

Plant 1.0 MTPA ALUMINA REFINERY STREAM-5	Client NALCO	Contract Code NAL	Document ID 6695-ELT-G00-EC-0029	Contract No. 66-6695	
	TECHNICAL SPECIFICATION FOR ELECTRICAL HOIST (ELECTRICAL PART)			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.	
				Rev	01

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INDEX SHEET

The document Cover Sheet indicates revisions made in this document along with the purpose of issue of the revised document. The details of revisions made in the enclosures of this document are listed in the table of *Contents* below and the enclosures listed therein are an integral part of this document.

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1.0 INTRODUCTION

The design, manufacturing, testing and performance of **Electrical Hoist** shall comply with all currently applicable Indian & IEC Standards and specific Standards & Codes specified under clause 'Codes' of Part-II of this specification.

Equipment and services to be furnished under this specification shall be as per various parts of this specification. Specific requirement is covered in Part-II, while standard and descriptive requirement is covered in Part-I.

2.0 GENERAL REQUIREMENTS

This specification is intended to cover general requirements of design, manufacture, testing, inspection, dispatch, supervision of installation and commissioning for Electrical Hoist.

All equipment and components shall be new and shall have a design life of minimum 20 years.

If conflict arises between the various parts of this specification and standards, the vendor shall bring such points to the notice of Owner/ Consultant for their review & approval. Owner/ Consultant decision shall be final and binding.

2.1 LSTK Contractor's Battery Limit and Scope

LSTK Contractor shall provide 415V, 3 phase power supply as indicated in Part-II for Electrical Hoist at one point i.e. at down shop isolator (supplied by Vendor) located at one meter above floor level. The vendor shall make the necessary arrangement for tapping this power from the down shop isolator for the Hoist. For power supply details refer design data sheet.



All accessory and auxiliary electrical equipment including drive motors, junction boxes, interconnecting armoured, unarmoured, flexible, power and control cables, brakes, limit switches, cable from junction box to down shop isolator, control panel, pendant type push button station for Hoists control etc. necessary for the safe and satisfactory operation and maintenance of the Hoists shall be included in the Vendor's scope of supply.

All cables on the downstream side of down shop isolator shall be in vendor's scope.

2.2 Equipment Suitability

Electrical equipment shall be adequately rated to permit simultaneous operation of any combination of motions of the Hoists for its duty service.

Motors (main and creep) and control circuit components for the Hoist shall be suitable for reversing control. Electrical brakes provided for Hoists drives shall operate when the power to drive motor is off.

2.3 Motors

All Electrical Hoist motors shall be 3 phase, totally enclosed fan cooled (TEFC), squirrel cage induction motors. The motors shall confirm to Hoist duty class (S4) with Cyclic Duration Factor (CDF) as specified in PART-II. In case of electric braking, the motor shall conform to Hoist duty class S7.

Enclosure of Motor shall be as per Part II.

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The pullout torque of any motor supplied at rated voltage should not be less than 2.25 times the rated torque for Class 1, 2 & 3 Hoists and 2.75 times for class 4 Hoists. Motor shall be of higher starting torque, crane duty & shall be suitable for reversing, frequent acceleration and mechanical braking. If it is intended to retard or stop the motion of a Hoist by electric braking the motor shall be of suitable design to withstand this duty.

Unless steps are taken to limit the main motor speeds to 2½ times the rated speed or 2000 rev / min., whichever is less the motor shall be specially designed for higher speeds.

Motor leads shall be brought out from the motor frame to terminals in the terminal box fixed to the motor frame. Motors shall be so located that the terminals are accessible for inspection and maintenance and normal ventilation is not restricted.

Special requirement

Motor frames shall be constructed of ferrous materials, and protected with a caustic resistant paint coating.

Ventilating fans shall be made of steel, or a caustic-resistant non-metal. Nonferrous alloys are prohibited. Cooling tubes or ducts, if used, shall be mild steel. Cooling tubes shall be easily accessible for cleaning

Stator laminations shall not be exposed to external cooling air. End cowls shall be constructed of steel or a caustic-resistant fibre reinforced plastic. Terminal boxes shall be robustly constructed of caustic-resistant material. Aluminium alloys are not permitted

2.4 Control Panel and Swithgear Components

All control equipment for the Hoists shall be housed in dust tight, sheet steel cabinets. The cabinets shall be fabricated from CRCA sheet steel of minimum thickness 2.0 mm. Degree of protection to be provided for the panel enclosure to the internals shall be as per Part II. Enclosure shall be Industrial, suitable for safe area or Hazardous area as per Part II. Layout of the components inside the panels/cabinets shall be spacious enough, so that the maintenance and repairs can be carried out by owner/LSTK Contractor at a later date without much difficulty. Anti-condensation heaters with thermostat, a controlling switch and fuse shall be provided in the panel.

The control panel shall have provision to have various components to be installed/mounted.

Control supply shall be 110V, Single Phase, 50 Hz. AC derived through an isolating transformer. One pole of this supply shall be earthed.

Ferrules shall be provided at the end of each wire for identification purposes.

Power & Control terminals in the panel shall be stud / clip-on type, and of 650V grade.

Cable shall be terminated using Nickel plated Brass cable glands & crimping type tinned copper ring type lugs.

Control panel shall have following Power & Control components as minimum:

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Incomer:

- Switch fuse unit with indicating lamp.

Individual Drive Control:

- Switch fuse unit for isolation of each motor.
- Forward and reverse power contactors. 
- For Motor ratings up to 7.5kW Electronic overload relay shall be used. For rating above 7.5kW Digital motor protection relay with 46, 49, 50L/R with display & fault record shall be used, both relays shall have single phase preventor.
- ON (Red), OFF (Green) & TRIP (Amber) indicating lamp.

Contactors shall be suitable for AC-4 duty for squirrel cage motors, as defined in IEC-60947 Part-3. Contactor ratings shall comply to type-2 coordination chart as per Part-IA.

Stainless steel Name Plate labels with white engraving, black background shall be provided on each component / equipment. The Name Plate details shall be as per relevant Indian Standards.

2.5 Control

Complete Hoists Control System shall be designed as per the control described in IS-6547 and IS-3177.



Operation of the Hoist shall be from pendant control and cordless remote control as specified in Part II.

If the control is by push button or other suitable device, it shall automatically return to the OFF position immediately they are released. One lockable OFF push button shall be provided for switching off power supply in positive manner when the Hoist is not in use.

The control station shall comprise of the components as listed in Part-II.

If required, suitable regenerative braking system shall be incorporated in Hoists Control System for limiting the over speed of motors / load to 110% of rated speed during lowering operation of main load.

2.6 Pendant Push Button Station

Enclosure of the Push Button Station shall be as specified in PART-II.

The control of the Hoists is by Push Button on the Pendant. Push buttons, switches and indicating lamps shall be as per Part II.

Height of the pendant above the operating floor shall be 700-1000 mm (in case of wired pendant).

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Stainless steel Name Plate labels with white engraving on black background shall be provided on each PB and lamp for defining their functions.

Degree of protection provided by pendant enclosure to the internals shall be IP 55.

Control cable connected to pendant push button shall be flexible type PVC insulated, copper conductor, unarmoured type.

Pendant type control station shall be supported independently of the electrical cable and it shall be provided with chain/wire rope arrangement of insulating material.

Pendant type control station shall be earthed separately, independent of the suspension and shall have two earthing terminals.

The pendant switch shall be capable of withstanding rough handling without being damaged and the cover shall be effectively secured.

2.7 Down shop isolator & Junction Boxes

Down shop isolator (DSI) shall be TPN, on-load Isolator and heavy duty type, 2mm thick sheet steel enclosed adequately rated. The DSI shall be provided with mechanical ON/OFF position indicator. DSI enclosure shall be provided with front access hinged door of adequate strength and padlocking facility with main power switch handle. DSI shall be located at accessible position to be decided during detail engineering. Suitable terminals shall be provided for termination of LSTK Contractor's cable, the size of which will be furnished later based on final motor ratings to be furnished by the vendor.

Power Junction box at hoist beam level shall be with enclosure as per specified in Part-II. It shall house with adequately rated terminals.

2.8 Cables and Other Conductors

Only flexible stranded copper cables shall be used for control circuits. The minimum cross-sectional area of cables shall be as follows:

- For power circuits 2.5mm² copper.
- For control circuits 1.5mm² copper.

All the cables shall be adequately protected against mechanical damages and metal trunking may be used if desired. Where hoists are equipped with one hour rated motors, the stator or armature cables may be uprated by a factor of 1.4 above the ratings for continuous duty. Similarly for hoists equipped with half hour rated motors an uprating factor of 1.7 may be used. Where the hoists are equipped with intermittent duty rated motors the factor for uprating the cable will be equal to $10 / \sqrt{IDF}$ where IDF is the intermittent duty factor of the motor.

Conductor areas for main power circuits shall be selected taking in to consideration simultaneous operation of all motors for the duty service of Hoist, suitably derated considering the laying conditions. Generally, all cables shall be derated by factor of 0.6.

Conductor shall be properly terminated / connected to withstand vibration.

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Power cable shall be of Copper multistrand conductor, XLPE insulated, extruded PVC inner sheathed, GI wire armoured with extruded PVC outer sheath. Main flexible cable shall have at least two nos. of cores as spare.

Control cable shall be of Copper conductor, PVC insulated, extruded PVC inner sheathed, GI round wire armoured with extruded Si-rubber outer sheathed.

Outer sheath shall have FR/FRLS property if specified in data sheet part-II.

2.9 Cabling & Wiring

Ferruling on all cores of wires and tagging of all cables must be done for proper identification and traceability at both ends.

Each control wire shall be identified at both ends with wire designation in accordance with the wiring diagram developed from approved control schematics. Inter-locking type plastic ferrules of yellow colour shall be used for identification. Colour of lettering of ferrule shall be black.

2.10 Electric Braking

Effective means shall be provided for stopping the motion in the event of power failure and in case of emergency.

Braking system shall be fail safe. Brakes shall be suitable for operation on three phase power supply.

2.11 Limit Switches

The limit switches, after being tripped shall automatically reset within a reasonable distance travelled in opposite direction. Hoist limit switches shall be provided to prevent over hoisting and overlowering. Limit Switches, as specified in Part - II, shall be fitted to prevent, over traveling and over traversing and other special requirements.

2.12 Earthing

The Electrical Hoists structure, motor frames and metal cases of all electrical equipment including metal conduit or cable glands and guards shall be effectively connected to earth. Where the supply to the Electrical Hoists is through flexible cord or flexible cable, the Electrical Hoists shall be connected to earth by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord or flexible cables.

2.13 Painting

Epoxy based two coats primer shall be applied to all enclosures for electrical items before final epoxy painting. Final paint shade shall be RAL 7032 for Industrial & 355 of IS-5 for flame proof. Minimum thickness of paint shall be 60 microns.

2.14 NAME PLATES

Nameplates must be provided for each and every electrical equipment (like JB's, DB's, contactors, pendant, push buttons, motors etc.) based on the vendor drawings, for easy identification.

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Nameplates shall be provided for equipments / components included in the Electrical Hoist.

In case of flameproof enclosures, caution nameplate marking as per relevant IS shall also be provided.

3.0 FACTORY ACCEPTANCE TEST AND DESPATCH

Inspection & testing shall be carried out based on latest revision of this specification and approved vendor drawings certified for construction. All tests as specified in ITP shall be carried out during final inspection. Minimum fifteen days advance notice shall be given for carrying out final inspection.

Vendor/LSTK Contractor shall ensure that all meters and associated testing equipments are calibrated by an authorized testing laboratory and the calibration certificates are valid at the time of carrying out the inspection.

After successful completion of inspection and testing, vendor/LSTK Contractor shall furnish all as-built documents in required number of sets. Only after receipt of final documents. The release order for dispatch of material will be issued.

4.0 INSTALLATION, TESTING AND COMMISSIONING

Vendor/LSTK Contractor shall supervise the installation of all equipment within their scope of supply. Vendor's/ LSTK Contractor's scope of work shall include all electrical work such as supervision of installation of festoon cable arrangement, laying and termination of all cables within the battery limit, installation of all control panels, pendant and down shop isolator.

After installation is complete, vendor/LSTK Contractor shall carry out testing to check operation of equipment in line with the specification and approved drawings. Vendor/LSTK Contractor shall organise & conduct the required overload test at site. Special tools and instruments as required for testing and commissioning of the system shall be arranged by the Vendor/LSTK Contractor.

5.0 GUARANTEE

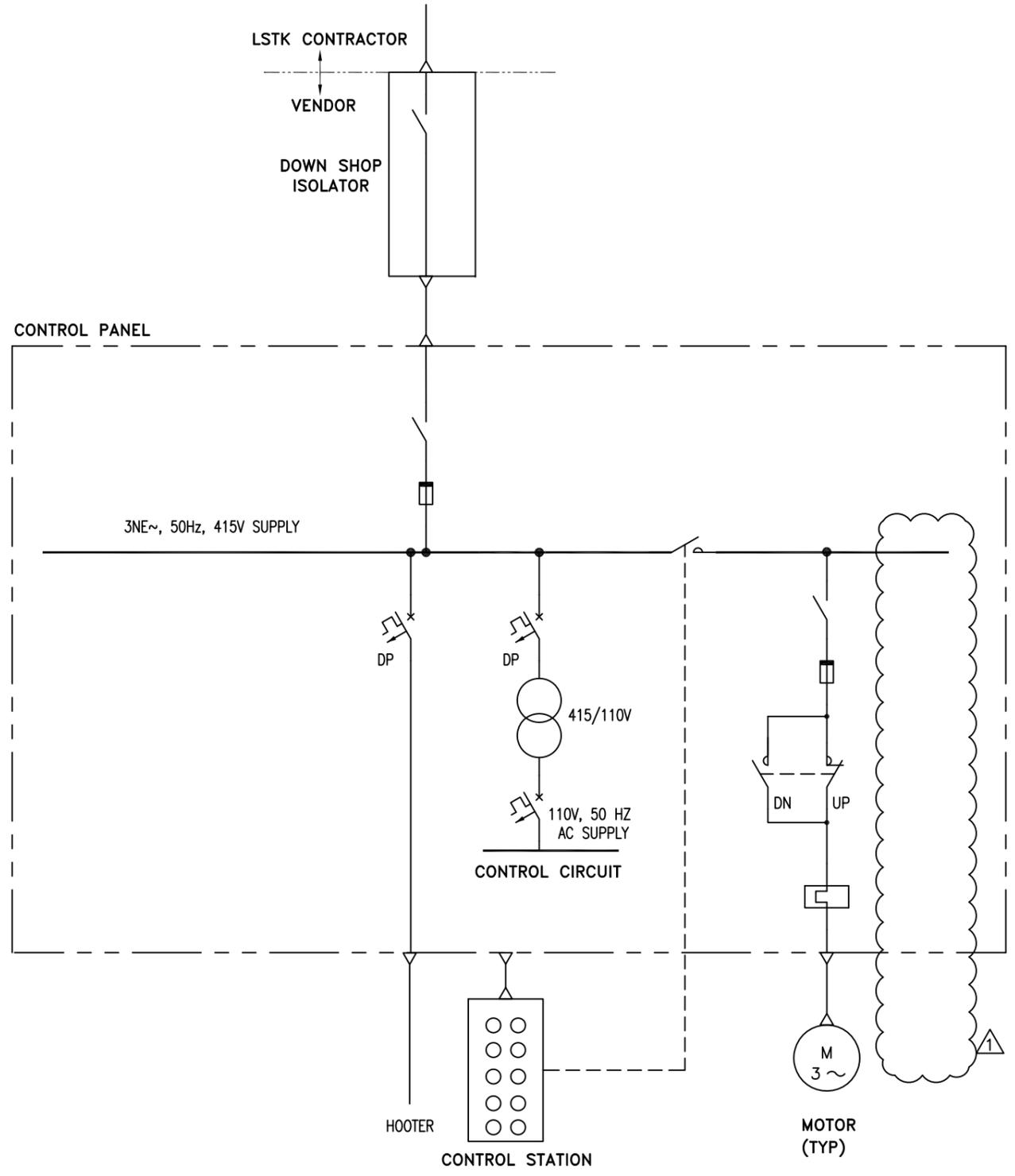
The performance figures indicated in Part-II shall be guaranteed within the tolerance specified or as permitted by relevant standards. In case of failure of the equipment to meet the guaranteed performance, Owner/LSTK Contractor , reserves the right to reject the equipment. However, Owner/LSTK Contractor , also reserves the right to use the rejected equipment until the new equipment meeting the guaranteed performance requirements is supplied by the vendor.

If any equipment supplied by the Vendor/ LSTK Contractor fails at site during erection, commissioning or service (within guarantee period), the Vendor/ LSTK Contractor shall repair and put back into successful operation the failed equipment within the time frame and procedure of repair agreed with the Owner depending on nature of failure at no extra cost to the Owner .

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GENERAL	001	Make	: As per approved vendor list- Electrical							
	002	TON NO	:							
	003	Usage	: Maintenance *							
	004	Location	: Indoor/Outdoor *							
	005	Enclosure	: Industrial / Flameproof							
	006	Motions required (m/sec)	:		Main		Creep			
			a) Long	:	*	*				
			c) Hoist	:	*	*				
	007	Hazardous Area Classification :								
			i) Zone	:						*
			ii) Gas group	:						*
			iii) Temperature Class	:						*
	008									
	009	01	IS/IEC 60034 - Three phase induction motors							
	010	IS 807 - Design manufacturer, erection & testing of cranes and hoists								
	011	IS 3177 - EOT cranes & gantry cranes other than steel work cranes								
	012	IS 6547 - Specification for Electric Chain Hoists								
	013	IS 1554 - PVC insulated (heavy duty) electric cables								
	014	IS 9968- Elastomer insulated cables								
	015	IS 8130 - Conductors for insulated electric cables & flexible cords								
	016	IS 3938 - Specification for Electrical Wire Rope Hoist								
	017	IS-2147 - Degree of protection								
	018	IS 434 - Rubber insulated cables								
	019	IEC - 34 Rotating Electrical Machine								
	020	IS 5571 - Guide for Selection and installation of Electrical Equipment for Hazardous Areas (other than mines)								
	021	IS 5572 - Classification of hazardous areas (other than mines) having flammable gases and vapours for electrical installation								
	022									
MOTORS	023	Make	: As per approved vendor list- Electrical							
	024	Voltage and frequency								
		a> Rated Voltage	:	415 V ± 10 %						
		b> Rated Frequency	:	50 Hz + 3 % / -5 %						
		c> Combined variation	:	The sum of absolute percent variations of a) & b) not exceeding 10%						
	025	No. of phases	:	3						
	026	Insulation Class	:	F with temperature rise limited to B						
	027	Enclosure Type	:	Industrial / Flameproof						
	028	Enclosure Protection	:	IP55						
	029	Starting Current	:	8.4 times full load current						
	030	Cyclic Duration Factor	:	40						
	031	No. of starts per hour	:	150						
	032	Thermistors required	:	Yes / No (Yes Hazardous Area Motors)						
	033									
MOTIONS REQUIRED	034	Description			LONG		HOIST			
				Main	Creep	Main	Creep			
	035	KW rating		*	*	*	*			
	036	Speed (RPM)		*	*	*	*			
	037	Quantity (Nos.)		*	*	*	*			
	038	Frame Size		*	*	*	*			
	039	Type of Duty		S4	S4	S4	S4			
040										

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BRAKES	041	Quantity			*	*	*	*
	042	Type (Electric/Electro-Hydraulic/Electro-Mechanical)			*	*	*	*
	043	Braking time			*	*	*	*
	044	Whether separate brake drums used without using coupling halves			*	*	*	*
	045							
LIMIT SWITCHES	Description				Quantity			
	046	Hoist (Main Limit Switch) -			*			
	047	Hoist (Back-up Limit Switch) -			*			
	048	Long Travel - Lever / proximity type			*			
CONTROL PANEL	050	Enclosure : Industrial / Flameproof						
	051	Degree of Protection : IP55						
	052	Enclosure Thickness : 2 mm (min.)						
	053	Paint Shade : RAL 7032						
	054	Control Transformers :						
		a) Rating : kVA			*			
		b) Voltage Ratio : 415 / 110			*			
		c) Type : Dry type						
	055	Cable Entry : Bottom			*			
	056	Components : As per SLD & as required						
PENDANT/CORDLESS CONTROL STATION	058	01	Control Station : Pendant and Cordless					
	059	Control Station shall comprise of the following :						
		1. Main Supply 'ON'		: Key operated Push Button				
		2. Main Supply 'OFF'		: Lockable staput type Push Button				
		3. Long Travel 'TO'		: Spring return Push Button				
		4. Long Travel 'FRO'		: Spring return Push Button				
		5. Hoist 'UP'		: Spring return Push Button				
		6. Hoist 'Down'		: Spring return Push Button				
		7. Long Travel speed selection (Normal / Creep)		: Two way Selection Switch				
		8. Hoist motion speed selection (Normal / Creep)		: Two way Selection Switch				
		9. 'ON' indication		: Red Lamp				
		10. Horn for audio warning		: Spring return Push Button				
		11. Motor TRIP indication for each motor		: Amber lamp. LED type				
	060	Make :			*			
	061	Enclosure : Industrial / Flameproof						
062	Degree of Protection : IP55							
063	Material of Construction :			*				
064	Dimensions :			*				
065	Approximate Weight :			*				
066								
CABLES	067	Power Cable						
		a> Conductor Material		: Copper				
		b> Insulation		: XLPE				
		c> Outer Sheath		: PVC				
		d> Armour		: GI wire				
	068	Control Cable						
		a> Conductor Material		: Copper				
		b> Insulation		: PVC				
		c> Outer Sheath		: Si-rubber				
		d> Armour		: GI wire				
	069	Fire retardant properties : FRLS						
070	Voltage Grade : 1100 Volts							
071								

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DOWN SHOP ISOLATOR	072	Down Shop Isolator panel shall comprise of the following				
	073	Make	:		*	
	074	Tag	:		*	
	075	Enclosure	:	Industrial / Flameproof		
	076	Degree of Protection	:	IP55		
	077	Mounting	:		*	
	078	Push Buttons	:	ON / OFF		
	079	Rating	:	1.2 times rated current		
	080	No. Of Phases	:	TPN		
	081	Duty	:	AC23		
	082	Incoming Cable Size and No. Of Runs	:		*	
	083	Cable Gland	:	To be supplied with Down Shop Isolator	*	
	084	Cable Entry	:	Bottom	*	
	085	Components	:	As per SLD	*	
JBS	087	Enclosure	:	Industrial / Flameproof		
	088	Degree of Protection	:	IP55		
	089	Mounting	:		*	
	090	Material of Construction	:	FRP / SS	*	
	091	Cable Entry	:	Bottom	*	
	092					
MISC.	093	Warning bell/horn	:	Yes		
	094	Audio visual alarms	:	Yes		
	095					
MAKE OF COMPONENTS	096	Electro mechanical relays	:	Alstom/ ABB	*	
	097	Numerical/ Microprocessor based relays	:	ABB/ Siemens	*	
	098	Auxiliary relays	:	Schneider/ ABB/ Easun Reyrolle	*	
	099	Timer Relays	:	Alstom/ ABB/ Easun Reyrolle	*	
	100	Power fuses	:	Siemens / L&T / ABB / Schneider / Mersen (Ferraz)	*	
	101	Instrument transformers	:	AE/Indcoil/Precise/Kappa/ ABB/Pragati/Siemens	*	
	102	Bus bar support insulator	:	Dolfi/Fibrochem/Glassfibro/Baroda Insulators/Vinayak	*	
	103	kWh meter	:	Areva / SIMCO	*	
	104	Digital / Composite / Multi function meter	:	Conserv/ Secure/ Siemens/ HPL/ L&T/Satec	*	
	105	Analog meters	:	Automatic Electric(AE)/ SIMCO/ IMP/ Rishabh/ MECO	*	
	106	Air circuit breaker	:	L&T/ Siemens / ABB / Schneider	*	
	107	Moulded case circuit breaker	:	ABB / L&T / Schneider / Siemens	*	
	108	Miniature circuit breaker	:	L&T/ Siemens/ ABB/ Schneider / Havells/ MDS	*	
	109	Power Switch	:	Siemens / L&T / Areva / Schneider / ABB	*	
	110	Contactors	:	Siemens / L&T / ABB / Schneider	*	
	111	Breaker control switch	:	Kaycee/ Areva / Recom / Vaishno / Gem Telergon	*	
	112	Control selector switch	:	Kaycee/Siemens/L&T/Recom/Vaishno/Gem Telergon	*	
	113	Terminal block	:	Elmex/ Connectwell/ Allen Bradley / Fuji	*	
	114	Internal wiring	:	BIS compliant	*	
	115	Lugs	:	Dowell/ Jainson	*	
116	Push Buttons	:	Siemens/ L&T/Teknik/ Hensel / Vaishno	*		
117	Indication lamps	:	Technik/ L&T/ Siemens /Schneider/Altos	*		
118	Thermister Relay	:	Minilec	*		
119	Annunciator	:	Chhabi/ Minilec/ IIC/ Vashno/ AE	*		
120	L.V. Motors	:	Siemens / Bharat Bijlee / ABB / Crompton Greaves / Laxmi Hydraulics / Marathon Electric Motors / Hindustan Motors	*		
121	Cable Glands	:	Baliga, Flexpro, Flp Eqpt Pvt Ltd	*		
122	Limit Switch	:	Siemens, BCH, Teknik	*		
123	Brake	:		*		
124						
DOCUMENTATION		Description	For review & Approval		Final, As-built Documents	
	125	G.A. Drawings of all Panels	For No. of copies of drawing/documents to be issued by LSTK contractor for Approval/Review/Information during Detail Engineering and as a part of Final, As-built documentation - LSTK contractor to refer requirement indicated elsewhere in the tender			
	126	Power & Control Schemes				
	127	Wiring diagram of all panels				
	128	Interpanel wiring diagrams				
	129	Complete Bill of Material indicating make, type, quantity of Electrical equipments.				
	130	Filled up data sheets				
	131	Routine Test certificates for electrical items				
	132	Type test certificate for motors				
	133	Manufacturing schedule				
	134	Recommended spares for electrical equipments				
	135	Quality Assurance Plan & Inspection Test Procedure				
	Note : 1. For items marked " * ", data to be furnished / confirmed by LSTK Contractor during detail Engineering					



- NOTES :-**
- 1) SINGLE LINE DIAGRAM INDICATES POWER DISTRIBUTION SYSTEM AND SCOPE OF MAJOR ELECTRICAL EQUIPMENTS.
 - 2) THE MOTOR STARTER SHALL BE REVERSIBLE DOL AS PER MANUFACTURER'S STANDARD.
 - 3) NO. OF MOTORS SHALL BE DECIDED BY THE VENDOR ACCORDING TO OPERATIONAL REQUIREMENT.
 - 4) CONTROL PANEL FOR HOIST SHALL BE PLACED AT FLOOR LEVEL.

LEGENDS :-

	CONTROL TRANSFORMER		SWITCH
	3 PHASE AC MOTOR		FUSE
	POWER CONTACTOR		
	CABLE GLAND		
	ELECTRONIC/DIGITAL OVERLOAD RELAY		
	INDICATING LAMP R = RED Y = YELLOW B = BLUE		

01	13.01.18	RDK	PDW	13.01.18	MSD	13.01.18	MSD	REVISED AS MARKED	1
00	30.10.17	RDK	BTK	30.10.17	MSD	30.10.17	MSD	FIRST ISSUED	
Rev.	Date	Name		Date	Name	Date	Name	Description	Acc. Code
		Drawn/Prepared			Checked		Approved		
Pro. Unit	TON			Group	Cat. Code	Acc. Code	Status	Date	Name
Con. Unit	Type of Document	Order No.		Scale	Sheet			Drawn	30.10.17
					1 / 1			Prepared	30.10.17
								Checked	30.10.17
								Approved	30.10.17

BAR-Code

Contract No.	66-6695
Document ID	ANNEXURE-I
Part	01
Rev.	01

Store Location: Server/Share
V:\AP_0_60.00_0_Electrical

Store Location: Folder
V:\AP_0_60.00_0_Electrical\AP_0_60.04_0_Specifications

Store Name
Annex-I_Elec Hoist.DWG

thyssenkrupp

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ANNEXURE-I
SINGLE LINE DIAGRAM