS: 3177-2020	
	h.	Arrangement of lubrication	Grease	
3.11.0		**Lifting hooks**	**MH**	**AH**
	a.	Type	Ramshorn shank with safety latch swiveling type as per latest edition of DIN-15402	Plain with safety latch swiveling type as per latest edition of IS: 15560
	b.	Safe lifting capacity	SWL is 265 T , however 320T capacity hook model as per DIN-15402 is to be provided	25 T as per IS: 15560
	c.	Material	-As per DIN-15402	Class 3 for hook of grades L & M respectively as per IS 1875:1992 for hooks conforming to IS : 15560
	d.	Standard conforming to	DIN-15402	IS: 15560
	e.	Hook can rotate	Yes	
	f.	Safety latch on hook provided	Yes	
	g.	Locking device on swivelling hook required or not	Provided	
3.12.0		**Buffers**	**Cross travel**	**Long travel**
	a.	Type	Spring loaded type. To be designed to bring the loaded crane (In calculation crane is considered to be loaded with SWL) to rest from speed of 50% of the rated speed.	

	b.	Numbers provided	4	4
	c.	Details of end stop	Mild steel, grade 'B' of IS 2062 in 100% killed, normalised and ultrasonically tested quality or high strength steel of IS 8500 as appropriate.	
3.13.0		**Brakes**		
3.13.1		**Hoist Motions**	**MH**	**AH**
	a.	Type of brake	AC Electro-Hydraulic Thruster operated	
	b.	Number provided per motor	2	2
	c.	Braking capacity (% of torque transmitted to the brake drum with full load.)	150%	150%
	d.	Material		
		· Brake liners	Ferrodo liners	
		· Drum	CS IS : 1030 / CL 4 IS : 1875	
		· Springs	As per manufacturers standard	
3.13.2		**Travel Motions**	**CT**	**LT**
	a.	Type of brake (ac / dc / thrustor)	AC Electro-Hydraulic Thruster operated	
	b.	Number provided per motor	2	2
	c.	Braking capacity (% of motor rated torque before derating)	125%	125%
	d.	Material		
		· Brake liners	Ferrodo liners	
		· Drum	CS IS : 1030 / CL 4 IS : 1875	
		· Springs	As per manufacturers standard	

3.14.0	**Motors**		
	a.	Type	Three phase Squirrel Cage Induction motors to be operated from VFD system shall be suitable for speed range and torque without exceeding temperature rise limits as specified elsewhere in this specification. These motors shall be provided with insulated bearing on at least one side for motor frame size above 250 frame. However, contractor's proven practice with respect to use of insulated bearing in VFD driven motor may be accepted subject to Employer's approval. Motor operating through variable frequency drives shall be suitable for inverter duty with VPI insulation.
	b.	Design Codes & Standards	1.Three phase induction motors : IS15999, IEC:60034, IS: 12615, IS: 325 2.Single phase AC motors : IS:996, IEC:60034 3.Energy Efficient motors : IS 12615, IEC:60034-30 4.Crane duty motors : IS:3177, IS/IEC:60034 5.Designation of Methods of Cooling of Rotating Electrical Machines: IS 6362 6.Designation for types of construction and mounting arrangement of rotating electrical machines: IS 2253
	c.	Enclosure	Totally enclosed fan cooled (TEFC) or totally enclosed tube or ventilated (TETV) or Closed air circuit air cooled (CACA) type.
	d.	Numbers of motors	For Main hoist: 1 no.
			For aux hoist: 1 no.
			For Cross travel: 2 nos.
			For long travel: 2 nos.
	e.	Voltage, phase and frequency	415V ± 10%, 3 Ph., 4 wire, 50 Hz, +3/-5 % Combined voltage & frequency variation = 10% (absolute sum)
	f.	Class of protection for motor including terminal box	IP – 55
	g.	Rated capacity (KW)	The motor shall be suitable for 40% CDF. Motor nameplate rating at 50° C shall have Motor rating will be calculated keeping margin of at least 10% over the maximum power requirement in the duty condition specified.
	h.	Duration factor/duty	40 % CDF / S-4
	i.	Class of insulation	Class 'F' for sq. cage motors with temp rise limited to 70°C
	j.	Bearings (Motors)	-Grease lubricated ball or roller bearings for Horizontal motors Grease lubricated ball or roller bearings or combined trust and guide beaing for Vertical motors. These motors shall be provided with insulated bearing on at least one side for motor frame size above 250 frame. However, supplier's proven practice with respect to use of insulated bearing in VFD driven motor may be accepted subject to End customer's approval.
	k.	Number of starts/ hour	Starts / hr as per IS 3177-2020
	l.	Overload protection for motors provided	Yes
	m.	Space heater requirements	For motors of rating 30 KW and above. Separate terminal box for space heaters & RTDs shall be provided.
	n.	Motor Duty and pull out torque	Duty S4 and pull out torque 275% of full load torque
	o.	Terminal box of motor	-Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation. DOP of terminal box shall be same as motor.
			-Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated.
			- The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.
			- Rotation at 90 deg
	p.	Cable glands and lugs	-Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used.
			-Gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided in case of cable boxes.
	q.	Earthing points suitable for conenction	Motor body shall be grounded at two earthing points on opposite sides with two separate and distinct grounding pads complete with tapped holes, GI bolts and washers. LT Motors above 125 KW --- 50 x 6mm GS flat 25 KW to 125 KW --- 25 x 6mm GS flat 1KW to 25 KW --- 25 x 3mm GS flat.

	r.	Minimum spacing between gland plate & centre of bottom terminal stud	UP to 3 KW As per manufacturer's practice. Above 3 KW - upto 7 KW 85 mm Above 7 KW - upto 13 KW 115 mm Above 13 KW - upto 24 KW 167 mm Above 24 KW - upto 37 KW 196 mm Above 37 KW - upto 55 KW 249 mm Above 55 KW - upto 90 KW 277 mm Above 90 KW - upto 125 KW 331 mm Above 125 KW-upto 200 KW 385/203 (For Single core cables only) mm
	s.	Minimum inter-phase and phase-earth air clearances with lugs installed	UP to 110 KW 10mm Above 110 KW and upto 150 KW 12.5mm Above 150 KW 19mm
	t.	Inspection/Testing (For Motors)	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 100 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(Shall be limited as mentioned above.) 10. Test for degree of protection and 11. Overspeed test. 12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1.
			The type test listed above should have been conducted within 10 yrs prior to supply under this contract. In absence of type tests reports or in case reports are not found to be meeting the specification/standards requirements, vendor shall conduct all such type tests without any commercial/delivery implication to BHEL according to the relevant standards and reports shall be submitted to the owner for approval.
			The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, 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.
			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.
	u.	Other requirement	
	u.1	Squirrel cage Induction motor with VPI insulation shall be provided With VVVF system. Motor shall be energy efficient as per IS:12615, IEC 60034 and shall be Crane duty as per IS:3177. Winding & insulation shall be Electrolytic grade Copper conductor, Non-hygroscopic, oil resistant, flame resistant Insulation. Vibration shall be limited within the limits IS:12075.	
	u.2	For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time. Permissible starting voltage for motor shall be as follows:Up to 85% of rated voltage for ratings below 110 KW & upto 80% of rated voltage for ratings from 110 kW to 200 kW. Starting Duty : Two hot starts, with motor initially at normal running temperature Maximum Locked Rotor Current : as per IS 12615	
	u.3	The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed 11 for motors above 50 KW upto 110 KW.	
3.15.3		**Storm brake**	2x50% storm brakes, one each at each end of the bridge, shall be provided for each crane. Storm brakes shall be designed for wind velocity and detail given in project data. Storm brakes shall be truck end mounted, hydraulic rail clamp type of adequate capacity (depending on wind pressure) to be provided. The setting shall include automatic engagement of clamps in case of crane is left idle for five minutes (adjustable).
3.16.0	**Drive system for hoisting**		
	a.	Arrangement of drive from motor to rope drum (main)	Through geared coupling and gear box
	b.	Arrangement of drive from pony motor to rope drum (creep speed)	Creep speed through VVVF drive.
3.17.0	**Bearings (for crane hook, Trolley wheels, rope drum, gear box or any other assembly)**		
	a.	Type	Antifriction ball / roller bearings

	b.	Number provided for each	As per assembly requirements
	c.	Method of lubrication	Centralised grease lubrication with hand operated grease pump for all bearings as per bidder's standard proven practice.
	d	Bearing life	not less than 10,000 working hours
3.18.0	**Rails**		
	a.	Type / section	Rails sections as per IS: 3443. Joint to be butt-welded by thermit welding or fusion welding.
	b.	Standard conforming to	IS: 3443
3.19.0	**Power conductors (DSL) & Cables**		
	a.	Design Criteria	Cable from main isolating switch (1.5M above operating floor) to motor terminal shall be so sized that the voltage drop does not exceed 2% of rated voltage at motor terminals.
	b.	Type	LT: PVC shrouded Cu/Al conductor bus bar. CT: EPR insulated, copper conductor trailing cables, as per IS: 9968, on the bridge/ energy chain trailing system
	c.	LT POWER CABLES	All cables (LT power and control cables) shall be Armoured type. LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated, and sizes shall be of 1Cx150, 1Cx300, 1Cx630, 3Cx150, 3Cx185, 3Cx240& 3Cx300 Sq.mm. However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable.
	c.1	1.1 KV grade XLPE power cables	1.1 KV grade XLPE power cables shall have multi stranded compacted aluminum conductor (tensile strength of more than 100 N/ sq.mm), XLPE insulated, PVC inner-sheathed (black color as per IS:5831), Armoured (For single core Armoured cables, armoring shall be of aluminum wires H4 grade. For multicore Armoured cables armouring shall be of galvanized steel round wire/strip), PVC FRLS outer-sheathed (black colour) conforming to IS: 7098. (Part-I).
	c.2	1.1KV grade PVC power cables	1.1KV grade PVC power cables shall have multi stranded aluminum conductor (compacted type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed ((black color as per IS:5831)) Armoured (For single core Armoured cables, armoring shall be of aluminum wires H4 grade. For multicore Armoured cables armouring shall be of galvanized steel round wire/strip), PVC FRLS outer-sheathed (black colour) conforming to IS:1554 (Part-I).
	c.3	LT Control Cables	LT Control Cables are Cu conductor 1.5 sq mm, PVC insulated, PVC inner sheath, GS wire/strip armoured and FRLS PVC outer sheath confirming to IS 1554 Part-1. Standard control cable sizes shall preferably be 3CX1.5, 5CX1.5, 7CX1.5 & 10CX1.5mm2, 14CX1.5 mm2.
	c.4	1.1 kV grade trailing cables	1.1 kV grade trailing cables shall have tinned copper (class 5) conductor, insulated with heat resistant elastomeric compound based on Ethylene Propylene Rubber (EPR) suitable for withstanding 90 deg.C continuous conductor temperature and 250deg C during short circuit, inner sheathed with heat resistant elastomeric compound, nylon cord reinforced, outer-sheathed with heat resistant, oil resistant and flame retardant heavy duty elastomeric compound conforming to IS 9968.
	d.	Size	a) Rated current of the equipment b) The voltage drop in the cable, during motor starting condition, shall be limited to 10% and during full load running condition, shall be limited to 3% of the rated voltage. c) Short circuit withstand capability Derating factors for various conditions of installations (variation in ambient temperature, grouping of cables) shall be considered while cable sizing.
	e.	Length	Suitable for bay length
	f.	CABLE TRAYS	Cable trays shall be ladder/perforated type complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.) accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, G.I. strap, hook etc.) as required. Cable tray shall be ladder type for power & control cables and perforated for instrumentation cables. Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. These (including hardware) shall be hot dip galvanized. Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 metre. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be 2 mm. The thickness of side coupler plates shall be 3 mm. Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of thickness 2 mm and shall be hot dip galvanised. Troughs shall be standard width of 50mm & 75 mm with depth of 25 mm. The tolerance for cable tray and accessories shall be as per IS 2102 (Part-1). Tolerance Class: - Coarse

	g.	SUPPORT SYSTEM FOR CABLE TRAYS	Cable supporting steel work for cable racks/cables shall comprise of various channel sections, cantilever arms, various brackets, clamps, floor plates, all hardwares such as lock washers, hexagon nuts, hexagon head bolt, support hooks, stud nuts, hexagon head screw, channel nut, channel nut with springs, fixing studs, etc. All steel components, accessories, fittings and hardware shall be hot dip galvanized. Cable tray support system shall be pre-fabricated out of single sheet. Support system for cable trays shall essentially comprise of the two components i.e. main support channel and cantilever arms. The main support channel shall be of two types : (i) C1:- having provision of supporting cable trays on one side and (ii) C2:-having provision of supporting cable trays on both sides. The main support channel and cantilever arms shall be fabricated out of 2.5 thick rolled steel sheet conforming to IS 1079. Cantilever arms of 320 mm, 620mm and 750 mm in length are required.
	h.	PAINT SHADE FOR MOTOR (CORROSSION PROOF PAINTS OF COLOUR SHADE)	'- RAL 5012 (Blue). '-The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However, in case electrostatic process of painting is offered. minimum paint thickness of 50 microns shall be acceptable for finish coat. Epoxy based paint with suitable additives shall be used.
	i.	Guard provided for DSL	Yes
3.20.0	**Operators cabin**		
	a.	Type of construction	Open type with minimum 6mm toughened glass.
	b.	Area and minimum clear height	2500x1850 mm with a head room of 2000 mm
	c.	Operator's seat	Revolving type
	d.	Warning gong	A foot operated electric warning horn of double bell type suitable for 240 V AC. of noise level 95 dB at 3.5 m. One brass gong suspended outside the Cabin and operated from inside.
	e.	Alarm	A distinct type alarm with conspicuous warning lights on either side of the crane bridge to indicate overloading of crane.
	f	Position of controllers	In front/ side of operator's chair
	g	Ventilation	One no non oscillating ventilating electric fan in cabin
	h.	Additional features	-Emergency Push Button
			-Switches for lights and bells
			-Lamps for Power 'ON' indication and emergency corner switch operation
3.21.0	**Limit switches**		
	a.	Type	For MH: Rotary gear + Gravity
			For AH: Rotary gear + Gravity
			For CT: Lever type (one way/ two way)
			For LT: Lever type (one way/ two way)
	b.	Number provided	For MH: 1+1
			For AH: 1+1
			For CT: 2/1
			For LT: 2
	c.	Material of contacts	Double break Silver Cadmium
	d.	Control voltage / Enclosure	110 V/ IP 55
3.22.0	**Isolating switch**		
	a.	Main isolating cum changeover switch (01 no.), mushroom type emergency STOP push buttons : At center of bay length(to be decided during detail engineering). Additionally Two nos. isolating switch shall be provided at extreme ends of the bay length, at a distance of approximately 20 mtrs. From the centre line of first & last column for maintenance of the cranes	
	b.	BHEL will provide two number 415 V AC (3 PHASE 4 WIRE) supply feeder only up to isolating cum changeover switch. Any other voltage level (AC/DC) required will be derived by the vendor.	
	c.	Motor starter shall be part of crane control panel.	
3.23.0	**Protective Panel**		Shall be Provided with isolating switch, power contactor control and indication to switch ON/OFF power to starter panels, control and lighting transformer.
	a.	Material	Cold Rolled Sheet steel 2 mm size,3mm for Gland Plates (CRCA/HR),1.6mm: Doors, covers etc
	b.	Numbers and location	One number located in cabin
	c.	DOP	IP 54
3.24.0	**Control panel**		
	a.	Material	Cold Rolled 2 mm size,3mm for Gland Plates (CRCA/HR),1.6mm: Doors, covers etc: sheet steel 2mm size

	b.	Numbers and location	One each for MH, AH, CT and LT located on bridge platform with space heaters.
	c.	Degree of protection	IP 54
3.25.0	**Master Controllers (Desk Type)**		
	a.	Number of steps	Five speed control points in each direction of hoist motion. Four speed control points in each direction of bridge and trolley motion.
	b.	Voltage & current rating	415 V/10 A
	c.	Type	Heavy duty type having DOP IP54. Release of operators' hand from the controls shall stop motion and set brakes automatically.
	d.	Location	In cabin
3.26.0	**Control for Hoists /CT/LT operations**		Through separate Variable Voltage Variable frequency drives
	a.	Speed control	Thru' VVVF with minimum 6 pulse design
	b.	Starting torque of VVVF	Up to 400 % typical with/ without encoder
	c.	Starting current	Less than 150 % of rated torque.
	d.	Temperature	VVVF system shall be capable of withstanding up to 50 ^{o} C without derating.
	e	Other requirements for VFD	Necessary input & output devices to be provided to reduce harmonics, as per IEEE519, at supply side of the drive at the switchgear.
	f	Other requirements for VFD	The Variable frequency drive (VFD) system shall be of a modern proven design for similar applications in power plants/industry. The system shall be either Current Source Inverter (CSI) or Voltage Source Inverter (VSI) type with minimum Twelve (12) pulse design / 6 pulse with active frontend harmonic filter. For drives less than 100 KW Six (6) pulse can be offered meeting all other requirements.
	g	Other requirements for VFD	All necessary protections e.g., Input Phase Loss, Earth Fault, Over Voltage, Output Short Circuit, Load Loss, Input Transient Protection, overload etc to be provided.
3.27.0	**a.**	**Contactors**	AC 4 duty for reversing application. AC 3 duty for non-reversing application
	b.	**Switches**	AC 23 for motor application, AC 22 for other application.
	c.	**Fuses**	HRC
	d.	**Overload relay**	Temperature compensated bimetallic with single phasing preventor.
3.28.0	**Power supply**		Purchaser shall provide Two (2) nos. 415 V, 3 phase, 4 wire supply at operating floor near A row column at centre of bay length shall be provided. Bidder shall provide change over switch in enclosure to receive above power supply.
3.29.0	**Cable glands**		Cable shall be terminated using double compression type cable glands. Cable glands shall conform to BS:6121. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and Hardware shall also be made of brass with nickel chrome plating. Rubber components shall be of neoprene or better synthetic material and of tested quality.Cable glands shall be suitable for the sizes of cable supplied/erected.
3.30.0	**Lugs**		Cable lugs/ferrules shall be solderless crimping type suitable for power and control cables as per the DIN 46239. Aluminium solderless crimping lugs/ ferrules shall be used for Aluminium cables and Copper lugs/ferrules shall be used for Copper cables. Bimetallic washers or bimetallic type lugs shall be used for bimetallic connections
3.31.0	**Transformer**		(Dry type, With Insulation Class B or Better)
	a.	Quantity	2 X 100 % for control, 1 no for lighting & 1 no for hand lamp.
	b.	Voltage Rating	Control 415/110V, Lighting 415/240V and hand lamp 415/24V.
	c.	KVA rating	20% over loading to be considered while sizing the rating
3.32.0	**Illumination**		
	a.	In cabin	40W florescent tube + Bulk head fitting with 60W incandescent lamp – 1 each 2 nos. 24V- 5A-3 pin industrial socket.
	b.	Over Bridge	4 no. 60W Bulk head fittings with Florescent lamp lamps and 4 nos.24V 20A -3 pin Industrial socket
	c.	Under bridge	4 nos. 250 W HPSV lamps
	d.	For inspection of crane components	One (1) portable 40W hand lamp with min. half span length flexible cable for inspection of crane compon-ents.
3.33.0	**Fire Extinguisher**		
	a.	Type and size	4.5 kg CO2 type
	b.	Location	One in cabin and Three on bridge

3.34.0	**Maintenance cage**	Suitable inspection cages to accommodate two persons to facilitate inspection of down shop lead.
3.35.0	**Mechanical overload protection (Load Cell)**	To be provided for hoist mode
3.36.0	**RRC details**	
	a.	RRC should be supplied with transmitter unit, receiver unit, encoder unit, decoder unit, interface panel, coupling system, battery unit and any other control gear if required.
	b.	The equipment should be based upon the microprocessor based digital technology with almost nil hard wiring.
	c.	The remote unit should communicate up to the distance of approximately 100 meters.
	d.	The system has to integrate with the control system of crane, which operates at 110 V AC, Single phase.
	e.	The remote unit should have transmitter which can be mounted on shoulder by suitable belt. Main controls can be of single joystick movement or double joystick movement type stepped control with spring return. The Micro control should be toggle switch type or push control type.
	f.	Frequency allotment for radio remote unit from Govt. of India, Dept. of Telecommunication or any other agency shall be the responsibility of supplier.
	g.	The transmitter and receiver unit should have its own frequency and address code with each system having its own security code so that one particular set becomes unique and there is no interference from any other remote unit device. A microprocessor should check all security codes. The processor should have its own watchdog circuit. The receiver FM band should be sufficiently narrow to allow only passing of desired frequency and valid command. Any error should shut down the system immediately.
	h.	The remote unit should have safety key to prevent any unauthorized operation. All the crane operations should stop at once the communication breakdown occurs.
	i.	On local unit (receiver side), the system should be provided with one selector switch so that EOT crane can be operated either from Operator cabin or radio remote unit.
	j.	In case tandem operation is envisaged, a suitable selector switch shall be provided in the cabin for selection of Tandem/normal operation.
	k.	The receiver unit along with I/O interface unit should be able to bear the vibrations and shocks encountered in normal usage of EOT crane.
	l.	The system should have very fast response time.
3.37.0	**Sweep**	Sweep shall be attached to the end carriages and to the trolley to remove foreign materials from the rails.
3.38.0	**Whether tandem operation envisaged**	Yes
3.39.0	**Lifting Beam & its capacity**	SWL= 450T, Design Capacity= 472.5T, Overload test (Manufacturer works) at 1.25XSWL A suitable indicating device to indicate the difference in the lifts of the two cranes, which shall be limited to 200 mm shall be provided on the lifting beam. The level difference indication shall be visible from ground level. A limit switch shall be provided to give alarm at both the cabins to enable the crane operators to control the level difference within 200mm.
3.40.0	**Anti Collision device**	Suitable anti-collision device of two cranes, alongwith stoppers at both the gable ends.
3.41.0	**Lubrication**	
	a.	Provisions shall be made for proper lubrication of all parts.
	b.	Bearings shall be provided with means of pressure lubrication.
	c	The crane shall be provided with all necessary lubrication fittings.
	d	Lubricating points shall be located for easy and safe access without the necessity of removing guards or other parts. Lubrication lines shall be securely fastened to the cranes structure and shall be located to provide the maximum protection and so that ordinary repairs can be made without removing the lines.
	e	The crane shall be provided with a centralized lubrication system of reputed make. This system shall be manually operated, complete with a manual pump, reservoir, supply lines, connectors, valves, and discharge lines to all bearings. System shall be centralized lubrication type with at least, one pump mounted on the trolley and one on each of the crane bridge with supply line for connection to all lubrication points. .
	f	Metering valves with indicators shall be provided for all points of grease application and shall be mounted at readily visible and accessible locations.
	g	All piping shall be made of suitable metal tubing with flexible hoses where required.
3.42.0	**DSL phase indicating lamps**	to be provided on both side of bay length.
3.43.0	**Consumables**	The Bidder's scope includes requirements of consumables such as oils, lubricants including grease, servo fluids, cadmium compounds, gases and essential chemicals etc. First fill of all these consumables shall also be included in the scope of the Bidder.
3.44.0	**E-Learning Package**	
	a.	The courses shall be web based and mobile based Application type. It shall run on all possible versions of web browser like Internet Explorer, Google Chrome, Firefox etc. on Laptop/Desktop and shall be Smartphone/Tablet/ Mobile responsive. The Mobile responsive courses shall run on Android, Windows Mobile, Blackberry, iOS etc.

	b.	The courses shall support liquid/fluid page layout so that the entire screen gets adjusted to PC, Laptop, Smartphone/ Mobile, Tablet and any other display devices.	
	c	Course content text shall be in English language and be associated with a voiceover in English language with Indian accent.	
	d	Courses shall be SCORM (Sharable Content Object Reference Model) compliant, version 1.2 which is compatible with LMS at PMI.	
	e	Each course shall have every physical and functional detail of the equipment / system supplied.	
	f	Each of the e-Learning course shall be based on multiple web pages and mobile pages with multiple modules.	
	g	There shall be option for self-assessment test after every course. In case the user doesn't opt for self-assessment test the user shall be able to go to the next course. There shall be no restriction in no. of times for repeating the assessments. All correct answers along with the answers marked by the users shall be displayed at the end of test/ quiz.	
	h.	If Java and Flash, as applicable are not available in the system to run the package, then there shall be a prompt message for updation of the same.	
	i.	Each course shall have a self-running interactive content with navigation buttons containing forward, backward, pause, bookmark and menu options in the course window.	
	j.	The course shall contain chapter titled 'Introduction/overview' that explains the purpose of the course.	
	k.	The course content shall contain descriptive text shall be factual, specific, terse, clearly worded, and simply illustrative, so that the user can understand it.	
	l.	The system shall provide the user with the ability to select the information with a Cursor.	
	m	The course menu should contain table of content linked to concerned pages. The user shall be given the capability to access all of the functions available on the system through a menu system. This shall consist of active buttons, which shall control a hierarchy of pull down/pop-up menus. Menu shall appear quickly and exist only while a selection is being made. The user shall be given the capability to position the cursor or pointer on the menu item and use pointer device such as mouse to activate the function.	
	n	Every course shall contain the 3D design/drawing/exploded view/3600 turn around view of the equipment/system, textual description of the equipment/system and its functionality with video (as applicable), animation and audio.	
	o	The users shall be able to control audio sound level associated with the courses.	
	p	Drawings / text in the courses shall be scalable (Zoom In/ Out).	
	q	The user shall have the capability to record a bookmark to mark displayed information for later recall, whenever he accesses the same course next time.	
	r	e-learning Package of an equipment / system shall include e-learning courses for each of erection, commissioning, operation and maintenance of that equipment / system.	
	s	e-learning courses on erection, commissioning, operation and maintenance of an equipment / system shall include e-learning lessons/chapters/modules (as required) for erection, commissioning, operation and maintenance respectively of that equipment / system.	
	t	The vendor shall get the approval of one sample course from EIC before proceeding for further courses.	
3.45.00	**Nuts & Bolts**	As per IS:1363, IS:1364 and IS:1367.	
3.46.00	**Electrodes**	Radiography quality, covered electrodes with heavy covering as per IS : 814 and relevant requirements of ASME Sec. IX and IIC. Bare Electrodes as per IS:7280 and flux wire combination as per IS : 3613.	

TECHNICAL DATA SHEET B/ ELECTRICAL TECHNICAL DATASHEET				
(SUCCESSFUL BIDDER TO FILL AFTER PLACEMENT OF ORDER)				
Sr. No.		**DESCRIPTION**	**TECHNICAL PARTICULARS**	
1.0.0	**COMPONENT DETAILS**			
	Bridge girder			
	a.	Size		
	b.	Width		
	c.	Length		
2.0.0	**Trolley**			
	a.	Centre to centre distance of wheels (on the same rails)		
3.0.0	**Rope drums**		**Main hoist**	**Aux hoist**
	a.	Dimensions in mm length and diameter (PCD)		
	b.	Number of grooves		
	c.	Diameter on bottom of grooves		
4.0.0	**Rope details**		**Main hoist**	**Aux hoist**
	a.	Grade		
	b.	Diameter in mm		
	c.	Breaking strength		
	d.	Tensile designation		
	e.	Number of falls		
	f	Length of rope		
3.4.0	**Sheaves details**		**Main hoist**	**Aux hoist**
	a.	Diameter of main sheaves in mm on Root		
	b.	Diameter of Equalizing sheaves (in mm) on Root		
3.5.0	**COUPLINGS & SHAFTING**			
3.5.1	**Coupling details (between motor and gear**		**(for Main hoist, Aux hoist, Cross Travel and long travel)**	
	a.	Size & Torque rating		
3.5.2	**Coupling details (between gear box and**		**Cross Travel (CT)**	**Long Travel (LT)**
	a.	Size & Torque rating		
3.5.3	**Coupling details (between gear box and**		**Main hoist**	**Aux hoist**
	a.	Size		
3.5.4	**Shafting (Output)**		**Cross Travel**	**Long Travel**
	a.	Diameter in mm		
	b.	Number of support bearings		
	c.	Type of support bearing		
	d.	Max unsupported length of shaft in mm		
3.6.0	**Gear box details**			
3.6.1	**Hoist Motions**		**MH and MH Micro**	**AH and AH Micro**
	a.	Total number of reductions		
	b.	Type of gears for MH and AH		
	c.	Reduction ratio		
	d.	Hardness (BHN) – gear		
	e.	Hardness (BHN) – pinion		
	f.	Difference in Gear and pinion hardness		
	g.	Materials (gear/pinions)		
3.6.2	**Travel Motions**		**CT and CT Micro**	**LT and LT Micro**
	a.	Total number of reduction		
	b.	Type of gears		
	c.	Reduction ratio		
	d.	Hardness (BHN) – gear		
	e.	Hardness (BHN) – pinion		

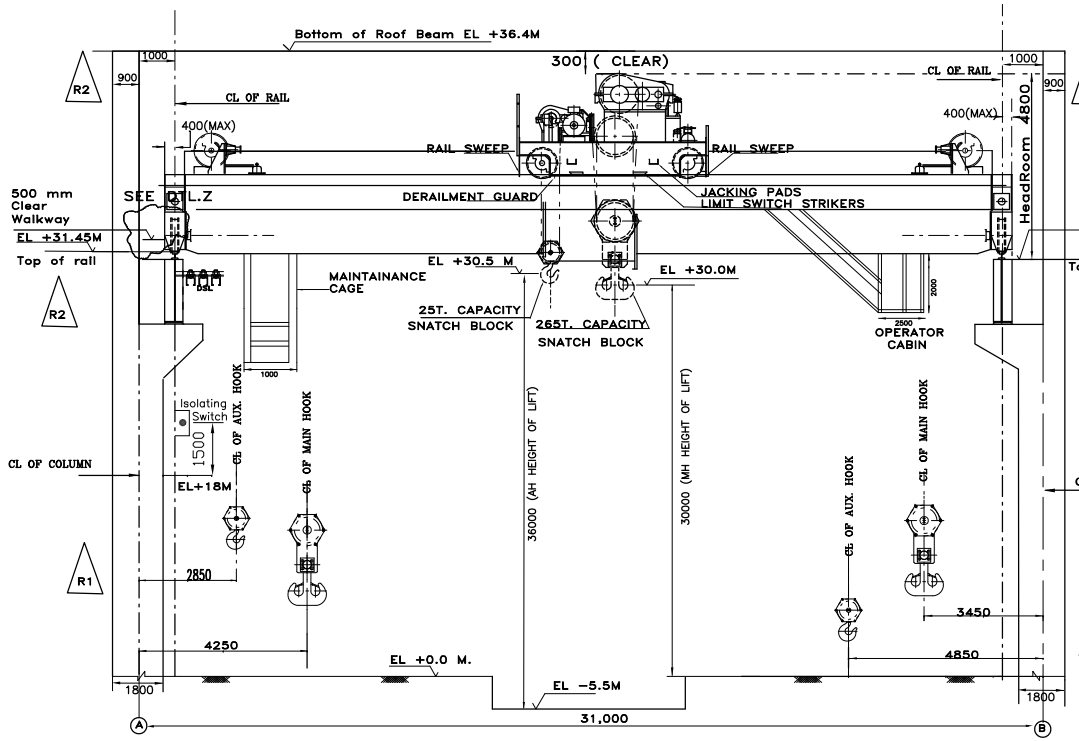
	f.	Difference in Gear and pinion hardness		
	g.	Materials (gear / pinions)		
3.7.0	**Wheels details**		**Cross Travel**	**Long Travel**
	a.	Material		
	b.	Hardness		
	c.	Depth of hardness		
	d.	Tread diameter in mm		
	e.	Tread width in mm		
	f.	Numbers provided		
3.8.0	**Lifting hooks**		**MH**	**AH**
	a.	Material		
3.9.0	**Brakes**			
3.9.1	**Hoist Motions**		**MH**	**AH**
	a.	Diameter of brake in mm		
	b.	Torque rating Kg. M		
	c.	Braking torque actually required		
	d.	Braking distance in mm		
	e.	Thruster material		
3.9.2	**Travel Motions**		**CT**	**LT**
	a	Dia of brake in mm		
	b.	Torque rating KgM		
	c.	Braking torque actually required		
	d.	Thruster material		
	e.	Braking distance in mm		
3.10.0	**Rails**		**CT**	**LT**
	a.	Weight per metre		
	b.	Top width in mm		
	c.	Height in mm		
3.11.0	**Motors**			
	a.	rating	For Main hoist: For aux hoist: For Cross travel: For long travel:	
	b.	Speed (rpm)		
	c.	Contactors for motor		
	d.	Spacing between gland plate & centre of bottom terminal stud		
	e.	Minimum inter-phase and phase-earth air clearances with lugs installed		
	f.	Space heater requirements details		
	g.	Overload protection details		
3.12.0	**Limit switches**			
	a.	Rating of contacts		
3.13.0		**Protective Panel**		
	a.	Dimension		
3.14.0	**Control panel for MH, AH, CT and LT**			
	a.	Dimension		
3.15.0	**Slings, suitable for load & overload test of EOT Crane (to be supplied alongwith load test certificate for joint at 2 X rated capacity)**			
	a	Length		
	b.	Size		

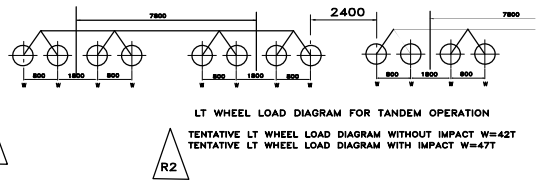
COMPLIANCE DRAWINGS

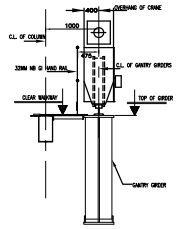
LIST OF DRAWINGS

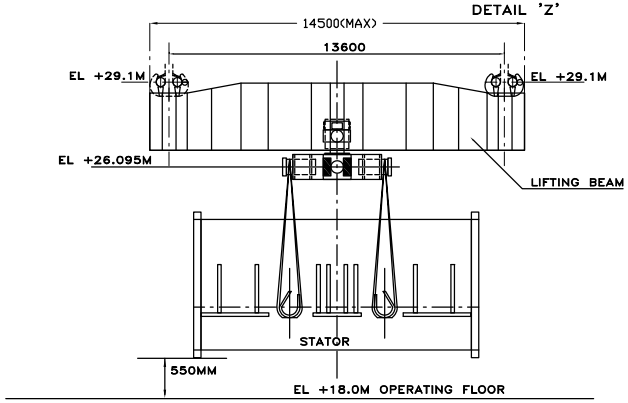
1 CRANE CLEARANCE DIAGRAM OF TG HALL EOT CRANES
2 LIFTING ARRANGMENT OF STATOR

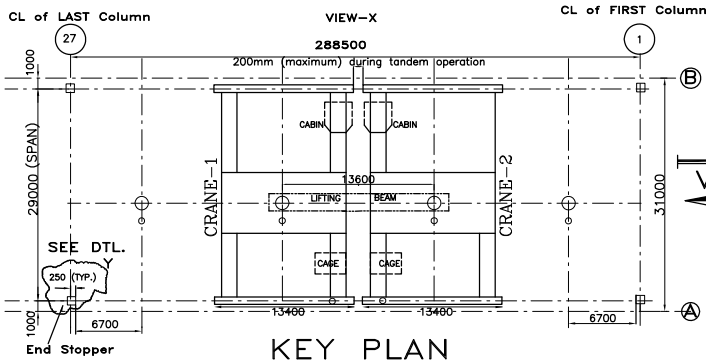
COMPUTER FILE NAME : TAL5

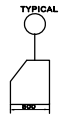












VIEW X

DESIGN CRITERIA (CRANE)

HEAVIEST WEIGHT (GEN STATOR) TO BE LIFTED (IN TANDEM) = 445 T
WEIGHT OF LIFTING BEAM, SLINGS ETC. = MAXIMUM 50 T
CONSIDERING 5 % MARGIN = 24.75 T
TOTAL DESIGN LOAD FOR TANDEM = 519.75 T
REQUIRED CAPACITY FOR EACH CRANE = 259.75 T

2ND HEAVIEST WEIGHT (HP TURBINE WITH TRANSPORT SKID) TO BE LIFTED
CONSIDERING 5 % MARGIN = 128T X 1.05= 134.4T
(2ND HEAVIEST WT. SHALL BE LIFTED BY SINGLE EOT CRANE)
CRANE CAPACITY SELECTED = 265 T

DESIGN CRITERIA (LIFTING BEAM)

SWL OF LIFTING BEAM (CONSIDERING WEIGHT OF STATOR & SLINGS) = 450 T
DESIGN CAPACITY OF LIFTING BEAM (CONSIDERING 5% MARGIN ON SWL) = 472.5 T
DESIGN CAPACITY OF LIFTING BEAM SHALL BE USED FOR STRUCTURAL SIZING
OVERLOAD TESTING OF LIFTING BEAM – 1.25 X SWL AT MANUFACTURER'S WORKS

NOTE

1. THE DESIGN CODE FOR EOT CRANE SHALL BE IS:3177 (latest edition).
2. DRAWING IS NOT TO SCALE.
3. LT WHEEL SHALL SUBJECT TO APPROVAL OF MECHANICAL SIZING CALCULATION OF TG HALL EOT CRANE.

R2

Ref. Drg.

1. TG Cross Section Drawing (Drg. No. 9587-001-110-PVM-F-053)
2. TG equipment plan at 18.0m drawing (9587-001-110-PVM-F-051)

REV.	DATE	ALTD	CHD	APPD
1	14.02.24	RG	PK	PK
	DOCUMENT UPDATED AS PER NTPC COMMENTS.			
2	21.03.24	RG	PK	PK
	DOCUMENT UPDATED AS PER NTPC COMMENTS.			

NTPC DRG NO

OWNER

CONTRACT

PRINT SCALE

2X800 MW SINGRAULI STPP STAGE III EPC

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN	DATE
	DRN	RG		21.03.24
	DESN	RG		21.03.24
	CHD	PK		21.03.24
	APPD	PK		21.03.24

SUB-CONTRACTOR

TITLE

CRANE CLEARANCE DIAGRAM OF TG HALL

265/25T (DOUBLE GIRDER) E.O.T. CRANES IN TANDEM OPERATION

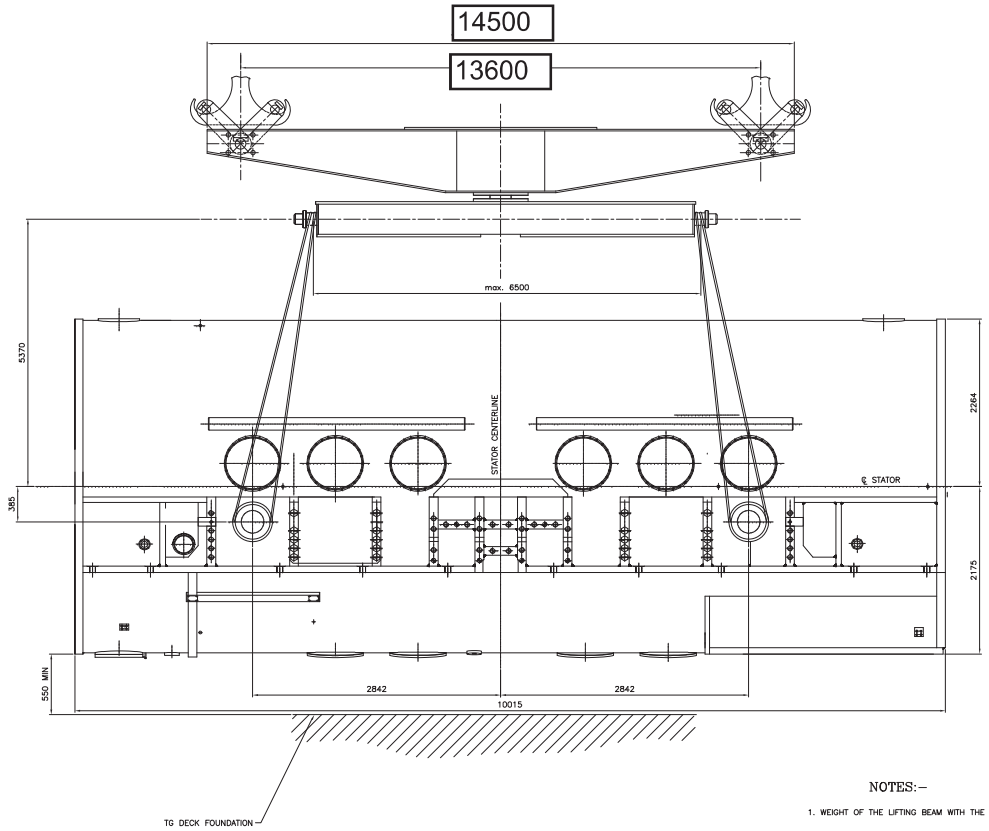
DEPT. | SCALE | SIGN | DATE

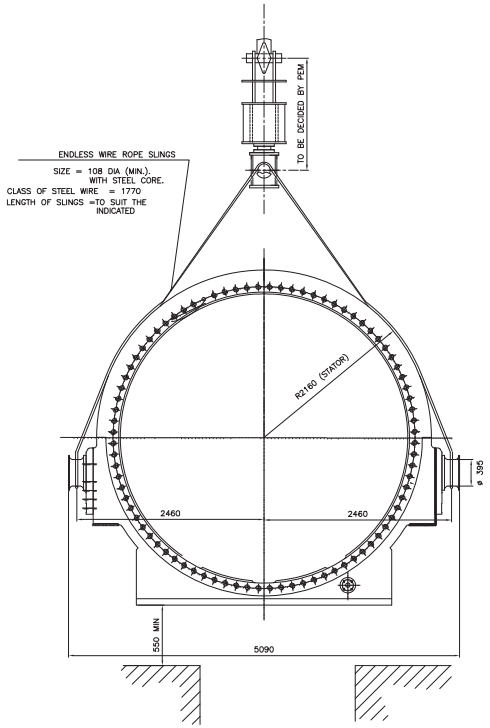
SHEET 1 OF 1 | REV 2

SIZE-A2

FIRST ANGLE PROJECTION | (ALL DIMENSIONS ARE IN mm)

DRAWING NO. TGE-2842





NOTES:–

1. WEIGHT OF THE LIFTING BEAM WITH THE INDICATED ARRANGEMENT TO BE USED FOR DECIDNG EOT CRANE CAPACITY.
2. WEIGHT OF THE PACKED STATOR WITH TERMINAL BUSHING BOX IS 450 TONNES.
3. DIFFERENCE IN THE LIFTS OF TWO CRANE AT ANY TIME SHOULD NOT EXCEED 200MM.
4. THE ARRANGEMENT SHOWN IN THIS SHEET IS FOR STATOR ALONE BROUGHT TO TG DECK TO BE PLACED ON PEDESTALS.

TECHNICAL REQUIREMENTS

1. THE DETAIL OF LIFTING BEAM WITH SWIVELLING ARRANGEMENT INCLUDING MATERIAL IS TO BE DONE BY THE PEM, FOR A MAXIMUM LIFTING CAPACITY OF 450 TONNES,

WORKSHOP NO. | SIGN & DATE | REF. DRG NO.

2X800 MW SINGRAULI STPP STAGE III
EPC

SHEET NO.1 | NO.OF SHEETS 1
SIZE A0

PERFORMANCE GUARANTEES TO BE DEMOSTRATED AT SITE

PERFORMANCE GUARANTEES TO BE DEMOSTRATED AT SITE AS PER IS-3177.

S.N.	DESCRIPTION OF TESTS TO BE PERFORMED
1	Speed test at rated load for hoisting, CT and LT mechanism.
2	Brakes test
3	Deflection test of bridge girder at rated load. Crane shall rest on centerline of LT wheels.
4	Overload test (running of CT and Hoisting mechanism at 125% of the rated load). Capability of crane to lift the overload from mid-air shall be demonstrated.

STANDARD MANUFACTURING QUALITY PLAN FOR DOUBLE GIRDER EOT CRANE

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		MANUFACTURING QUALITY PLAN						SPEC. NO: PE-TS-512-501-A001					DATE:
			CUSTOMER: NTPC						QP NO.:					DATE:
			PROJECT: 2 X 800MW SINGRAULI						PO NO.:					DATE:
			ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES				SYSTEM: EOT CRANES		SECTION:					SHEET 1 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
1.0 MATERIAL:														
1.1	Steel Plates (Box Girder, End Carriage, Trolley & Gear Casing ,Fabricated Rope Drum)	1.Chemical & Physical	Major	Chemical & Physical	100%	1/Heat	APPD. DRG / DATA SHEET	APPD. DRG / DATA SHEET	TC	√	P	V/ W	V	Refer Note 12
		2. NDT	Major	UT (25mm & above thickness)	100%	100%	ASTM A435 / A578 LEVEL B	ASTM A435 / A578 LEVEL B	TC/ NDT Report	√	P	V/ W	V	Refer Note 13
1.2	Round Bars (For Pinion ,Gear ,Axles & Shafts)	1. Chemical & Physical	Major	Chemical & Physical	100%	-	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V	V	Refer Note 14
		2. NDT	Major	U.T	100%	-	ASTM A 388-2007	UT PROCEDURE	NDT Report	√	P	V	V	For UT procedure refer Note 4
1.3	Forgings (For Gears, Wheels)	1. Chemical & Physical	Major	Chemical & Physical	100%	1/Heat	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V/ W	V	Refer Note 12 & 14
		2. NDT	Major	U.T	100%	-	ASTM A 388-2007	UT PROCEDURE	NDT Report	√	P	W	V	For UT procedure refer Note 4
1.4	Casting for Gear	1. Chemical & Physical	Major	Chemical & Physical	100%	-	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V	V	
		2.NDT	Major	U.T	100%	-	ASME Sec.V,article-23,SA-609	SA - 609 , Level - II	NDT Report	√	P	V	V	For UT procedure refer Note 4
1.5	Pulley & Brake Drums	1. Chemical & Physical	Major	Chemical & Physical	100%	-	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V	V	
		2.NDT	Major	U.T (only boss area)	100%	-	ASME Sec.V,article-23,SA-609	SA - 609 , Level - II	NDT Report	√	P	V	V	For UT procedure refer Note 4
1.6	Seamless Pipe for Rope Drum	1. Chemical & Physical	Major	Chemical & Physical	100%	-	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V	V	
		2.NDT	Major	U.T	100%	-	ASTM E 213	ASTM E 213	NDT Report	√	P	V	V	For UT procedure refer Note 4
			Major	Macro Etching, Flattening for Seamless Pipe	100%	-	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V	V	
2.0	BOUGHT OUT ITEMS													
2.1	Hook	Forging Raw material	Major	Visual Check	100%	100%	APPD. DRG. / DATA SHEET	No Visual defect	I.R	√	P	W	V	
			Major	UT after forging	100%	100%	ASTM A 388-2007	UT PROCEDURE	NDT Report	√	P	W	V	Refer Note 15
		Heat treatment	Major	Heat treatment after forging	100%	-	Mfg. Std. / Drg	Mfg. Std. / Drg	HT Chart	√	P	V	V	Refer Note 16

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		MANUFACTURING QUALITY PLAN						SPEC. NO: PE-TS-512-501-A001					DATE:
			CUSTOMER: NTPC						QP NO.:					DATE:
			PROJECT: 2 X 800MW SINGRAULI						PO NO.:					DATE:
			ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES			SYSTEM: EOT CRANES			SECTION:					SHEET 2 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
		Chemical test	Major	Chemical integral test piece.	1 Per Heat/Batch	-	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	TC	√	P	V	V	
		Physical test	Major	Tensile test on integral test piece after heat treatment	1 Per Heat/Batch	1 Per Heat/Batch	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	I.R	√	P	W	V	Refer Note 17
		Macro etching	Major	Grain Size	100%	-	ASTM E 112	Grain size 6 or final	TC	√	P	V	V	
		NDT before Proof Load	Major	UT	100%	-	ASTM A 388-2007	UT PROCEDURE	NDT Report	√	P	V	V	For UT procedure refer Note 4
			Major	DPT	100%	-	ASME Sec V	ASME SEC. VIII, Div-1, Append. - 8	NDT Report	√	P	V	V	
		Proof Load Test	Major	Proof Load Test	100%	100%	APPD. DRG. / DATA SHEET	APPD. DRG. / DATA SHEET	I.R	√	P	W	V	Refer Note 18
		NDT after Proof Load (UT only shank portion)	Major	U.T & MPI after Proof Load Test	100%	100%	ASTM A 388-2007 / ASTM E 709-2007	ASTM A 388-2007 / ASTM E 709-2007	NDT Report	√	P	W	V	
		Identification Punch	Major	Visual	100%	100%	—	—	I.R	√	P	H	V	Refer Note 20
2.2	Wire Rope & slings	Visual & Breaking Strength	Major	Type, grade, breaking strength &visual , Diameter	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	Mill T.C.	√	P	V	V	
2.3	Rails	Chemical & Tensile , Cross section , Hardness , Dimension	Major	Chemical & Tensile, Hardness, Dimension	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC	√	P	V	V	
3.0	**ELECTRICAL ITEMS**													
3.1	Transformer (Control transformer, Light transformer etc.)	Make , Rating	Major	Visual	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	IR	√	P	V	V	
		Routine Test	Major	Doc. Review	100%	-	Mfg. Catalogue	Mfg. Standard	TC	√	P	V	V	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS	MANUFACTURING QUALITY PLAN			SPEC. NO: PE-TS-512-501-A001	DATE:
		CUSTOMER: NTPC			QP NO.:	DATE:
		PROJECT: 2 X 800MW SINGRAULI			PO NO.:	DATE:
		ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES	SYSTEM: EOT CRANES		SECTION:	SHEET 3 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
3.2	SFU , MCCB , MCB , CONTRACTORS , DSL, RELAYS , FUSES , RESISTENCE BANK,HOOTER, PUSH BUTTONS, indicating instruments , junction box, Limit Switches	Make / Rating / Type / Size	Major	Visual	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	IR	√	P	V	V	
		Functional / Continuity Check	Major	Operational	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	IR / COC	√	P	V	V	
3.3	Motor	Type, Rating, Make, Size	Major	Visual	100%	-	CUSTOMER approved BOI list & ADS / DRG		Mfg. TC	√	P	V	V	Refer Note 19
		Routine Test / Clearance of QP for Motor above 50 KW	Major	Measurement	100%		IS: 325 / App. Data sheet/CUSTOMER ADS	IS: 325 / App. Data sheet/CUSTOMER ADS	COC / Mfg T.C. (As per Note-3)	√	P	V	V	
3.4	Brakes	Make,Type,Rating	Major	Measurement	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC		P	V	V	
		IR, HV, Functional Test	Major	Measurement	100%	-	MFG. STD.	MFG. STD.	TC	√	P	V	V	
3.5	VVVF Drive	Type, Rating, Make,	Major	Visual	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC/ COC	√	P	V	V	
		Routine Test	Major	Measurement	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC	√	P	V	V	
3.6	Cables (Power / Control / Trialing / Flexible)	Make, Type, Size	Major	Visual	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC	√	P	V	V	
		Routine Test	Major	Measurement	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC	√	P	V	V	
3.7	Radio Remote, Master Controller, Pendent Station, Switches	Make / Rating / Type / Functional	Major	Visual	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC / COC	√	P	V	V	
3.8	Anti - Collision Device , Cable Gland & lugs , Rectifier ,Lamps, Load cell, Illumination and Earthing material	Make / Type	Major	Visual	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC/ COC		P	V	V	
4.0	OTHER BOUGHT OUR ITEMS													

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

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Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		MANUFACTURING QUALITY PLAN						SPEC. NO: PE-TS-512-501-A001					DATE:
			CUSTOMER: NTPC						QP NO.:					DATE:
			PROJECT: 2 X 800MW SINGRAULI						PO NO.:					DATE:
			ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES			SYSTEM: EOT CRANES			SECTION:					SHEET 4 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**		10
					M	C/N				D	M	C	N	
4.1	Bearings	Type & Size	Major	Verification	100%	-	Appd.drg./ Mfr's catalogue	Appd.drg./ Mfr's catalogue	TC / IR / COC	√	P	V	V	
4.2	Tools and tackles	Verification of type size / rating	Major	Verification	100%	-	As per PO / BBU	APPD DRG / DATA SHEET	TC / COC	√	P	V	V	
4.3	Spares (Mandatory / recommended spare / commissioning spares)	Verification of make, type, size , rating	Major	Review Of Internal Inspection Reports / Mfr's TC / COC	100%	-	Approved Spare List	APPD DRG / DATA SHEET	IR / COC	√	P	V/W	V/W	Refer Note 21
5.0	**IN PROCESS : FABRICATED COMPONENTS : GIRDER, END CARRIAGE, TROLLEY, GEAR BOX CASING , FABRICATED ROPE DRUM**													
5.1	Welding	WPS, PQR & WPQ	Major	Review of Document	100%	-	ASME SEC IX	ASME SEC IX	As ASME Format	√	P	V	V	Refer Note 22
5.2	Weld Fit Up & Edge Preparation	Dimension	Major	Dimension	100%	-	Mfg. Drg.	Mfg. Drg.	I.R	√	P	V	V	
5.3	Fillet Weld	NDT	Major	DPT on Fillet Weld	100%	-	ASME - Sec. V	ASME SEC. VIII , Div-1 , Append. - 8	NDT Report	√	P	V	V	Refer Note 23
5.4	Butt Weld (Girder ,End-carriage, Trolley & Fabricated Rope drum, if applicable)	NDT	Major	Radiography Test / Gamma Ray	Refer Note 24	-	ASME - Sec. V	ASME - Sec. VIII,Div-1, Cl.- UW-51 & 52	NDT Report	√	P	V	V	
				DPT on Butt Weld	100%	10%	ASTM E165	No Relevant Indications	I.R	√	P	W	V	10% random witness by BHEL
5.5	Heat Treatment (SR) of Rope drum and Gear Box Casing	Mechanical	Major	Review of SR chart/Test Report	100%	-	Appd Drg./ Relevant Std.	Appd Drg./ Relevant Std.	SR Chart	√	P	V	V	
5.6	Cabin (as applicable), Platform, Hand railing	Dimension	Major	Dimension	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	I.R	√	P	V	V	
5.7	Fabricated Components (Girders, End Carriages & Trolley, end stopper)	Visual & dimensional	Major	Dimensional & Visual Check	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	I.R.	√	P	V	V	At the Time of Final Insp. Of Crane
6.0	**IN PROCESS INSPECTION OF MACHINED COMPONENTS**													
6.1	Pinions, Gear & Wheel	1.Dimensional Check	Major	Measurement	100%	-	Mfg Drg / Data sheet	Mfg Drg / Data sheet	I.R	√	P	V	V	
		2. Heat Treatment	Major	Heat Treatment chart	100%	-	Material specification/ Mfg drg	Material specification/ Mfg drg	HT Chart	√	P	V	V	Refer Note 25
		3. Hardness	Major	Measurement	100%	100%	Mfg Drg / APPD DRG / DATA SHEET	Mfg Drg / APPD DRG / DATA SHEET	I.R	√	P	W	V	
		4. NDT	Major	DPT on teeth	100%	-	IS:3658-1981 / ASME - Sec. V	NO CRACKS & LINEAR INDICATION	NDT Report	√	P	V	V	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		MANUFACTURING QUALITY PLAN						SPEC. NO: PE-TS-512-501-A001					DATE:
			CUSTOMER: NTPC						QP NO.:					DATE:
			PROJECT: 2 X 800MW SINGRAULI						PO NO.:					DATE:
			ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES			SYSTEM: EOT CRANES			SECTION:					SHEET 5 OF 8
SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
6.2	Hardness Difference (Pinion & Gear)	Hardness	Major	Mechanical	100%	-	APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC	√	P	V	V	
6.3	Rope Drum	1.NDT & Dimensional Check	Major	DP test on fillet weld & Dimension	100%	-	ASME SEC VIII Div -1 / Mfg. Drg.	NO RELEVANT INDICATION	NDT Report	√	P	V	V	
		2.NDT	Major	DP test on Groove after machining	100%	-	IS: 3658-1981 / ASME - Sec. V	NO RELEVANT INDICATION	NDT Report	√	P	V	V	
6.4	Pulley & Brake Drums	1.Visual & dimension	Major	verification	100%	-	Mfg. Drg	Mfg. Drg	I.R.	√	P	V	V	
		2. NDT	Major	DPT after machining	100%	-	ASME - Sec. V	NO RELEVANT INDICATION	NDT Report	√	P	V	V	
6.5	Assembled Gear Box	1. Visual & Dimensional	Major	Visual & dimensional	100%	-	Mfg. Standard	Mfg. Standard	I.R.	√	P	V	V	
		2. NDT	Major	DPT on Fillet Weld	100%	-	ASME - Sec. V	NO RELEVANT INDICATION	NDT Report	√	P	V	V	
		3.Mechanical	Major	Backlash ,Contact Pattern	100%	-	APPD DRG / DATA SHEET /Mfg. Std.	APPD DRG / DATA SHEET /Mfg. Std.	I.R	√	P	V	V	
			Major	Reduction Ratio , No Load Run Test For Check of Oil Leakage / Temp. Rise, Vibration & Noise	100%	100%	Approved Drawing /Data Sheet/Mfg. Std	Approved Drawing /Data Sheet/Mfg. Std	I.R.	√	P	V/W	V	Refer Note 26
6.6	DSL Guard	Dimensional	Major	Dimension	100%	-	Mfg. Drg.	Mfg. Drg.	I.R.	√	P	V	V	
7.0	**FINAL INSPECTION**													
7.1	CONTROL PANEL With VVVF Drive	Identification of all Elect. Components, Cable laying / Dressing/ Feruling /Terminations Dimensional, Functional , HV, IR, interlocks, Protection DOP	Major	Visual, dimensional, Operational & Functional Check , HV,IR, Painting	100%	100%	IS:3177 / APPD DRG / DATA SHEET	IS:3177 / APPD DRG / DATA SHEET	I.R	√	P	W	W	Refer Note 27
		Paint Shade/ Thk/ Adhesion	Major	Visual / DFT Check	100%		APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	TC	√	P	V	V	Refer Note 28

BHEL					
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	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS	MANUFACTURING QUALITY PLAN			SPEC. NO: PE-TS-512-501-A001	DATE:
		CUSTOMER: NTPC			QP NO.:	DATE:
		PROJECT: 2 X 800MW SINGRAULI			PO NO.:	DATE:
		ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES	SYSTEM: EOT CRANES		SECTION:	SHEET 6 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9		**			10
					M	C/N				D	M	C	N	
7.2	EOT crane assembly with control panel, Master Controller / Remote Controller Pendent Station (At Works)	Visual & dimensional	Major	Dimensional ,Span, Diagonal & Wheel Base Dimension, LT Stopper Dimension	100%	100%	IS 3177 / APPD DRG / DATA SHEET	IS 3177 / APPD DRG / DATA SHEET	I.R.	√	P	W	W	Refer Note 29
		Operational	Major	(1) Speed & Current Measurement at No Load for Hoist & CT/LT motion (2) Speed & Current measurement at SWL of Hoist & CT motion (3) Over load test (125%) of SWL for Hoist motion (4) Deflection test at SWL (5) Operation Check of Brake at SWL (6) Interlock & Functional test	100%	100%	APPD DRG / DATA SHEET / IS 3177	APPD DRG / DATA SHEET / IS 3177	I.R.	√	P	W	W	Refer Note 30
8.0	Lifting beam (if applicable for tandem operation) - at works	Measurement	Major	Dimension, Visual and load /overload test	100%	100%	APPD DRG / DATA SHEET / IS 3177	APPD DRG / DATA SHEET / IS 3177	IR	√	P	W	W	
9.0	Cleaning & painting	Paint Shade / DFT	Major	Visual , DFT Check	100%		APPD DRG / DATA SHEET	APPD DRG / DATA SHEET	IR	√	P	V	V	
10.0	Review of QA documentation						As per approved QAP			V	V	V	V	
11.0	Packing of components	Packing Soundness	Major	Visual	100%	100%	APPD DRG / DATA SHEET /Packing specification	APPD DRG / DATA SHEET /Packing specification	IR	√	P	W	V	Refer Note 6

NOTES:

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ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
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Reviewed by:			Reviewed by:		

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Sign & Date	
Seal	

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Doc No:			
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Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		MANUFACTURING QUALITY PLAN					SPEC. NO: PE-TS-512-501-A001			DATE:
			CUSTOMER: NTPC					QP NO.:			DATE:
			PROJECT: 2 X 800MW SINGRAULI					PO NO.:			DATE:
			ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES			SYSTEM: EOT CRANES		SECTION:			SHEET 7 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	

1) Original TCs / Photocopies certified in original by mill shall be furnished for review. Test In absence of correlated TCs Check test shall be carried out from each plate/ bar for above 10 mm thk., certificates shall be offered for review at the time of stage inspection of components / assembly. Supplier shall ensure that pitted material is not used.
2) X-Ray to be taken for thickness upto 19 mm and Gamma Ray for thickness above 19 mm. If Gamma Ray is used for lower thickness slow speed film like D2 or equivalent which gives enough readable and interpretable film quality to be used for clarity. All NDT shall be carried out by Qualified Level II personnel.
3) Performance of electrical & control devices along with the interlocks, protection & sequence to be checked after crane assembly at works.
4) Vendor's UT Procedure from NDT Level II to be submitted to BHEL for approval.
5) Following to be noted for packing:
   a) Packing shall be suitable for storage at site in tropical climate conditions.
   b) For export job, packing shall be as per BHEL seaworthy packing specification.
   c) Photographs of items duly placed inside the box just before the final packing and photographs of the box just before dispatch to be sent to BHEL purchase group for review before issuing MDCC.
6) In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
7) The latest revisions/year of issue of all the standard indicated in the QP shall be referred.
8) Blank.
9) Blank.
10) The heat no. /plate identification no. shall be transferred on all major cut pieces of the MS plate for proper correlation, cutting plan of each plate shall be maintained for proper traceability.
11) Welder no. shall be punched near butt weld joints, the welding plan of each fabricated item shall be maintained.
12) In absence of co-related TC, check testing shall be witnessed on samples selected by Main contractor.
13) Co-related Mill TC inclusive of UT will be reviewed by BHEL/CUSTOMER, In absence of UT conformance in Mill TC, then UT will be witnessed by BHEL. For UT procedure refer Note 4.
14) Mech. Properties against H.T condition if applicable against respective Material standard/Grade. Hardness test report review after applicable Q & T condition.
15) For MH Hook, UT in proof machined condition and AH Hook in grinding condition. For UT procedure refer Note 4
16) HT chart review for Main Hook & AH Hook.
17) Test Piece will be drawn from top of shank portion to be identified by BHEL and CUSTOMER.
18) W - FOR MAIN HOOK, & AH Hook (Cap. >15T). For UT procedure refer Note 4.
19) For Motors of 50kW rating and above Routine Test will be witnessed by BHEL and Type test Certificate for identical frame size will be reviewed for validity and conformance. For below 50kW rating routine tests to be witnessed by supplier of crane and type test Certificate for identical frame size will be reviewed for validity and conformance. Photocopies of Type Test Certificates are acceptable but shall be authenticated by Manufacturer. SQP of Motor: PE-QP-999-Q-007, REV-04 Dated 17.04.2021 (MOTORS 55 KW & ABOVE) & PE-QP-999-Q-006, REV-02 Dated 17.04.2021 (MOTORS UPTO 55 KW)
20) Identification by BHEL/Customer
21) V/W for items as per the Quality Plan
22) Welder/procedure qualification will be witnessed by Customer/ BHEL as per appd. WPS. In case the BHEL/NTPC/Lloyds /any other renowned approving agency already available, and doing the job, requalification is not required.
23) DP test of fillet weld for rope drum to be conducted after final machining.
24) 100% in Tension Zone, 25% in Compression Zone & 100% for rope drum Seam weld. RT before Stress relieving. RT Film shall be reviewed by BHEL/Customer
25) Heat treatment Chart to be reviewed by BHEL/CUSTOMER.
26) Noise Max.85 db at 1 mtr. & 30^0 C temp. rise at ambient. Witness for Noise & vibration measurement during the final inspection

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		MANUFACTURING QUALITY PLAN					SPEC. NO: PE-TS-512-501-A001			DATE:
			CUSTOMER: NTPC					QP NO.:			DATE:
			PROJECT: 2 X 800MW SINGRAULI					PO NO.:			DATE:
			ITEM: TG HALL– AB BAY 160/25T DOUBLE GIRDER EOT CRANES			SYSTEM: EOT CRANES		SECTION:			SHEET 8 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	

27) HV at 2.5 KV AC for power ckt at 2 KV for control ckt, DOP by paper insertion method. BOI as per CUSTOMER Approved Makes. Will be Checked at the time of Final Inspection.
28) 7 Tank Pretreatment before Painting.
29) Crane Should be Operable by RRC & PPB (Radio Remote Controller, Pendent) meant for that Crane only.
30) Functional & Interlock test to be checked as per approved Electrical Schematic drawing.

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: WBPDCL/DCPL,
P: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR**, CR:** CRITICAL. **H** - Hold point

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

STANDARD MANUFACTURING QUALITY PLAN FOR MOTOR

FOR MOTORS
UPTO 50 KW

ANNEXURE III

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-Q-006, REV-02	DATE: 17.04.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))	SYSTEM:	SECTION: II	SHEET 1 of 2

S. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	M	C	N	
					M	C/ N					**			
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	-	MFG. SPEC.	MFG. SPEC.	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	VISUAL	100%	-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	LOG BOOK		P	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MFG.SPEC./	MFG.SPEC.	LOG BOOK		P	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	-	MFG. SPEC/ APPROVED DATASHEET	MFG. SPEC/ APPROVED DATASHEET	LOG BOOK	✓	P	V	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST	MA	VISUAL	100%	-	IS-325 / IS-12615/ APPROVED DATA SHEET	IS-325 / IS-12615/ APPROVED DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	-	APPROVED DRG/ DATA SHEET	APPROVED DRG/ DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1 & NOTE-2

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

THIS IS PART OF TECHNICAL SPECIFICATION PE-TS-497-501-A502 Rev 0

		3.NAMEPLATE DETAILS	MA	VISUAL	100%	-	IS-325 / IS-12615 / APPROVED DATA SHEET	SAME AS COL. 7	TEST/ INSPN. REPORT	✓	P	V	-	
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MFG. STANDARD / (#)	AS PER MFG. STANDARD / (#).	INSPC. REPORT	✓	P	W	-	(#) REFER NOTE-8

NOTES:
1. Routine tests on 100% motors shall be done by the vendor. However, BHEL/ Customer shall witness routine tests on random samples. The sampling plan shall be mutually agreed upon.
2. For exhaust/ventilation fan motors of rating up to 1.5 KW, only routine test certificates shall be furnished for scrutiny.
3. In case test certificates for these tests on similar type, size and design of motor from independent laboratory are available, the same is valid for 5 years.
4. BHEL reserves the right to perform repeat test, if required.
5. After packing and prior to issue MDCC, photographs of items to be despatched shall be sent to BHEL for review.
6. In case of any changes in QP commented by customer at contract stage, same shall be carried out by bidder without any implication to BHEL/ Customer.
7. Project specific QP to be developed based on customer requirement.
8. For export job, BHEL technical specification for seaworthy packing to be followed.
9. Packing shall be suitable for storage at site in tropical climate conditions.
10. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER,
P: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR**, CR:** CRITICAL
D: DOCUMENTATION

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:	Kunal Gandhi	KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
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	Sign & Date	Name	Seal
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Approved by:			

MOTOR

TESTS/CHECKS / TEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating /General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	Routine & Acceptance tests as per IS-4722 /IS- 9283/IS 2148/IEC60034\IEC 60079-I/ IS-12615	Vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint shade, thickness & adhesion
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y				Y										
Shaft	Y	Y	Y	Y	Y	Y			Y										
Magnetic Material	Y	Y	Y	Y			Y			Y		Y							
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y										
Stator copper	Y	Y	Y	Y			Y		Y			Y							
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y										
Insulating Material	Y		Y	Y			Y					Y							
Tubes, for Cooler	Y	Y	Y	Y	Y				Y		Y								
Sleeve Bearing	Y	Y	Y	Y	Y				Y		Y								
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y											
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y											
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y			Y	Y										
Wound stator	Y	Y					Y	Y											
Wound Exciter	Y	Y					Y	Y											
Rotor complete	Y	Y					Y						Y	Y					
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y												

Accessories, RTD, BTD, CT, Space heater, antifriction bearing, gaskets etc.	Y	Y	Y																
Complete Motor	Y	Y	Y												Y	Y	Y	Y1	Y

Note:

1. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, following methodology to be followed for Inspection Categorization:

Note for LT Motor:

i) Motor rating up to 50 KW: Inspection CAT- III : Acceptance of Motor up to 50 KW is based on COC of the Manufacturer and Main Contractor confirming as follows:
"It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage frequency variation, hot s
KVA/KW, temperature rise, distance between center of stud gland plate and tested in accordance with approved drawing /data sheets."

ii) Motor rating above 50 KW & less than 75 KW: Inspection CAT- II as per NTPC approved MQP: Acceptance of Motor rating above 50 KW & less than 75 KW is based on NTPC rev
report as per IS:12615 - 2018 (including latest revision) duly witnessed by main contractor along with COC of the Manufacturer and Main Contractor confirming as follows:
"It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage frequency variation, hot s
KVA/KW, temperature rise, distance between center of stud gland plate, space heater and tested in accordance with approved drawing /data sheets."

iii) Motor rating 75 KW & above: Inspection CAT-I: As per NTPC approved MQP.

2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard
3. Makes of major bought out items for HT motors will be subject to NTPC approval.
4. Y1 = for HT Motor / Machines only.
5. For LT Motors, stator core stack length & grade, no load loss and winding resistance w.r.t. type tested motor for IE2/IE3 shall be checked/verified in addition to Compliance of relevant standard IS:12615/IEC requirement. In case actual results are not within the tolerance limit as declared by manufacturer during QP submission, the motor shall be subjected to efficiency test.

(ANNEXURE-A TO MQP OF LIFTING BEAM)

LOAD TESTING PROCEDURE OF LIFTING BEAM FOR DOUBLE GIRDER TG HALL EOT CRANES AT WORKS

1	SCOPE
	This covers the guidelines for load testing of lifting beams of EOT cranes.

2	ACCESSORIES AND FACILITIES NEEDED.
a	Slings of suitable size and length , proof load tested at 2 X Safe working load (SWL).
b	Jacking system.
c	Supporting structure
d	Test loads.
e	Cradle for accommodating test load (if required).

3	PROCEDURE
3.1	Support the lifting beam on fabricated structure and hydraulic jacks at both ends or as per facility available at works.
3.2	Place the load to be lifted under the lower lifting beam. Total test load shall be 1.25 times the SWL.
3.3	Drop the lifting slings from the lifting beam and safely tie it with the load.
3.4	The sling should be tied with the lifting beam such that the slings should not be slack. This should ensure that the slings are in full tension when the lifting beam is elevated by at least 100mm.
3.5	Fix the necessary measuring instrument in the lifting beam with wire and plumb to measure the initial reading for vertical deflection of both lower and upper lifting beam.
3.6	Now elevate the lifting beam by means of hydraulic jacks , such that the lifting beam is elevated by at least 100mm.
3.7	Ensure that the whole load is lifted clear from the floor.
3.8	Ensure that the elevation is equal at both ends.
3.9	Now the load is lifted by 100 mm and hence the sling is in full tension.
3.10	Keep the load in lifted condition for one minute.
3.11	Measure the deflection of the lifting beam structure.
3.12	Bring down the lifting beam to its original position with the help of jack.
3.13	Make the lifting beam free from testing position and put in safe place.
3.14	Visually check the weldments of lifting beam and carryout DP test in case of doubt.

ANNEXURE-IV

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOs				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)

2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (dc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V

: ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)

BHAVINI	LOAD DATA (ELECTRICAL)	JOB NO.		ORIGINATING AGENCY	PEM (ELECTRICAL)
		PROJECT TITLE		NAME	DATA FILLED UP ON
		SYSTEM / S	DG EOT CRANE	SIGN.	DATA ENTERED ON
		DEPTT. / SECTION		SHEET 1 OF 1 REV. 00	DE'S SIGN. & DATE

ANNEXURE I

S. NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	Isolating Switch	Vendor	Vendor	BHEL will provide two number 415 V AC (3 PHASE 4 WIRE) supply feeder only up to isolating switch for each crane. Any other voltage level (AC/DC) required will be derived by the vendor. Motor starter shall be part of crane control panel.
2	Power cables, control cables, screened control cables and any special cables (if required) between equipment supplied by vendor.	Vendor	Vendor	Cable from supply feeder to isolating switch shall be in BHEL scope.
3	Cabling material (cable trays, accessories, cable tray supporting system, conduits etc).	Vendor	Vendor	
4	Equipment Earthing	Vendor	Vendor	All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL.
5	Motors	Vendor	Vendor	
6	Cable glands and lugs for equipment supplied by vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty lugs for power & control cables.

STANDARD MANUFACTURING QUALITY PLAN FOR LIFTING BEAM

	MANUFACTURER NAME & ADDRESS	MANUFACTURING QUALITY PLAN		TECHNICAL SPECIFICATION: PE-TS-512-501-A501
		ITEM: LIFTING BEAM ASSEMBLY FOR TG HALL DOUBLE GIRDER EOT CRANES **W.O.NO**:	BHEL DOC. NO. : REV : DATE :	PROJECT : 2X800 MW SINGRAULI STPP STAGE III EPC

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	D	10			11
1)	**For Lifting beam (Lower & Upper Lifting Beam)**									**M**	**C**	**N**	
i)	Material	Chem. & Phy.	Major	Co-relation with T.C. Check test in absence of T.C.	1/heat/batch	Drg. / Tech. Spec. / IS:2062:2006 , GR-BR, (E250) , AMD.1 ,2009	Drg. / Tech. Spec. / IS:2062:2006 , GR-BR, (E250) , AMD.1 ,2009	MTC	✓	P	R	R	
		NDT	Major	U.T	100%	ASTM A 435	ASTM A 435	I.R	✓	P	R	R	UT on 25 mm & above thick plate
ii)	Weld set up	Dimensional conformity	Major	Measurement	100% for butt weld joint	Component drawing	Component drawing	I.R	-	P	-	-	
iii)	Pins for Slings & Hooks	Chem. & Phy.	Major	Co-relation with T.C. Check test in absence of	100%	Mfg.drg/EN-9(070M55) / BS - 970-1983	Mfg.drg/EN-9(070M55) / BS - 970-1983	I.R	✓	P	R	R	
		NDT	Major	U.T	100%	ASTM A 388	ASTM A 388	I.R	✓	P	R	R	IF DIA >= 50mm UT to be Applicable.
iv)	Wire rope	Make, construction , breaking strength	Major	Visul corelation with TC	100%	IS:2266 / As Per Drg.	IS:2266 / As Per Drg.	MTC	✓	P	R	R	
2)	**Welding**												
i)	WPS , WPQ & PQR	Welding parameters	Major	Review of earlier appd. WPS/WPQ/ PQR records	100%	ASME SEC IX	ASME SEC IX	WPS/WPQ/ PQR records as per ASME SEC -IX format	✓	P	R	R	WPS already approved by LIOYDS/NTPC/NPCIL shall be valid. In case NTPC/BARC/NPCIL/ IRS/TPL/LIOYDS qualified welders already available & doing the same job regularly, re-qualification is not required. Alternatively welder qualified by above agences will be utilised.
ii)	Back chipping	Surface defects	Major	DPT	100%	ASME Sec.V	ASME - Sec. VIII Div 1 Appen.-8	-		P	R	-	

LEGEND:
RECORDS IDENTIFIED WITH 'TICK (✓) SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION
"M" MANUFACTURER/ SUBCONTRACTOR
"C" CONTRACTOR (BHEL)
"S" CUSTOMER
INDICATE "P" PERFORM, "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE.
" CHP" SHALL IDENTIFIED IN COLUMN " N "
NOTE: ITEMS NOT COVERED IN MQP, MAY BE CLEARED ON BASIS OF "CERTIFICATE OF CONFIRMANCE"

MANUFACTURER	CONTRACTOR (BHEL)	FOR CUSTOMER USE			
SIGNATURE			REVIEWED BY	APPROVED BY	APPROVAL SEAL

	MANUFACTURER NAME & ADDRESS	MANUFACTURING QUALITY PLAN	TECHNICAL SPECIFICATION: PE-TS-512-501-A501
		ITEM: LIFTING BEAM ASSEMBLY FOR TG HALL DOUBLE GIRDER EOT CRANES **W.O.NO**:	BHEL DOC. NO. : REV : DATE :	PROJECT : 2X800 MW SINGRAULI STPP STAGE III EPC

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	D	10			11
										M	C	S	
a)	Butt-Weld	Weld Quality	Critical	RT	100% in tension & 10% in compression	ASME SEC VIII	ASME SEC VIII Clause UW -51	RT report & Film	✓	P	R	R	Review of radiography report
			Major	DPT	100%	ASME Sec.V	ASME SEC VIII Appnd. 8	I.R	✓	P	R	R	
b)	Fillet Weld	Surface defect & size	Major	Visual	100%	Component Drawing	Component Drawing	I.R	✓	P	R		
			Major	DPT	10% at random	ASME Sec.V	ASME Sec. VIII	I.R	✓	P	**W**	R	W - At the time of final Inspection of Lifting beam
iii)	Inspection of Fabricated Lifting Beam	Visual & dimensional	Major	Dimensional & measurement	100%	Individual component drawing	Individual component drawing	I.R	✓	P	R	R	
3)	Final assembly of Lifting beam	Visual & Dimensional	Major	Visual & Dimensional check	100%	GA Drawing of lifting beam / IS 3177 / Tech-Specification.	GA Drawing of lifting beam / IS 3177 / Tech-Specification.	I.R	✓	P	**W**	**W**	CHP (AT WORKS)
4)	Review of QA Documents	-	-	-	-	-	As per approved QAP	-	-	R	R	R	
5)	Load test at Mfg. Works	Visual	Major	Visual	100%	Appd drawing / Load test procedure	Appd drawing / Load test procedure	I.R	✓	P	**W**	**W**	Overload test to be performed at @ 1.25 X SWL. Refer Annexure-A for procedure
		Deflection test at SWL	Major	Measurement	100%			I.R	✓	P	**W**	**W**	
		Overload test at (1.25 x SWL)	Major	Visual	100%			I.R	✓	P	**W**	**W**	

LEGEND:
RECORDS IDENTIFIED WITH 'TICK (✓) SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION
"M" MANUFACTURER/ SUBCONTRACTOR
"C" CONTRACTOR (BHEL)
"N" CUSTOMER
INDICATE "P" PERFORM, "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE.
" CHP" SHALL IDENTIFIED IN COLUMN " N "
NOTE: ITEMS NOT COVERED IN MQP, MAY BE CLEARED ON BASIS OF "CERTIFICATE OF CONFIRMANCE"

MANUFACTURER	CONTRACTOR (BHEL)	FOR CUSTOMER USE
SIGNATURE		REVIEWED BY / APPROVED BY / APPROVAL SEAL

(ANNEXURE-A TO MQP OF LIFTING BEAM)

LOAD TESTING PROCEDURE OF LIFTING BEAM FOR DOUBLE GIRDER TG HALL EOT CRANES AT WORKS

1	SCOPE
	This covers the guidelines for load testing of lifting beams of EOT cranes.

2	ACCESSORIES AND FACILITIES NEEDED.
a	Slings of suitable size and length , proof load tested at 2 X Safe working load (SWL).
b	Jacking system.
c	Supporting structure
d	Test loads.
e	Cradle for accommodating test load (if required).

3	PROCEDURE
3.1	Support the lifting beam on fabricated structure and hydraulic jacks at both ends or as per facility available at works.
3.2	Place the load to be lifted under the lower lifting beam. Total test load shall be 1.25 times the SWL.
3.3	Drop the lifting slings from the lifting beam and safely tie it with the load.
3.4	The sling should be tied with the lifting beam such that the slings should not be slack. This should ensure that the slings are in full tension when the lifting beam is elevated by at least 100mm.
3.5	Fix the necessary measuring instrument in the lifting beam with wire and plumb to measure the initial reading for vertical deflection of both lower and upper lifting beam.
3.6	Now elevate the lifting beam by means of hydraulic jacks , such that the lifting beam is elevated by at least 100mm.
3.7	Ensure that the whole load is lifted clear from the floor.
3.8	Ensure that the elevation is equal at both ends.
3.9	Now the load is lifted by 100 mm and hence the sling is in full tension.
3.10	Keep the load in lifted condition for one minute.
3.11	Measure the deflection of the lifting beam structure.
3.12	Bring down the lifting beam to its original position with the help of jack.
3.13	Make the lifting beam free from testing position and put in safe place.
3.14	Visually check the weldments of lifting beam and carryout DP test in case of doubt.

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
1.	STEEL	SAIL	
		TISCO	
		JINDAL	
		RINL	
		ESSAR	
2.	HOOKS	STEEL FORGING & ENGG. CO.,	
		SIMRITI FORGING	
		KARACHIWALA	UP TO 25T CAPACITY
		IRIZAR FORGE, SPAIN	
3.	GEAR COUPLINGS	ALLIANCE	
		FLEX-TRANS (formerly known as HICLIFF)	
		SAHARA	
		NUTECH	
		OEM	
4.	WIRE ROPE	USHA MARTIN	
		FORT WILLIAMS	
		B OMBAY WIRE ROPES	
		BHARAT WIRE ROPES	
5.	BEARINGS	SKF	
		FAG	
		TATA	
		NBC	
6	MOTORS	NGEF	UPTO 15 KW
		CGL	RQP , FOR FLAME PROOF MOTOR
		KEC	UPTO 90KW, RQP, FOR FLAME PROOF ALSO
		BHARAT BIJLI	RQP, FOR FLAME PROOF ALSO
		MARATHON	RQP (UPTO 690V & 600 KW) FOR FLAME PROOF ALSO
		ABB, FARIDABAD	UPTO 55 KW
		ABB, SWEDEN	UPTO 55 KW
		ABB, BANGALORE	
		HAVELL	UPTO 90 KW
		JYOTI LTD.	
		TIPM	UPTO 15 KW (NON FLAME PROOF)
		HYOSUNG	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
		WEG	
		HYUNDAI	
		LHP	
		TMEIC	
		KAWAMATA	UP TO 75 KW
		TIPS	UP TO 45 KW
		GE-POWER	
		RAJINDRA ELECT INDUSTRIES	
		SIEMENS	
7.	BRAKES	ELECTROMAG	
		SPEED-O- CONTROL	
		BCH	FOR DCEM BRAKES ONLY
		KAKKU	
		PATHE	
8.	CONTACTOR	SIEMENS	
		L&T	
		SCHNEIDER (Earlier TELE MECHANIQUE)	
		GE-POWER	As per BHEL Sub vendor List
		BCH	
10.	HRC FUSES	SIEMENS	
		L&T	
		GE POWER	
		ABB	
		INDO ASEAN	
		C&S ELECTRIC LTD	
		SPACEAGE SWITCHGEARS LTD	
		SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		ALSTOM LTD	
		ESSEN DEINKI	
11.	ISOLATING SWITCH	SIEMENS	
		L&T	
		CONTROL & SWITCH GEAR	
		ABB	
12.	SWITCH FUSE UNITS	SIEMENS	
		L&T	
		SCHNEIDER	
		CONTROL & SWITCH GEAR	
		ABB	
		ABB	
		ALSTOM LTD	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
13	AUXILIARY RELAYS	JYOTI LTD.	
		OEN INDIA LTD	
		SIEMENS	
14	BIMETAL RELAYS	L&T	
		GE-POWER	
		SIEMENS	
		TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	
15	CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	INDCOIL	
		LOGICSTAT	
		KAPPA	
		AUTOMATIC ELECTRIC	
		PRECISE ELECTRICALS	
		UNILEC ENGINEERS PVT. LTD.	
		M/s NEWTEK ELECTRICALS	
16	BULB & FLOURESCENT TUBES/FITTINGS	PHILIPS	
		PHILIPS	
		CROMPTON	
17	CABLE LUGS (HEAVY DUTY)	DOWELLS	
		UNIVERSAL MACHINES LTD.	
18	HOOTERS	BEACON	
		OSC	
		TARGET	
		KHERAJ	
19	LIGHTING SWITCH , SOCKET & S/F UNIT	ELEXPRO ELECTRICALS PVT/ LTD.	
		ANCHOR	
		KAYCEE	
		L&T	
		SIEMENS	
		INDO ASIAN	
20	CONTROL SWITCHES/ SELECTOR SWITCH	KAYCEE	
		GE-POWER	
		ALSTOM LTD	
		SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		M/s Shrenik & Co.	
		RECOM PVT. LTD.	
21	MODULAR SWITCH BOARD	ANCHOR	
		ELEXPRO ELECTRICALS PVT/ LTD.	
		HAVELLS INDIA LIMITED	
		ANCHOR	
		ELEXPRO ELECTRICALS PVT/ LTD.	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
22	SWITCH BOX	BAJAJ ELECTRICALS	
		AJMERA INDUSTRIES & ENGG. WORKS	
		S.B. ELECTRICAL ENGINEERING CORPORATION	
23	FUSE BASE	INDO ASIAN	
		GE-POWER	
		L&T	
		C&S ELECTRIC LTD.	
		SIEMENS	
		ABB	
		SPACEAGE SWITCHGEARS LTD.	
		SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		ALSTOM LTD	
		ESSEN DEINKI	
24	AC LOAD BREAK SWITCH	GE-POWER	
		L&T	
		SIEMENS	
		KAYCEE	
		C&S ELECTRIC LTD.	
25	CABLE CLAMPS & CABLE TIES	ELECTROMAC IND.CORPN.	
		INCAB	
		NOVOFLEX MARKETING PVT. LTD.	
26	CABLE GLANDS	ALLIED TRADERS & EXPORTERS	
		ARUP ENGG & FOUNDARY WORKS	
		BALIGA LIGHTING EQPT.PVT.LTD.	
		COMMET BRASS PRODUCTS	
		DOWELLS	
		ELECTROMAC INDUSTRIES	
		INCAB	
27	GI CONDUITS/ GI CONDUIT (EPOXY PAINTED)	BIS APPROVED MAKE	
28	FLEXIBLE CONDUITS (LEAD COATED)	PLICA INDIA PVT. LTD.	
29	FLEXIBLE CONDUIT (PVC COATED)	REPUTED MAKE	
		Advance Cable	
		Apar Industries Ltd	
		Cords Cables	
		CMI	
		Delton Cable Ltd	
		Dynamic Cables	
		Gemscabs Industries	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
30	LT POWER CABLE TYPE-XLPE Insulated, PVC Sheathed	Gupta Power Cables	
		Havells India Ltd.	
		KEC International	
		KEI Industries	
		Paramount Cable	
		Polycab Wires Pvt. Ltd	
		Ravin Cables	
		Special Cables	
		Suyog Cables	
		Thermocables	
		Tirupati Plastomatics	
		Torrent Cable Ltd	
		Universal Cable Ltd.	
31	LT Control Cable 1.1 KV, Type - PVC (incl FRLS)	Advance Cable	
		Apar Industries Ltd	
		Cords Cables	
		CMI	
		CMI	
		Delton Cable Ltd	
		Elkay Telelink	
		Gemscabs Industries	
		Goyoline Fibres (I) Ltd	
		Gupta Power Cables	
		Havells India Ltd.	
		KEC International	
		KEI Industries	
		Paramount Cable	
		Polycab Wires Pvt. Ltd	
		Ravin Cables	
		Special Cables	
		Suyog Cables	
		Thermocables	
		Tirupati Plastomatics	
		Torrent Cable Ltd	
		Universal Cable Ltd.	
32	PUSH BUTTONS	SIEMENS	
		L&T	
		BCH	
		SCHNEIDER	
33	LIMIT SWITCHES	SPEED-O-CONTROL	
		ELECTROMAG	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
34	MASTER CONTROLLER	SPEED-O-CONTROL	
		ELECTROMAG	
35	SAFETY SWITCHES	ALSTOM	
		L&T	
		SCHNEIDER	
		ABB	
		SIEMENS	
36	PENDENT PUSH BUTTON STATION	OEM	
37	INDICATING LAMPS	C&S ELECTRIC LTD.	
		ESSEN DEINKI	
		VAISHNO(HOTLINE SWGR.& CONTROL)	
		GE-POWER	
		SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		BCH	
		SIEMENS	
38	MCB	MDS SWITCHGEAR LTD	
		INDO ASIAN	
		SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		S&S POWER SWITCHGEAR LTD,	
39	PANELS	OEM	
		RITTAL	
		BCH	
		PYROTECH	
40	RESISTANCE BOXES	ENAPROS	
		SOC	
		EMM	
		OEM	
41	FIRE EXTINGUISHERS	ASKA EQUIPMENTS LTD.	
		ASHOKA ENGINEERING COMPANY	
		KANADIA FYR FYTER PVT. LTD	
		NITIN FIRE PROTECTION INDUSTRIES LTD	
		NEW ENGINEERING CORPORATION	
		SAFEX FIRE SERVICES LTD	
		UNITED FIRE EQUIPMENTS PVT. LTD	
		ZENITH FIRE SERVICES (INDIA) PVT LTD	
		BIS APPROVED SOURCE WITH VALID LICENSE	
42	VVVF	L&T -YASKAWA	
		ABB	
		SIEMENS	
		SCHNIEDER	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
42	VVVF	FUJI ELECTRIC	
		ROCKWELL	
		VACON	
		MITSUBISHI ELECTRIC	
43	SHROUDED DSL	SUSHEEL	
		STROMAG	
44	ANTI COLLISION DEVICE	SICK	
		IFM	
		ELECTRONIC SWITCHES INDIA	
45	LOAD CELL	IPA	
		METTLER TOLEDO	
		SARTORIUS	
46	RRC	ACROPOLIS ENGINEERING	
		HBC	
		SOC	
		SNT CONTROLS	
47	GEAR BOX	OEM	* = Applicable for Geared Motors only
		ELECON ENGINEERS	
		SHANTI GEARS	
		PBL*	
		NAW*	
		NORD*	
		SEW*	
		BONGFILIOLI*	
48	RAIL	JSPL	
		SAIL	
49	CENTRALIZED LUBRICATION / HYDRAULIC POWER PACK	LUBCON, PUNE	CRANE OEM MAKE POWERPACK IS NOT ALLOWED.
		PRAKASH LUBRICANT, KOLKATA	
		AFMC, KOLKATA	
		SKF ENGG AND LUBRICATION (LINCOLN HELIOS)	
		VIJAY ENGINEERS	
		INDO HYDRAULIC BOMBAY PVT LTD	
		MEHATA HYDRAULIC EQUIPMENT	
		CLAYSYS	
		VEDNAT ENGINEERING SERVICES	
		ELECTROPNEUMATICS AND HYDRAULIC PVT LTD	
		SN HYDRAULIC	
50	MCCB	L&T	
		SIEMENS	
		SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		GE-POWER	

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
		C&S ELECTRIC LTD.	
		CROMPTON GREAVES	
51	MPCB	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
		L&T	
		SIEMENS	
		GE-POWER	
		C&S ELECTRIC LTD.	
52	SINGLE PHASE PREVENTOR	MINILEC	
		L&T	
		SIEMENS	

Note:

1	THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND NTPC APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL
2	BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.
3	THE INSPECTION CATEGORY WILL BE INTIMATED AFTER AWARD OF CONTRACT BY BHEL/CUSTOMER. HOWEVER THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ NTPC.

PAINTING REQUIREMENT

Package	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT
DOUBLE GIRDER EOT CRANE	STEEL STRUCTURE	Surface preparation: Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns.	Epoxy based zinc phosphate	1	40 µm per coat.	Epoxy base Tio2 pigmented coat	1 coat	40 µm per coat	Epoxy based finish coat/Two pack polyurethane coat	2 coat	35 µm. per coat	150µ
DOUBLE GIRDER EOT CRANE	For Indoor components such as motors, electrical parts etc	Epoxy based with suitable additives. The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 50 microns shall be acceptable for finish coat.										

COLOR SHADE			
SL. No	**Item Description**	**Color Shade**	**Remarks**
1	Crane Structure	Golden Yellow shade 356 as per IS-5	Colour band-Black
2	Trolley and hook	Golden Yellow shade 356 as per IS-5	
3	Motors	RAL 5012 (Blue)	
4	Control Panels	RAL 9002 for front & rear and RAL 5012 for side	

MINIMUM REQUIREMENTS FOR HEALTHINESS CHECK

Following work should be carried out during visit for healthiness check:

Bridge and Trolley wheel assembly	Checking for wear, flat spots and cracks in flange. Ensure drive wheels are of the same diameter.
Runway	Checking alignment and elevation of gantry track. Checking rail clamp bolts.
Machine Bolts	Checking all foundation bolts of Electrical and Mechanical equipment for tightness.
Structural Bolts	Checking for tightness. They should also be checked after the first month of operation.
Flexible Couplings	Checking pins and teeth for wear, cleaning and greasing.
Cross-shaft Plummer Blocks	Dismantling cap. Cleaning and checking oil seals and to be packed with fresh grease.
Trolley Collectors	Checking of cable trolleys / cabling / chain. Ensuring connection of trolley wheels is kept through entire length of span.
Brakes	All Brake assembly will be checked for loose connection, earthing connection, linings for wear, leakages and adjustments to ensure brake is not rubbing the brake drum during operation. Greasing pins and operation adjustment of brakes.
Resistor Connections	Checking, tightening connections at grid joints and at cable terminations.
Control Station	Clean out control cabinets. Checking of all connection at push buttons, master controllers contact tips, cams and terminals.
Control Panels	All Control Panels will be checked for loose connection and cleaning the contactor contacts, if required will be replaced.
Electrical Motors	All motion motors connection will be checked for loose contacts in terminal box loose crimping of wire lugs, loose

	contacts on slip ring assembly with carbon brush. Earthing connection with motor.
Safety Switches	All limit switches will be checked for desired operation and limits. Emergency switches will be checked.
Main Collectors	Checking of worn collector shoes, sag in main runway wiring, ensuring contact is kept through entire length runway properly.
Electrical connections	Checking throughout electrical equipment for loose connection such as selector switches, junction boxes, min isolator switch etc.
Lubrication	All gear box and thrusters' oil level will be checked. All bearings, couplings' grease will be checked.
Testing	After completion of checking and required rectification, trolley will be checked for idle operation, for brake operation, limit switch operation & safety switch operation. All motor currents will be checked on no load.
Gear Boxes	Oil seals will be checked, if required will be replaced. Gear and pinion teeth will be checked. Drain the oil cleaning gear box and refill fresh oil. (annually)
Motor	All motors' insulation test and meagre test will be carried out.
Resistance Box	All resistance boxes' step resistance value will be checked

PACKING REQUIREMENT

	COMMON GUIDELINES FOR PACKING
1	**GENERAL:**
1.1	The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.
1.2	All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.
1.3	The identification marking indicating the name and address of the consignee shall be clearly marked in indelible ink on two opposite sides and top of each of the packages. In addition the Contractor shall include in the marking gross and net weight, outer dimension and cubic measurement.
1.4	Each package shall be accompanied by a packing note quoting specifically the name of the Contractor, the number and date of contract and names of the office placing the contract, nomenclature of contents and Bill of Material.

2.	**TYPES OF PACKING:**
	The following 5 types of packing have been standardized for packing of General Components/ Assemblies.
a	**OP'** - Open Type.
b	**PP'** - Partially Packed.
c	**CP'** – Crate/Box Packing - Components/Equipment requiring physical protection.
d	'**CQ**' - Case Packing – Machined components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
e	**'CR'** - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc…

3.	**DESCRIPTION OF TYPES OF PACKING:**
	The various types of packing, as standardized above, are described below.

3.1	**'OP' - Open Type**
	In case, of components which are not affected by water & dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.

3.2	**PP' - Partially Packed**
3.2.1	Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene
3.2.2	Film. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film.

3.3	**'CP' - Crate Packing**
	Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

3.4	**'CQ' - Case Packing -** Machined Components/Assemblies/Equipment
3.4.1	Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.
3.4.2	For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

3.5	**CR' - Case Packing** - Electrical & Electronic Components/Assemblies

	Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel.

4	**PREPARATION OF PACKING CASES**
4.1	**DIMENSIONS:**
a)	Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units/manufacturers.
b)	Width of all planks including the tongue shall be more than 125mm and after plaining it shall be minimum 100mm.
c)	Minimum number of planks shall be used for a shook.
d)	Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel.
e)	Width of binding planks shall be minimum 100mm.
f)	Distance between any 2 binding planks shall be less than 750mm.
g)	diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
h)	Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
i)	Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

4.2	**HOOP IRON STRIPS**
	These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6+0.01mm. The material shall be free from rust. If sufficient nailing is done for bigger boxes, strapping need not be done.

4.3	**BRACKETS**
	These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of “L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

4.4	**MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM**
	100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

4.5	**RUBBERISED COIR:**
	The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

5	**MULTI LAYER CROSS LAMINATED POLY FILM WHILE PACKING OF CUBICLES/CASING**
5.1	The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 4.4) using blue nails wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.
5.2	The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film. This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.
5.3	The cubicles shall be covered with Multi-layer cross laminated poly film.

6	**PACKING OF LOOSE ITEMS/SPARES**
6.1	Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 5.4) using blue nails.
6.2	Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
6.3	Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
6.4	Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
6.5	Silica gel held in cotton bags shall be kept at proper places in the box.
6.6	Packing slip kept in polyethylene bag shall be placed in the box.
6.7	Two numbers of hoop iron strips shall be strapped tightly on the case using clips.

6.8	Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.
6.9	Loose items to be kept inside the cubicle/casing
	- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

7	TYPICAL PATTERN OF WOODEN BOX

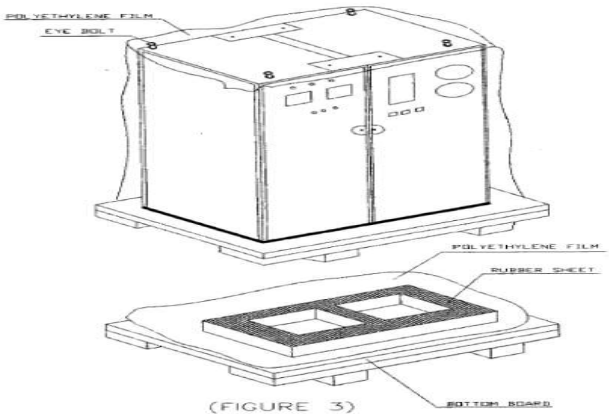

Figure 2

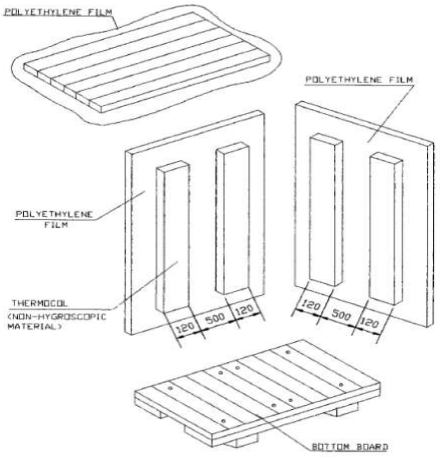

Figure 1

8	SEALED PACKING:
	Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and

9	MARKINGS/STENCILINGS
9.1	"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".
9.2	Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.
9.3	In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel.
9.4	Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.
9.5	Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.
9.6	In case the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

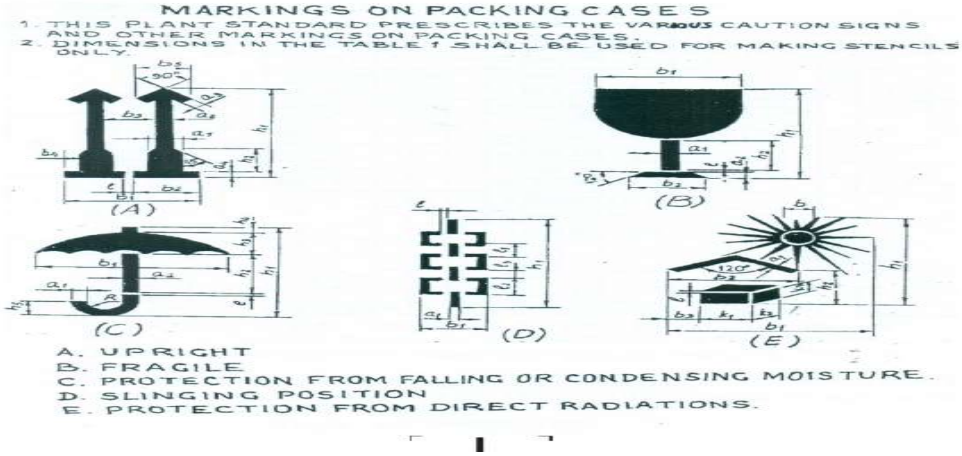

Figure 3

BHEL – <unit> - <location> - <pin>				
CONSIGNEE				
MATERIAL				
CUSTOMER REF.		MO. NO.		
DESPATCH ADVICE NOTE NO		CASE NO		
DIMENSIONS(MM) L x B x H			NET WT –KGS	GROSS WT –KGS
SPECIAL INSTRUCTIONS	HANDLE WITH CARE - KEEP DRY DO NOT DROP - DO NOT TILT			

Figure 4 – TYPICAL MARKING PLATE (225 X 170)

Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

10 STANDARD METHOD OF PACKING

Table 1 - Standard Method of Packing

S. No.	DESCRIPTION	CASE	CRATE	BUNDLE	BARE	DRUM
1	FAB STRUCTURALS, GIRDER				O	
2	FAB STRUCTURALS, GIRDER				O	
3	SUPPORTING STRUCTURALS				O	
4	STRUCTURE SUB ASSEMBLY, CRAB, END CARRIAGE, END STOPPERS, ROPE DRUM				O	
5	RAIL				O	
6	STAIR CASES				O	
7	HANDRAILS/ PLATFORMS/ LADDERS/ CAGE				O	
8	FASTENERS, RAIL CLAMPS AND FIXING ACCESSORIES	O				
9	BEARING BLOCKS	O				
10	FANS	O				
11	GASKETS	O	O			
12	FLANGES	O	O			
13	PAINT TINS		O			
14	PAINT DRUMS					O
15	MOTORS, TRANSMFORMERS, VVVFD, LIMIT SWITCHES, ELECTRIC HOIST ASSEMBLY, RELAYS, FUSES, LIGHTING FIXTURES, PENDANT, ISOLATING SWITCH, RRC, TRANSMITTERS AND OTHER ELECTRICAL ACCESORIES	O				
16	SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES, PANELS,		O			
17	INDICATORS, VIBRATOR SWITCHES	O				
18	CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL		O			
19	OPERATIONAL SPARES , MAINTENANCE TOOLS AND TACKLES	O				
20	ALL OTHER LOOSE ITEMS	O				

Note

Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

BILL OF QUANTITY

(A) SUPPLY:

S. No.	Description	For 265/25T Double Girder Crane 1		For 265/25T Double Girder Crane 2		Common for both Double Girder cranes	
		Qty	UOM	Qty	UOM	Qty	UOM
1	Bridge girders along with walkway, platform, handrails, CT stoppers etc.	2	Nos.	2	Nos.	----	----
2	End carriages						
a	End carriages structure with walkway, platform, handrails, LT buffers etc.	1	set	1	set	----	----
b	Long Travel Mechanism (Motor, gear box, shaft couling, wheels, brakes, bearings etc.)	1	set	1	set	----	----
3	Crab (trolley)						
a.	Crab (trolley) structure with CT rails, platform, handrails, CT buffers etc.	1	set	1	set	----	----
b	Main Hoist Mechanism (Motor, Gear box, Rope drum, Rope Upper block, Lower block, hook, couplings, shaft, brakes, bearings etc.)	1	set	1	set	----	----
c.	Aux Hoist Mechanism (Motor, Gear box, Rope drum, Rope Upper block, Lower block, hook, couplings, shaft, bearings, brakes etc.)	1	set	1	set	----	----
d.	Cross Travel Mechanism (Motor, gear box, shaft couling, wheels, brakes, bearings etc.)	1	set	1	set	----	----
4	LT End stopper	4	Nos.	4	Nos.	----	----
5	Storm Brake	2	Nos.	2	Nos.	----	----
6	LT rail along with accessories	----	----	----	----	577	m
7	LT PVC insulated shrouded bus bar conductor type DSL with accessories and junction boxes as required	----	----	----	----	288.5	m
8	Operator's cabin along with operator's seat, gong, fan and other accesories	1	set	1	set	----	----
9	Main hoist limit switch (Rotory gar + Gravity)	1+1	Nos.	1+1	Nos.	----	----
10	Aux hoist limit switch (Rotory gar + Gravity)	1+1	Nos.	1+1	Nos.	----	----
11	CT lever type limit switch (one way/two way)	2/1	Nos./No.	2/1	Nos./No.	----	----
12	LT lever type limit switch (one way/two way)	2/1	Nos./No.	2/1	Nos./No.	----	----
13	Power cables, control cables etc. along with cable tray/conduits etc.	1	set	1	set	----	----
14	Temprory cable: 3.5 Core Power copper flexible cable of suitable size as per load calculation for commissioning, testing & operation of EOT Crane till such time the DSL is charged.	170	m	170	m		
15	Main Isolating switch cum Changeover	-----	----	----	----	1	No.
16	Protective Panel along with Control tansformers, lighting transformers, 415/24 V (DC) transformer, contactors, switches, fuses relays and other accessories	1	No.	1	No.	----	----
17	Main Hoist Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	----	----
18	Aux Hoist Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	----	----
19	Cross Travel Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	----	----
20	Long Travel Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	----	----
21	Master Controller	1	No.	1	No.	----	----
22	Lighting for cranes (including illumination in cabin, over bridge and under bridge) along with fittings, sockets etc.	1	set	1	set	----	----
23	Portable 40 W hand lamp with minimum 14.5 m length flexible cable for inspection	1	set	1	set	----	----
24	Fire extinguisher	4	Nos.	4	Nos.	----	----
25	Maintenance cage	1	No.	1	No.	----	----

26	Mechanical overload protection (Load cell) for hoist mode	1	No.	1	No.	----	----
27	Radio Remote control with transmitter unit, receiver unit, batterg etc.	1	set	1	set	----	----
28	Additional isolating switches for maintenance of cranes	1	No.	1	No.	----	----
29	Lifting beam & its slings	----	----	----	----	1	No.
30	Anti collission device	1	No.	1	No.	----	----
31	Centralized grease lubrication system to be provided with hand pumps located at crab and both end carriages for all grease lubricated bearings of crane.	1	set	1	set	----	----
32	DSL Phase indicating lamps (RYB)	----	----	----	----	4	Sets
33	Earthing strips	1	set	1	set	----	----
34	First fill of lubricants i.e. oils, grease, servo fluids, cadmium compounds etc.	1	set	1	set	----	----
35	E-Learning Package	----	----	----	----	1	no.
36	Slings for load & overload testing	----	----	----	----	1	set
37	**Maintenance tools & tackles**						
a.	Complete set of ring spanners	----	----	----	----	1	set
b.	Complete set of screwdrivers (Min. 6 Nos., Indicate the sizes)	----	----	----	----	1	set
c.	Adjustable Spanner	----	----	----	----	1	no.
d.	Insulated plier	----	----	----	----	1	no.
e.	Wrench spanner	----	----	----	----	1	no.
f.	Grease Gun	----	----	----	----	1	no.
g.	Oil Gun.	----	----	----	----	1	no.
h.	Hand Lamp.	----	----	----	----	1	no.
i.	Line tester	----	----	----	----	1	no.
j.	O&M Manual	----	----	----	----	1	no.
k.	Steel box to place above tools & manual	----	----	----	----	1	no.
41	**Erection & Commissioning Spares**	----	----	----	----		
a.	Oil seal for each gear box	2	nos.	2	nos.	----	----
b.	Indicating lamps of each color	2	nos.	2	nos.	----	----
c.	Push button of each type and rating	2	nos.	2	nos.	----	----
d.	Auxiliary Contactor of each rating	2	nos.	2	nos.	----	----
e.	Limit switches	2	nos.	2	nos.	----	----
f.	HRC Fuses of each size	1	no.	1	no.	----	----
g.	Touch up paints for structural component	10	Ltr.	10	Ltr.	----	----
42	**Operation and maintenance Spares**						
a.	Gear Oil (ISO VG 68)	30	litres	30	litres	----	----
b.	Grease (ISO VG 220)	20	kg	20	kg	----	----
c.	Brake shoes of each size and rating	3	nos.	3	nos.	----	----
d.	Brake liners of each size and rating	3	nos.	3	nos.	----	----
e.	Brake springs of each size and rating	2	no.	2	no.	----	----
f.	Oil seal of each size for each gear box	3	nos.	3	nos.	----	----
g.	Main contactors of each rating	1	no.	1	no.	----	----
h.	Overload relays of each rating	1	no.	1	no.	----	----
i.	Bearing for motors of each size and rating	1	no.	1	no.	----	----

(B) MANDATORY SPARES:		**For 265/25T Double Girder Crane 1**		**For 265/25T Double Girder Crane 2**		**Common for both Double Girder cranes**	
S. NO.	**ITEM DESCRIPTION**	**Qty**	**UOM**	**Qty**	**UOM**	**Qty**	**UOM**
1.1	**Mechanical: Main TG Hall**						
(a)	Bearings for long travel wheels	----	----	----	----	1 Set (Requirement for one Crane)	
(b)	Bearings for cross travel wheels	----	----	----	----	1 Set (Requirement for one Crane)	
(c)	Bearings for Gear Boxes for each type of Hoist & travel (Main and aux hoist, LT and CT travel))	----	----	----	----	1 Set (Requirement for one Crane)	

(d)	Brake Liner for all the brakes (main and aux hoist, LT and CT travel))	----	----	----	----	2 Sets (Requirement for two Crane)	
(e)	Hydraulic thruster for all Brakes (Main and aux hoist, CT and LT travel)	----	----	----	----	1 Set (Requirement for one Crane)	
(f)	Oil Seals (both main and aux hoist, CT and LT)	----	----	----	----	2 Sets (Requirement for two Crane)	
(g)	Brake springs for all brakes (both main and aux hoist, LT and CT travel)	----	----	----	----	1 Set (Requirement for one Crane)	
(h)	Wire Rope for Aux. Hook	----	----	----	----	1	No.
(i)	Wire Rope for Main Hook	----	----	----	----	1	No.
1.2	**Electrical:**						
i)	Solenoid Coils for Brakes	----	----	----	----	2	sets
ii)	MCBs/MCCBS/Fuse links for the whole crane	----	----	----	----	1	set
iii)	Contactors and overload Relays of each type, size & rating for Motors of the EOT	----	----	----	----	1 set of each type, size & rating	
iv)	Timers of each type, size & rating	----	----	----	----	1	set
v)	Limit Switches for	----	----	----	----		
a	Main Hoist	----	----	----	----	1	set
b	Aux. Hoist	----	----	----	----	1	set
c	Cross Travel	----	----	----	----	1	set
d	Long Travel	----	----	----	----	1	set
vi)	Master Controller for Aux. Hoist	----	----	----	----	1 set each	
vii)	Drive for MH, AH, CT & LT	----	----	----	----	1 no. of each type& rating	

(C) SUPERVISION OF E&C AND PERFORMANCE GUARANTEES		**For 265/25T Double Girder Crane 1**		**For 265/25T Double Girder Crane 2**		**Common for both Double Girder**	
S.N.	**Description**	**Qty**	**UOM**	**Qty**	**UOM**	**Qty**	**UOM**
1	**Visit during supervision of erection & Commisioning**						
a.	No .of visits for during erecton & commisioning for both cranes	2	visits	2	visits	1	visits
b.	No. of days of stay at site during Erection and Commissioning	60	days	60	days	4	days
2	**Visit during supervision of performance guarantee tests**						
a.	No .of visits for supervision of performance guarantee tests	1	visits	1	visits	----	----
b.	No. of days of stay at site during supervision of performance guarantee tests	4	days	4	days	----	----
3	**Visit during warranty period for healthiness checks**						
a.	No .of visits (tentatively in a span of 3 months)	----	----	----	----	12	visits
b.	No. of days of stay at site during healtiness check.	----	----	----	----	48	days

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID

Sl. No.	DOCUMENT TITLE
1	PQR CREDENTIALS
2	COMPLIANCE SHEET
3	"NO DEVIATION" CERTIFICATE DULY STAMPED AND SIGNED.

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE

S.N.	BHEL drawing No.	Title	Approval category	Schedule date of submission (with in given weeks from date of LOI)
A	**BASIC ENGINEERING DRAWING / DOCUMENTS**			
1	PE-V0-512-501-A501	Manufacturing Quality Plan with sub vendor list For TG Hall Crane	A	3
2	PE-V0-512-501-A504	Mechanism Sizing Calculation Including storm brake calculation for TG Hall Crane	A	3
3	PE-V0-512-501-A505	General arrangement for TG Hall Crane with CT DSL details	A	3
4	PE-V0-512-501-A511	Lifting beam assembly for TG Hall Crane	A	3
5	PE-V0-512-501-A514	O & M Manual For TG Hall Crane	A	9
6	PE-V0-512-501-A526	Manufacturing Quality Plan For Lifting Beam	A	3
7	PE-V0-512-501-A527	Data sheet of TG Hall Crane with painting details	A	3
B	**BALANCE ENGINEERING DRAWING / DOCUMENTS**			

8	PE-V0-512-501-A518	"General Arrangement of a) Protective panel b) Main hoist panel c) Aux. hoist panel d) Cross Travel panel e) Long Traverse travel panel. f) Pendent g) Remote Radio Control For TG Hall Crane"	I	5
9	PE-V0-512-501-A519	Cable Sizing and cable schedule For TG Hall Crane	A	5
10	PE-V0-512-501-A521	Type test certificate (for motors) For TG Hall Crane (Applicable for above 100 KW rating motors)	A	8
11	PE-V0-512-501-A532	Gantry Rail installation for TG Hall crane	I	3
12	PE-V0-512-501-A550	Crane lubrication drawing For TG Hall Crane	I	6
13	PE-V0-512-501-A509	Main and Auxiliary hook block assembly with details of hook, nut and check plate For TG Hall Crane	I	3
14	PE-V0-512-501-A510	Long travel Machinery Assembly with LT wheel assembly For TG Hall Crane	I	4
15	PE-V0-512-501-A506	Crab sub assembly for TG Hall crane with CT wheel assembly	I	3
C	**Bidder to submit following additional document also.**			
16	PE-V0-512-501-A512	Structural calculations For TG Hall Crane (including structual calculation for crab structure)	A	3
17	PE-V0-512-501-A517	"Schematic circuit diagram of a) Protective panel, Main and lighting circuit & BOM b) Main hoist panel & BOM c) Aux. hoist panel & BOM d) Cross Traverse & BOM e) Long Traverse & BOM Including earthing diagram For TG Hall Crane"	A	5
18	PE-V0-512-501-A512	General arrangement for PVC shrouded DSL for TG Hall crane	I	3
19	PE-V0-512-501-A516	Electrical equipment layout in cabin for TG Hall crane	I	5
20	PE-V0-512-501-A503	Data sheet of motors for TG Hall Crane	A	5
21	PE-V0-512-501-A520	Crane Operational write up For TG Hall Crane	I	5
22	PE-V0-512-501-A523	Mandatory spare parts list For TG Hall Crane (if applicable)	A	8
23	PE-V0-512-501-A525	Erection procedure For TG Hall Crane	I	8
24	PE-V0-512-501-A551	Cradle drawing For TG Hall Crane	I	8
25	PE-V0-512-501-AXXX	Any other documents if required during detail engineering	-	-
	LEGENDS			

	A= Approval category
	I= Information category

Notes:-

1	Bidder to follow the following the drawing submission schedule: i.1st submission of drawings from date of LOI as per the submission schedule. ii.Every revised submission incorporating comments – within 10 days.
2	Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT			
Sl. No.	**DOCUMENT TITLE**	**No. of prints**	**No. of portable hard**
1	APPROVED DOCUMENTS	3	2
2	AS BUILT DRAWINGS/ DOCUMENTS	3	2
3	ERECTION MANUAL	3	2
4	O&M MANUAL	3	2
5	PERFORMANCE AND FURNTIONAL GUARANTEE TEST REPORTS	3	0

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

1	The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under exclusion.
2	Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.
3	All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
4	The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.
5	All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
6	Guarantee for plant/ equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions.
7	In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account.
8	Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
9	As built drawings shall be submitted as and when required during the project execution.

10	The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.
11	Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
12	In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

Pre-Qualification Requirement:-Double girder EOT crane having capacity of 100T or more with span of 28M or more.

1	The Bidder should have designed, manufactured, erected and commissioned EOT cranes of capacity 100T or more with minimum crane span of 28 meters, which is in successful operation in at least one (1) station for a minimum period of one (1) year as on 22/12/2023. For this the supplier has to submit performance certificate in English from end user along with copy of Purchase Order, meeting above mentioned pre-qualifying requirement.
2	Bidder shall provide all necessary data such as type, design, make, capacity, duty conditions, date of commissioning/ operation etc.
3	Bidder shall submit design documents to substantiate technical parameters specified in PQR, if the same is not mentioned in performance certificate/purchase order.
4	Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
5	BHEL shall evaluate and qualify the bidders for this tender based on their performance in current projects under execution. Particulars for evaluation along with qualifying marks are mentioned in Annexure I.
6	Consideration of offer shall be subjected to customer’s approval of bidders.
7	Notwithstanding anything stated above, BHEL/NTPC reserves the right to assess the capabilities and capacity of the Bidder/ its subcontractors to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL/NTPC.
8	After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

Annexure-I

Assessment of bidder wrt performance feedback from current projects under execution by PS- Region concerned

Name of Supplier:

Reference project & Enquiry details:

Packages quoted for:

Project Name for which assessment done

Sl. No.	Area of Assessment	Particulars for evaluation	Maximum marks	Qualifying marks	Marks awarded
1	**Material supply**		**40**	**20**	**0**
1a	Package Name	Whether agency has supplied the material within given contractual period. Supply 100% - 30 marks 75% - 20 marks 50% - 15 marks	30	15	
1b		Assement of Qualitative ability of agency to follow the approved documents/ BHEL procedures / guidelines for material inspections/ inspection call/ MDCC request / Dispatch documentation.	10	5	
2	**Execution Capabilities**		**60**	**40**	**0**
2a	Package Name	Whether agency has engaged competent graduate engineer as site incharge and other supervisiors/ manpowers to handle site execution.	10	10	
2b		Agency has made at least one no. office shed/container and one no. storage shed/ container.	10	5	
2c		Vendor involvement/ behaviour/ engagement during E&C at site and intiative to resolve of interface issues.	5	2	
2d		Quality of erection drawings and BOQ availability .	5	3	
2e		Agency efforts & inclination on implementation of HSE, Safety and quality during excution of system.	10	5	
2f		Whether agency has made the system ready before corresponding project milestone requirement.	20	15	
	Grand Total		**100**	**60**	

Note: 1. Performance feedback for each project under execution of respective PS-Region will be considered for evaluation.

2. The bidder will have to qualify in each project individually.

BHEL Region representative (Projects)

BHEL Region GM/Head (Projects)