





Plant 1.0 MTPA ALUMINA REFINERY STREAM-5	Client NALCO	Contract Code NAL	Document ID 6695-ELT-G00-EC-0026	Contract No. 66-6695
	TECHNICAL SPECIFICATIONS – EOT CRANE			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
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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 **EOT CRANE** 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 manufacture, testing, inspection, dispatch, installation and commissioning for EOT Cranes.

2.1 LSTK Contractor's Battery Limit and Scope

LSTK Contractor shall provide power supply for EOT Crane at one point i.e. at down shop isolator (supplied by Vendor/LSTK Contractor) located at one meter above floor level. The vendor/LSTK Contractor shall make the necessary arrangement for tapping this power from the down shop isolator for Cranes. For power supply details refer design data sheet.

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

Installation of all the equipment supplied as per this specification, shall also be considered in Vendor's/LSTK Contractor's scope.

2.2 Equipment Suitability



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

The crane motors and control circuit components for the long, cross travel and hoist (main and creep) operations of the crane shall be suitable for reversing control. Electrical brakes provided for crane drives shall operate when the power to drive motor is off.

2.3 Motors

All crane motors shall be totally enclosed preferably squirrel cage induction motors with fan cooling arrangement. The motors shall conform to Crane duty class (S4) with cyclic duration factor specified in Part-II. In case of electric braking, the motor shall conform to Crane duty class S7.

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 cranes and 2.75 time for class 3 & 4 cranes. Motor shall be suitable for reversing, frequent acceleration and mechanical braking. If it is intended to retard or stop the motion of a crane by electric braking the motor shall be of suitable design to withstand this duty.

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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.

Motors supplied through Variable frequency drives (VFD) shall be designed suitable for such duty. The motor winding shall be vacuum pressure impregnated to withstand the traveling wave generated by the VFD. Output choke shall be provided to reduce the peak of the wave.

2.4 Control Panel, Switchgear Components and Control Requirements

Complete control system shall be designed as per IS:3177.

All control equipment for the Cranes 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 IP 54 as per IS:2147. Layout of the components inside the panels/ cabinets shall be spacious enough, so that the maintenance and repairs can be carried out by Owner 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 as specified in Part-II.

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

Minimum size of power cable conductor shall be 2.5mm² (Cu) and that of control cable shall be 1.5mm² (Cu).

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 is tinned copper lugs.

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



Incomer :

- Switch fuse unit with indicating lamp.

Individual Drive Control :

- Switch fuse unit for isolation of each motor.
- Forward and reverse power contactors.
- Electronic Overload Relay
- 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

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Part-3.


Complete Cranes Control System shall be designed as per the control described in IS-6547 and IS 5177.

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

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.

VFD shall be provided for speed variation (main speed / creep speed) for long run, cross run & hoist motor drive. Technical details shall be as per Annexure-1.

2.5 Control

Operation of the crane shall be either from cabin or pendant control and cordless  remote control as specified. Control supply shall be derived through an isolating transformer or isolating transformer and rectifier. One pole of this supply shall be earthed.

For Cranes operated from cabin, the control voltage shall not exceed 110V for AC supply. If control is from floor by means of a pendant switch, then the control voltage shall not be more than 110V AC.

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 control power supply in positive manner when the crane is not in use.

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



Contactors for motor feeders shall be suitable for AC-4 duty. All switches shall be suitable for crane motor duty types.

A pilot red lamp should be so connected that it indicates that the crane is ready for operations and it shall be so located that is visible to the operator.

A mushroom head push button emergency stop shall be so located as to be readily available for prompt use by the operation in case of emergency. A reset push button shall be provided if specified in Part-II.

Electrical equipment mounted on bridge platform shall be enclosed type in sheet steel enclosure with provision for easy access to the parts inside. The units shall not impede the maintenance of the long travel drives.

The pendant switch shall be capable of withstanding rough handling without being damaged and the cover shall be effectively secured. The mass of the pendant shall be supported independently by means of chain or wire rope without exerting any stress on electric cable.

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2.6 Pendant Push Button Station

Enclosure of the Push Button Station shall be of fiber glass reinforced plastic (FRP).

The control of the Cranes is by Push Button on the Pendant. Following push buttons, switches and indicating lamps shall be provided on pendant. :

- ON OFF key switch for controlling control supply.
- Indicating Lamp to indicate control supply ON indication.
- One set of push buttons for forward & reverse motion.
- One set of push buttons for Cranes lower/riser control.
- One set push button for creep motion.
- Two way selector switch for Cranes motion speed selection.

Height of the pendant above the operating floor shall be 700-1000 mm.

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 non-conducting material.

Pendant type control station shall be earthed separately, independent of the suspension and shall have two (2) earthing terminals.



The pendant switch shall be capable of withstanding rough handling without being damaged and the cover shall be effectively secured. The mass of the pendant shall be supported independently of electric cable by means of chain or wire rope.

2.7 Down Shop Isolator & Junction boxes

Down shop isolator (DSI) shall be TPN and heavy duty type, 2mm thick sheet steel enclosed adequately rated. The DSI shall be provided with R/Y/B indication lamp. DSI shall be located at one end of the shop in accessible position. Suitable terminals shall be provided for termination of LSTK Contractor's cable, as indicated in Part-II.

Junction box at Crane beam level shall be with enclosure made of 3.0mm thick CRCA sheet steel / SS304 duly painted with epoxy paint. It shall house four nos. adequately rated terminals.

Junction box for connection between flexible cables and non-flexible cables of long travel drive shall be provided suitably at one end of the Crane beam. This junction box shall have enough space and sufficient no. of terminal blocks with 10% spare capacity for connecting incoming and outgoing cables. The box shall be made of 3.0mm thick CRCA sheet steel / SS304, duly painted with epoxy paint.

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2.8 Isolating Switches & Isolators

For all cabin operated cranes the crane manufacturer shall fit main isolating switch in the cabin or adjacent to it. When the operator's cabin is fitted to the trolley and moves in relation to the main crane structure an additional isolating switch shall be provided.

For pendant controlled cranes, an isolator shall be fitted on the crane bridge to prevent inadvertent operation from the floor while maintenance work is being carried out on the crane.

Down - shop isolator shall be provided if specified in Part - II.

2.9 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 or 6mm² aluminium.

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 cranes 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 cranes equipped with half hour rated motors an uprating factor of 1.7 may be used. Where the cranes are equipped with intermittent duty rated motors the factor for uprating the cable will be equal to 8.75 / CDF where CDF is the cycle duration factor of the motor.

Power cable shall be of Aluminium / Copper multistrand conductor, PVC/XLPE insulated, extruded PVC inner sheathed, GI wire armoured with extruded PVC outer sheath.

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 sheets.

C.T Festooned Cable quantity shall be estimated by the vendor/LSTK Contractor as per the length of travel & supplied accordingly.

Conductor areas for main power circuits shall be selected taking in to consideration simultaneous operation of all motors for the duty service of crane, 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.

Flexible trailing cable shall be provided for long travel, which shall be arranged in the Festoon type.

Flexible power and control cables shall be 650 / 1100V grade, stranded copper conductor XLPE insulated, metallic braided overall PVC sheathed. Main flexible cable shall have at least two nos. of cores as spare.

Minimum cross sectional area of conductors of flexible control cables and power cables with copper conductor shall be 1.5 mm² and 2.5 mm² respectively.

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

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2.10 Cabling & Wiring

Cabling for various electrical items, like motors, lights, controls, etc. must be done by GI perforated cable trays inside the whole crane assembly.

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

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

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.

2.11 Braking

Effective means shall be provided for stopping the motion of the crane in both normal and emergency operation. The braking system shall be failsafe.

2.11.1 Electro-Hydraulic Brakes

Use of Electro-Hydraulic thruster operated brakes is permissible on all motions of electrically operated cranes of larger capacity (tonnes). Otherwise DC brakes or conical brakes shall be provided

2.11.2 Brake Magnets

The terminals of brake magnets shall be protected from accidental contact and the connections and windings shall be effectively protected from mechanical damage.

2.12 Limit Switches

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



2.13 Hand Lamp, Lights and Fans

If a hand lamp is provided it shall not be connected to a circuit exceeding 24V AC. The hand lamp shall be fed through a double wound isolating transformer with center point of the secondary winding earthed. The primary winding of the transformer shall be controlled by a double pole switch. Fuses shall be provided in each pole of the primary circuit and one pole of each of the secondary circuits.

The cabin and the panel room should be provided with adequate lighting. Under bridge lighting if specified in Part - II shall be mounted on shock absorber.

A fan shall be provided in the cabin of closed type. In the case of open type cabins, a fan shall be provided if specified in Part - II.

The crane shall be equipped with warning lights if specified in Part - II. Each warning light fitting shall contain two electric bulbs connected in parallel and shall be accessible.

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2.14 Earthing

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

2.15 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. Minimum thickness of paint shall be 60 microns. The bright exposed parts of the crane shall be given one coat of rust inhibitor. Interior of all gear boxes shall be painted with one coat of oil-resisting paint.

3.0 NAME PLATES

Nameplates must be provided for each and every electrical equipment (like Jbs, Dbs, contactors, pendant, push buttons, motors etc.) based on the vendor drawings, for easy identification during commissioning stage and later on during operation and maintenance.

Nameplates shall be made from PVC sheets, rear engraved, Perspex with white letters of size minimum 6mm on black background.

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

4.0 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 ten 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 in tkIS office, the release order for dispatch of material will be issued.

5.0 INSTALLATION, TESTING AND COMMISSIONING

Vendor/LSTK Contractor shall carry out installation of all equipment within their scope of supply. Vendor/LSTK Contractor's scope of work shall include all electrical work such as installation of shrouded busbars (if applicable), 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. Special



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tools and instruments as required for testing and commissioning of the system shall be arranged by the Vendor/LSTK Contractor.



6.0 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 Vendor List- Electrical								
	002	TON NO : *								
	003	Usage : *								
	004	Location : *								
	005	Motions required (meters / minute) :				Main		Creep		
		a) Long :				*		*		
		b) Cross :				*		*		
		c) Hoist :				*		*		
	006	Cell House Application : No (Not Applicable)								
CODES	007	01	IS/IEC 60034- Three phase induction motors							
	008		IS 807 - Design manufacturer, erection & testing of cranes and hoists							
	009		IS 3177 - EOT cranes & gantry cranes other than steel work cranes.							
	010		IS 4137 - EOT cranes including special service machines for use in steel works							
	011		IS 1554 - PVC insulated (heavy duty) electric cables.							
	012		IS 9968- Elastomer insulated cables							
	013		IS 8130 - Conductors for insulated electric cables & flexible cords.							
	015									
MOTORS	016		Rated Voltage : 415 V \pm 10 %							
	017		Rated Frequency : 50 Hz +3%, -5%							
	018		No. of phases : 3 phase							
	019		Insulation Class : F with temperature rise limited to B							
	020		Enclosure Type :							
	021		Enclosure Protection : IP56							
	022		Starting Current : 8.4 times full load current							
	023		Cyclic Duration Factor : 40							
	024		No. of starts per hour : 150							
	025									
MOTIONS REQUIRED	026		Description		LONG		CROSS		HOIST	
	027				Main	Creep	Main	Creep	Main	Creep
	028		KW rating		*	*	*	*	*	*
	029		Speed (RPM)		*	*	*	*	*	*
	030		Quantity (Nos.)		*	*	*	*	*	*
	031		Frame Size		*	*	*	*	*	*
	032		Type of Duty		*	*	*	*	*	*
	033									
BRAKES	034		Quantity		*	*	*	*	*	*
	035		Type (EHT / DC / Conical)		*	*	*	*	*	*
	036		Braking time		*	*	*	*	*	*
	037		Whether separate brake drums		*	*	*	*	*	*
			used without using coupling halves							
	038									

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LIMIT SWITCHES	039		Description		Quantity		
	040		Hoist (Main Limit Switch) - Rotary shunt type		*		
	041		Hoist (Back-up Limit Switch) - Conterweight operated		*		
	042		Cross Travel - Lever / proximity type		*		
	043		Long Travel - Lever / proximity type		*		
	044						
CONTROL PANEL	045		Control panel cabinet shall comprise ofthe following components :				
	046		Enclosure		: Industrial / Flameproof		*
	047		Degree of Protection		: IP 55		
	048		Control Transformers		:		
			a) Rating		: ____ kVA		*
			b) Voltage Ratio		: 415 /110 V		
			c) Type		: Dry type		
	049		Components		: As per SLD		
050							
PENDANT/CORDLESS CONTROL STATION	051	01	Pendant and Cordless 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. Cross Travel 'RIGHT'		Spring return Push Button		
			6. Cross Travel 'LEFT'		: Spring return Push Button		
			7. Hoist 'UP'		: Spring return Push Button		
			8. Hoist 'Down'		: Spring return Push Button		
			9. Long Travel speed selection (Normal / Creep)		: Two way Selection Switch		
			10. Cross Travel speed selection (Normal / Creep)		: Two way Selection Switch		
			11. Hoist motion speed selection (Normal / Creep)		: Two way Selection Switch		
			12. 'ON' indication		: Red Lamp		
			13. Horn for audio warning		: Spring return Push Button		
			14. Crane bridge lights		: ON / OFF Rotary Switch		
			15. Motor TRIP indication for each motor		: Amber lamp. LED type		
	052		Enclosure		: Industrial / Flameproof		*
	053		Dimensions		:		*
	054		Approximate Weight		:		*
	055						
	056						
DOWN SHOP ISOLATOR	057		Down Shop Isolator panel shall comprise of the following				
	058		Enclosure		: Sheet steel		
	059		Mounting		:		*
	060						
	061		Description		:		*
	062		Components		: Annexure-I		
	063						
	064						
JBs	065		Enclosure		: Sheet steel		
	066		Mounting		:		*
	067						

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MISC.	068	Hand Lamp	: Yes/No				
	069	Underbridge Lights	: Yes/No				
	070	Warning Lights	: Yes/No				
	071	Warning bell/horn	: Yes/No				
	072	Fan for open type cabin	: Yes/No				
	073	Switch socket outlet 3 pin, 240V, 15A	: Yes/No				
	074	Audio visual alarms	: Yes/No				
	075	Spares	: Yes				
MAKE OF COMPONENTS	076						
	077						
	078	L.T Motors	: As per Vendor List- Electrical				
	079	Power & Control Cables & Wires	: As per Vendor List- Electrical				
	080	Brakes	:				
	081	Limit Switches	: Siemens, BCH, Teknic				
	082	Control Transformers	: Indcoil				
	083	Control Panels	: Zenith, Areva, ABB				
	084	Junction Boxes	: Baliga, Flexpro, Hansu				
	085	Control & Selector Switch	: Kaycee, GE, Siemens, L&T				
	086	Push Buttons	: Siemens, L&T, Teknic, GE				
	087	Termination Lugs	: Dowells, Jainson				
	088	Termination Blocks	: Elmex, Connectwell, Wago & Controls				
	089	Panel Indicating Meters	: Automatic Electric, Meco, Imp				
	090	Timers	: GE, L&T, Siemens				
	091	HRC Fuses & Fittings	: Siemens, L&T, GE				
	092	AC Contactor	: Siemens, L&T, GE				
	093	Bi-Metal Electronic thermal Overload Relay	: Siemens, ABB, GE, Schneider				
	094	MCBs	: Siemens, ABB, GE, Schneider				
	095	Indication Lamps	: Siemens, L&T, GE, Teknic				
	096	CTs / PTs	: Automatic Electric, Translec, Indcoil				
	097	Cable Glands	: Baliga, Flexpro, Flp Eqpt Pvt Ltd				
098	Lighting Fixtures	: As per Vendor List- Electrical					
099	Hand Lamps	:					
100							
DOCUMENTATION		Description	Prints for Review / Approval		Final, As-Built documents		
	108	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				
	109	Power & Control Schemes					
	110	Wiring diagram of all panels					
	111	Interpanel wiring diagrams					
	112	Complete Bill of Material indicating make, type, quantity of					
	113	Electrical equipments.					
	114	Motor Data Sheets					
	115	Routine Test certificates for electrical items					
	116	Type test certificate for motors					
	117	Manufacturing schedule					
	118	Recommended spares for electrical equipments					
	119	Quality Assurance Plan & Inspection Test Procedure					
	120						
	121						
	122	Note :					
	123	1 For items marked '*' thus, data to be furnished / confirmed by LSTK Contractor during detail Engineering.					
	127	2 Motor frames shall be constructed of ferrous materials, and protected with a caustic resistant paint coating.					
	128	3 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.					
	129	4 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.					

 नालको NALCO नैसर्गिक एलुमिनियम कार्पोरेशन लिमिटेड National Aluminium Company Ltd.		EOT CRANE PART - III INSPECTION TEST PLAN			Code		NAL	
					Contract no.		66-6695	
					Doc.		6695-ELT-G00-EC-0026	
					Rev.		01	Page
01		Tests	Reference Documents	Sample size	Scope of Inspection			
					Vendor	Owner / Consultant / LSTK Contractor	Remark	
	001	Insulation tests	IS 3177	100%	P	W		
	002	Test for Operation	IS 3177	100%	P	W		
	003	Deflection test	IS 3177	100%	P	W		
	004	Overload Test	IS 3177	100%	P	W		
	005	Tests for Motors	Routine tests as per IS/IEC 60034	100%	P	R		
	006							
	007							
	008							
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	011							
	012							
	013							
	014							
	015	Note:						
	016	1) W = Witness, R = Review, P = Perform.						
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