

SPEC.NO. TCE.M4-113-54	TATA CONSULTING ENGINEERS LIMITED ELECTRICALLY OPERATED HOISTS	SECTION: D30 SHEET 1 OF 4
1.0 <u>SCOPE</u> This specification covers the general design, materials, construction features, manufacture, shop inspection and testing at the manufacturer's works, delivery at site and performance testing at site of Electrically Operated Hoists. 2.0 <u>CODES AND STANDARDS</u> The design, materials, construction, manufacture, inspection, testing and performance of electrically operated hoist shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment is to be installed. The equipment shall also conform to the latest applicable Indian or equivalent standards. Other international standards are also acceptable, if these are established to be equal or superior to the listed standards. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility. 3.0 <u>CONSTRUCTION FEATURES</u> Electrically operated hoist shall be a complete unit with travelling trolley, hoisting motor, travel motor (if travelling trolley is motor operated), rope drum, wire rope, necessary gearing, sheaves, brakes, hook, pendent push button station, contactor panel, all wiring, conductor for travel motion (if travelling trolley is motor operated), limit switches, end stops, buffers, earthing terminals and other accessories to make the equipment complete in all respects. Electrically operated hoist shall have minimum factor of safety as five (5). 3.1 <u>TRAVELLING TROLLEY</u> The travelling trolley shall be motor driven or push pull or manual geared type as specified in data <u>sheet A</u>. Trolley frames shall be fabricated from rolled structural steel sections. The side plates of the trolley shall extend beyond wheel flanges, thus providing bumper protection for the wheels. The two side plates shall be connected by means of an equalising pin. The wheels shall be machined on their treads to match the profile of the monorail. 3.2 <u>ROPE DRUM</u> Rope drum shall be as per IS 3938. Rope drum shall be either cast or welded to sustain concentrated loads resulting from rope pull. Drum shall be machine grooved right and left with grooves of a proper shape for the rope used. Grooving shall be of proper length to handle entire rope required to make the specified lift plus the two dead laps at each anchor point, without overlapping. ISSUE R5		

SPEC.NO. TCE.M4-113-54	TATA CONSULTING ENGINEERS LIMITED ELECTRICALLY OPERATED HOISTS	SECTION: D30 SHEET 2 OF 4
---------------------------	---	------------------------------

3.3 WIRE ROPES

Wire ropes shall be extra flexible with well lubricated hemp core having six (6) strands of thirty-seven (37) or thirty-six (36) wires per strand with ultimate tensile strength of 1.6×10^6 KN/M². Wire ropes shall be of Right Hand Ordinary (RHO) lay construction. The rope shall be fastened to the drum with an attachment having strength equal to that of the rope. The rope fastening at the swinging end shall be aligned so as to prevent rope coming off its reeving. Rope shall be of sufficient length so that two (2) full laps shall remain on the drum at extreme low position of the hook. Reverse bends or cross bends and bird caging shall be avoided. The breaking loads for the hoist ropes shall not be less than the factor specified in IS 3938. The load shall include rated load on hooks, weight of the bottom block and the weight of rope.

3.4 LOAD CHAIN AND LOAD CHAIN WHEEL

In case chain is employed for lifting the load instead of wire rope, it shall be heat treated to give required ductility and toughness so that it stretches before breaking. The total length of the load chain shall exceed the minimum length required to give the specified range of lift by not less than three (3) links per fall to ensure that the slack end anchorage is not loaded. The load chain wheel shall be of adequate strength and shall be suitably designed to ensure effective operation of the chain and shall be properly secured with shaft, preferably with splines

3.5 SHEAVES

Sheaves shall be as per IS 3938. These shall be equipped with anti-friction bearings and shall be fully guarded to prevent the rope coming off. Equalising sheaves, if provided, shall also be as per IS 3938. Grooves shall be machined to proper shape for the rope used.

3.6 GEARS

Gears shall be cut from solid cast or forged steel blanks or shall be of stress-relieved welded steel construction or built-up from steel billets and welded together to form a one piece gear section. Pinions shall be of forged carbon or heat treated alloy steel. All gears and pinions shall be totally enclosed type upto last stage of reduction in all motions and shall be carried in fabricated steel gear boxes which shall be dust proof and firmly sealed to prevent oil leakages. For travel motion, creep speed if specified shall be achieved by one of the following methods :

- (a) Planetary gear box integral with main gear box
- (b) Planetary gear box independent with motor
- (c) Worm reducer with clutch

ISSUE
R5

SPEC.NO. TCE.M4-113-54	TATA CONSULTING ENGINEERS LIMITED ELECTRICALLY OPERATED HOISTS	SECTION: D30 SHEET 3 OF 4
However, for hoisting motion, creep speed shall be achieved only by methods (a) or (b) indicated above. Creep speed shall be generally 10 % of main speed. 3.7 <u>BEARINGS</u> Bearings may be ball or roller type. All anti-friction bearings shall be of approved make, which are interchangeable with corresponding size bearings of other make. Bearing housings shall be of split type or so designed to permit easy removal of the shaft. The design shall be such that there is no ingress of dust and oil or grease does not leak out. Bearings shall have a minimum life expectancy of 20 years based on equivalent running time as per specified class. 3.8 <u>SHAFTS AND AXLES</u> Shafts and axles shall be of forged steel and shall have ample strength, rigidity and adequate bearing surface for intended duties. Shafts and axles shall be accurately machined and properly supported. Shafts shall, as far as possible, be furnished straight. If shouldered, these shall be provided with fillets of ample radius or shall be tapered to avoid loss of strength and stress concentration. These shall be designed considering allowances for keys and splines. 3.9 <u>BRAKES</u> All brakes shall be of 'fail-safe' design and shall operate automatically in case of power failure. Each of the trolley and hoisting motors shall be equipped with electrically released, spring set, friction shoe type brakes. Hoisting brake shall be designed to hold 1.5 times full load torque while trolley travel brake shall be designed to hold 1.25 times full load torque. Separate brakes shall be provided for creep motions. All brakes shall have weather-proof enclosures. Coupling halves shall not be used as brake drums. 3.10 <u>LIFTING HOOK</u> The lifting hook shall be single hook type, solid, forged, heat treated, of rugged construction and provided with a standard depress type safety latch. Lifting hook shall have swivels and operate on ball or roller thrust bearings with hardened races. Lock to prevent hook from swivelling shall be provided. 3.11 <u>BUFFERS, STOPS AND SWEEPS</u> 3.11.1 Spring or rubber buffers shall be provided on the trolley. Suitable end stops shall be provided which shall be welded on the ends of monorail to contact the buffers mounted on the trolley. ISSUE R5		

SPEC.NO. TCE.M4-I13-54	TATA CONSULTING ENGINEERS LIMITED ELECTRICALLY OPERATED HOISTS	SECTION: D30 SHEET 4 OF 4
---------------------------	---	------------------------------

3.11.2 Trolley wheel stops shall be provided before the end stops. These shall match to wheel radius. Stops to prevent trolley from running off the monorail shall be abutted against ends of monorail. Stops shall be welded to the monorail.

3.11.3 Sweeps shall be attached to the trolley to remove foreign material from the rails.

3.12 GUARDS

3.12.1 All exposed couplings, shafts, gear wheels, pinions, drives etc. shall be safely encased and guarded.

3.12.2 The sheaves of hook blocks shall be guarded to prevent trapping of hand between a sheave and the in-running rope.

4.0 ELECTRICAL EQUIPMENT

4.1 MOTORS

Drive motors shall be as per IS 325 and companion specification TCE.M4-203-01. Motor shall be suitable for frequent reversal, braking and acceleration. Pull-out torque shall be 2.15 times the rated torque.

4.2 PENDENT PUSH BUTTON STATION

The pendent push button station shall be supported independently, earthed separately independent of suspension and shall comprise the following push buttons and indicating lamps :

- (a) 'Start' and 'Stop'
- (b) Trolley travel - 'To' and 'Fro'
- (c) Hook - 'Hoist' and 'Lower'

Red lamp shall indicate supply 'ON'

4.3 MISCELLANEOUS

Controllers and resistors, controls, electrical protective devices, cables and conductors, earthing guards etc. shall be as per IS 3938. Limit switches shall be provided for overhoisting and overlowering and for two extreme ends of trolley travel.

ISSUE
R5

SPEC.NO. TCE.M4-113-54	TATA CONSULTING ENGINEERS LIMITED ELECTRICALLY OPERATED HOISTS	SECTION: D SHEET 1 OF 1
---------------------------	---	----------------------------

DATA SHEET C

**DATA TO BE FURNISHED BY THE VENDOR AFTER THE ISSUE OF
PURCHASE ORDER**

1. List of drawings and documents to be submitted for review, approval and information with scheduled submission dates
2. Quality Assurance Plan (QAP)
3. Motor power calculations
4. Brake selection calculations
5. Detailed to-scale dimensioned general arrangement drawing showing all the components. Drawing shall also indicate all design data and information furnished in data sheets ~~A and B~~ **B 21**
6. Part list of all the components with materials and codes of construction
7. Flexible trailing cable arrangement drawing
8. Detailed explanatory functional write-up of control scheme, wiring diagrams and control cabinet drawings
9. Dimensional drawing for the hook
10. Installation, operation and maintenance manual with lubrication schedule

ISSUE
R4

5

SPECIFICATION NO. TCE.5750A-500-H-001 PART A	TATA CONSULTING ENGINEERS LIMITED		VOLUME: IIIA
	RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage- V, Unit # 7 & 8 at Suratgarh, Rajasthan DATASHEET A SG & their Auxiliaries ELECTRICALLY OPERATED HOISTS		SHEET 1 OF 2
SL. NO.	ITEM	UNIT	

1.0	DESIGN CONDITIONS		
1.1	Class of hoist		Class II, as per IS:807
1.2	Hoist speed		2-3 m/min
1.3	Method of operation		Pendant push button
1.4	Speed control (hoist)		Single speed
1.5	MATERIALS OF CONSTRUCTION		
1.5.1	Drums & sheave		Cast iron / cast steel / mild steel drum, grooving construction as per IS 3938
1.5.2	Hook		Forged alloy / carbon steel, as per IS 2758 / IS 2759 single hook provided with standard depress safety latch lock to prevent hook from swivelling
1.5.3	Bearing		Ball and / or roller
1.5.4	Shaft		Steel
1.5.5	Wire rope		Construction 6 x 36 minimum ultimate strength 1.6×10^6 kN/m ² as per IS 2365 factor of safety as per IS 3938
1.5.6	Gear		Cut from cast / forged steel as per IS 436
1.5.7	Brake		Electro hydraulic type to hold 125% of the load torque
1.5.8	Trolley		Gears and brakes same as for hoist
1.5.9	Lubrication		Centralised grease lubrication with hand

REV. NO.	R0	R1			JOB NO.	CLIENT: RRVUNL	
PPD. BY	GS	AA			TCE. 5750A	PROJECT: 2 x 660 MW, Super-Critical TPS, Stage-V, Suratgarh, Rajasthan	ISSUE R1
CHD. BY	SN	SN					
DATE	26-11-2009	30-05-2012					

FILE NAME: F330R2.DOC

TCE FORM NO. 330 R2

6

SPECIFICATION NO. TCE.5750A-500-H-001 PART A	TATA CONSULTING ENGINEERS LIMITED		VOLUME: IIIA
	RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage- V, Unit # 7 & 8 at Suratgarh, Rajasthan DATASHEET A SG & their Auxiliaries ELECTRICALLY OPERATED HOISTS		SHEET 2 OF 2
SL. NO.	ITEM	UNIT	

			pump
1.5.10	Trolley wheels		Heat treated carbon steel / low alloy steel / graded CI single flanged
1.6	Material test certificates		To be submitted for critical components such as hook, wire rope, drum, trolley, etc.
1.7	Overload test with 150% of specified load		At works : Yes At site : Yes
1.8	Visual inspection and dimensional check		Yes
1.9	Hoist motor shall be suitable for inching operation		

REV. NO.	R0	R1			JOB NO. TCE. 5750A	CLIENT: RRVUNL	
PPD. BY	GS	AA				PROJECT: 2 x 660 MW, Super-Critical TPS, Stage-V, Suratgarh, Rajasthan	
CHD. BY	SN	SN					
DATE	26-11-2009	30-05-2012					ISSUE R1

FILE NAME: F330R2.DOC

TCE FORM NO. 330 R2



SPEC.NO. TCE.5750A-H- 500-001		TATA CONSULTING ENGINEERS LIMITED		VOLUME III SG SHEET 2 OF 3	
		RRVUNL, 2X 660 MW, SUPER CRITICAL TPS, STAGE-V, UNIT-7 & 8, SURATGARH, RAJASTHAN SG AND ITS AUXILIARIES B21 : ELECTRICALLY OPERATED HOISTS			
SL. NO.	ITEM	UNIT	BIDDER		
17.	TYPE OF DOWN SHOP LEAD				
17.1	MAKE				
17.2	SIZE				
17.3	LENGTH	M			
17.4	SUPPORTING ARRANGEMENT				
17.5	IF CURVED MONORAIL, NUMBER OF CABLE TROLLEYS PROVIDED AND WIDTH OF EACH TROLLEY	NO./ mm			
18.					
19.					
20.					
21.					
22.	MONORAIL IF PROVIDED BY VENDOR : INDICATE BEAM SIZE MINIMUM/ MAXIMUM SUITABLE FOR TROLLEY MOVEMENT	mm	ISMB / ISMB		
23.	MONORAIL IF PROVIDED BY PURCHASER : IS SIZE SPECIFIED IN DATA SHEET A SUITABLE FOR TROLLEY MOVEMENT		YES/ NO IF NO, INDICATE SUITABLE SIZE ISMB		
24.	DISTANCE BETWEEN HIGHEST HOOK POSITION TO BOTTOM OF MONORAIL	mm			
25.	IF MONORAIL IS CURVED, MINIMUM RADIUS TROLLEY CAN NEGOTIATE	mm			
27.	IF HOIST IS IN HAZARDOUS AREA :				
27.1	TROLLEY WHEELS				
27.2	ROPE DRUM AND SHEAVES				
27.3	GEARS AND PINIONS				
NOTES TO BIDDER		SIGNATURE OF BIDDER			
1. DATA SPECIFIED IN DATA SHEET-A HAS NOT BEEN REPRODUCED IN DATA SHEET-B. IN CASE OF DEPARTURE FROM DATA SHEET-A, BIDDER SHALL BRING OUT THE SAME IN SCHEDULE OF DEVIATIONS, FAILING WHICH IT SHALL BE CONSTRUED THAT BIDDER COMPLIES WITH THE REQUIREMENTS STIPULATED IN DATA SHEET-A.					
2. THIS DATA SHEET SHALL BE FILLED UP COMPLETELY AND A COPY SHALL BE ENCLOSED WITH EACH COPY OF THE BID.		DATE			

SPEC.NO. TCE.5750A-H-500-001	TATA CONSULTING ENGINEERS LIMITED		VOLUME III SG SHEET 3 OF 3	
	RRVUNL, 2X 660 MW, SUPER CRITICAL TPS, STAGE-V, UNIT-7 & 8, SURATGARH, RAJASTHAN SG AND ITS AUXILIARIES B21 : ELECTRICALLY OPERATED HOISTS			
MISCELLANEOUS	SL. NO.	ITEM	UNIT	BIDDER
	30.	WIRE ROPE DIAMETER	mm	
	31.	WIRE ROPE BREAKING LOAD	KN	
	32.	WEIGHT OF COMPLETE HOIST AND TROLLEY ASSEMBLY	Kg	
	33.	WEIGHT OF HOIST	Kg	
	34.	WHEEL LOAD WITH IMPACT AND WITHOUT IMPACT	Kg	/
	35.	PRELIMINARY DIMENSIONED GENERAL ARRANGEMENT DRAWING OF ELECTRICALLY OPERATED HOIST ALONG WITH WHEEL STOP DETAILS TO BE FURNISHED		WHETHER FURNISHED YES/ NO
	36.			
	37.			
NOTES TO BIDDER 1. DATA SPECIFIED IN DATA SHEET-A HAS NOT BEEN REPRODUCED IN DATA SHEET-B. IN CASE OF DEPARTURE FROM DATA SHEET-A, BIDDER SHALL BRING OUT THE SAME IN SCHEDULE OF DEVIATIONS, FAILING WHICH IT SHALL BE CONSTRUED THAT BIDDER COMPLIES WITH THE REQUIREMENTS STIPULATED IN DATA SHEET-A. 2. THIS DATA SHEET SHALL BE FILLED UP COMPLETELY AND A COPY SHALL BE ENCLOSED WITH EACH COPY OF THE BID.		SIGNATURE OF BIDDER		
		DATE		