





Plant 1.0 MTPA ALUMINA REFINERY STREAM-5	Client NALCO	Contract Code NAL	Document ID 6695-ELT-G00-EC-0033	Contract No. 66-6695
	TECHNICAL SPECIFICATION – BULK MATERIAL			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
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TKIS - India / Vendor	TKIS - India / Owner / Client
<div> Category Codes (Submission Purpose) </div> <div> <input type="checkbox"/> 1 For Approval <input type="checkbox"/> 2 For Review / Comments <input type="checkbox"/> 3 For Information <input type="checkbox"/> 4 For Engineering <input type="checkbox"/> 5 For Enquiry <input type="checkbox"/> 6 For Order Placement <input type="checkbox"/> 7 Final & Approved <input type="checkbox"/> 8 Released for Construction </div>	<div> Category Codes (Submission Purpose) </div> <div> <input type="checkbox"/> 1 For Approval <input type="checkbox"/> 2 For Review / Comments <input type="checkbox"/> 3 For Information <input checked="" type="checkbox"/> 4 For Engineering <input type="checkbox"/> 5 For Enquiry <input type="checkbox"/> 6 For Order Placement <input type="checkbox"/> 7 Final & Approved <input type="checkbox"/> 8 Released for Construction </div>
<div> Acceptance Codes (Approval Codes) </div> <div> <input type="checkbox"/> 1 Approved <input type="checkbox"/> 2 Approved for Manufacturing / Fabrication with Comments as marked <input type="checkbox"/> 3 Not Approved / Resubmit <input type="checkbox"/> 4 Retained for Information / Records <input type="checkbox"/> 5 Reviewed <input type="checkbox"/> 6 Reviewed as Noted / Resubmit </div>	<div> Acceptance Codes (Approval Codes) </div> <div> <input type="checkbox"/> 1 Approved <input type="checkbox"/> 2 Approved for Manufacturing / Fabrication with Comments as marked <input type="checkbox"/> 3 Not Approved / Resubmit <input type="checkbox"/> 4 Retained for Information / Records <input type="checkbox"/> 5 Reviewed <input type="checkbox"/> 6 Reviewed as Noted / Resubmit </div>
<p>Remarks for AC2 : This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-submitted after revision. This drawing should be revised only to the extent of TKIS - India / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.</p> <p>This approval / review does not absolve the supplier from the full responsibility for design and fabrication.</p> <p>Date : __/__/____ Name : _____</p>	<p>Date : __/__/____ Name : _____</p>

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Rev.	Status	Description	Date	Prepared	Date	Checked	Date	Approved	AC
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1.0 INTRODUCTION

This specification covers general requirements for design, manufacturing, inspection & testing at manufacturer's works and supply of **Flameproof Junction boxes, Industrial Junction boxes, Flameproof sockets and handlamps, Industrial sockets and handlamps** for indoor & outdoor installations.

Equipments to be supplied shall comply with latest revision of applicable Indian Standards (IS), IEC Standards and specific codes & standards mentioned in clause '*Codes and standards*' of Part-II of this specification. Equipment shall be complete with all necessary components and accessories required for efficient and trouble free operation.

The offered equipment shall be brand new with state of the art technology and proven track record. No prototype equipment shall be supplied.

Standard and descriptive requirement is covered in Part-I while specific requirement is covered in Part-II. Requirements for testing at manufacturer's works are covered in Part-III.

Wherever conflict arises between the various clauses of this specification or with the standards, it shall be clearly brought out to notice of Owner / Consultant. Final decision shall be subjected to owner /consultant approval.

2.0 COMMON CONSTRUCTION REQUIREMENTS FOR FLAMEPROOF EQUIPMENT (POWER OUTLET PANEL, JUNCTION BOXES, SOCKETS & HAND LAMPS)

The flameproof equipments shall be suitable for installation and satisfactory operation in classified hazardous locations. These items shall have valid test certificates by authorized testing agency and approval for use from concerned statutory authority.



The enclosures of the equipment shall be made of Die cast aluminium(LM6) and shall be free from frictional sparking hazard. The temperature rise of external surfaces shall be limited to 200°C, unless otherwise specified by a different temperature class in datasheet. The enclosures shall be sized to facilitate easy maintenance and heat dissipation.

Equipment shall preferably be provided with integral canopy. However, where the enclosure has been certified without integral canopy additional canopy shall be provided which shall be suitable for providing protection against rain from top and two sides. The enclosures shall be treated and prepared for painting with two coats of epoxy paint with final colour shade (Both internal and external) indicated in Part-II.

The gasket if provided shall be made of non inflammable and self extinguishing plastic material.

A warning inscription "Isolate power supply elsewhere before opening"shall be provided on each enclosure". The warning inscription shall be embossed on the enclosure or a separate warning plate with above inscription shall be fixed to the enclosure with screws. The warning plate shall be of stainless steel.

The equipments specified for wall mounting shall have external fixing lugs for mounting on wall or column. The holes provided on these lugs shall be of oblong type. The earthing terminals shall be clearly identified by the symbol " \perp " marked in legible and indelible manner on or adjacent to the terminal.

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A nameplate indicating TAG NO. shall be provided on each equipment. Name plates shall also be provided for each incoming and outgoing feeder . A Separate nameplate shall also be provided to indicate the details of hazardous area as mentioned in Part II. Name plates shall be made from PVC sheets, rear engraved, perspex with white letters of size minimum 3 mm on black background. Nameplates shall be fixed by screws and shall not be pasted. Incase the standard details given above are embossed on the enclosures, the same need not be repeated on the name plate.

3.0 INDUSTRIAL & FLAMEPROOF JUNCTION BOXES , SOCKETS & HAND LAMPS

The Industrial Junction boxes, sockets & hand lamps shall be as per Part-II of the specification.

3.1 Construction of Flameproof Junction Boxes, Sockets & hand lamps

All the non current carrying metallic parts of the equipment shall be inherently bonded together. The TPN sockets shall be provided with two earthing studs with lugs on the exterior of the enclosure suitable for termination of GI wire size same as that of associated motor rating. Internal earth terminals shall be provided in each enclosures for all single phase plugs and sockets for connecting the earth core of the cables.

The terminal block enclosures shall be adequately sized to properly terminate the cables by taking into account the required bending radii of cable cores.

The sockets shall be provided with 2 nos. cable entries at the bottom suitable for cable sizes specified and complete with 2 nos. flameproof double compression type nickel plated brass flameproof cable glands.

All terminals shall be non-sparking & anti loosening type such that they do not produce spark or arc during normal operation.

3.2 Component Specification

Socket Outlets

The sockets shall be provided with a switch and a mechanical interlock so as to break the electrical circuit before the plug is completely withdrawn and make the circuit after the plug is fully inserted.

Sockets shall be provided with ELCB.



In order to prevent accidental removal of plug from socket, the engagement and disengagement shall be by two separate and distinct movement and positions.

Unless otherwise specified 415V, 63A, three phase flameproof plug and socket meant for welding receptacle / any other three phase auxiliary loads shall be provided with 5 pins (3P + N + E).

Unless otherwise specified all MCBs and ELCBs shall be with 9 kA (M9 category) interrupting capacity.

24V and 240V,20 A single phase industrial/flameproof plug and socket shall be provided with 3 pins (P+N+E).

Provision shall be made so that it shall not be possible to insert 24V plug on to a 240V socket.

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It shall also not be possible to insert plug socket suitable for gas group IIA/IIB in socket suitable for gas group IIC.

The sockets shall be provided with either a spring loaded hinged cover, or with a cap connected through metallic chain, to close the same when not in service.

24V sockets shall be provided with built in 240 V / 24 V transformer. The transformer shall be designed for 100VA rating on continuous basis. HRC fuses shall be provided on primary and secondary side of the transformer. The transformer shall have an earthed screen between primary and secondary winding.

Socket outlets shall be provided with 2 nos. of cable entries with suitable application as hazardous or non-hazardous.

24 Volt Hand Lamps

The lamp holder of the hand lamp shall be suitable for 60W, 24V, 50 Hz lamp with ES cap.

Hand lamps shall be earthed through flexible cords.

CRCA sheet steel hand lamp shall be corrosion resistant.

Suitable handle for carrying hand lamp and a stand type guard suspension hook shall be provided.

The well glass provided shall be clear, suitable for use under conditions involving exceptional risk of mechanical damage. Mechanical strength of well glass shall satisfy requirement of IS:2206 for type A glass.

Hand lamp shall be provided with a wire protective cage having mesh dimension not exceeding 50x70 mm. The material of the cage shall be either galvanised steel.

Each hand lamp shall be supplied complete with 20 mtrs. Length of 3x1.5 mm² copper conductor, PVC insulated, metal braided flexible cable duly terminated in the hand lamp while the loose end shall be used for termination in 24V plug.

24 Volt Plug & 240V plug



Scraping earth connection shall be provided between the plug and socket. Earth pin of plug shall first engage with earth pin of switch socket.

The plug assembly shall be mechanically rugged, light and shall not unduly stress the socket or its own pins when fitted on to the socket. The diameter of the earth pin of the plug and socket shall be atleast 1.1 times the diameter of the phase pins. IIC type 24V socket shall not be insertable in IIA / IIB type 24V socket or any 240V socket in case of hazardous application.

4.0 MISCELLANEOUS BULK MATERIAL

Following miscellaneous bulk items shall be supplied as specified in Part-II :

- Emergency stop push button (for transformer)
- Exhaust fans
- Split / Window type AC units & conduits
- Earthing material & Anchor fastener
- Canopy
- Insulation coat paint
- HV discharge rod
- Tool cabinet & Key cabinet
- Insulated step ladder
- Lightning protection

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5.0 INSPECTION & DESPATCH

Inspection and testing shall be carried out based on latest revision of this specification and approved manufacturer drawings certified for construction. In case of any ambiguity between manufacturer drawing and order specification, the requirement indicated in technical specifications shall govern.

LSTK Contractor /Owner/ Consultant representative shall have right to carry out stage inspection and shop visit to review the manufacturing progress. However, manufacturer need not hold any of the manufacturing activity for stage inspection.

All routine and type tests as specified in Part-III shall be carried out during final inspection at manufacturer's works in the presence of LSTK Contractor /Owner/ Consultant representative. Minimum 15 days advance notice shall be given for carrying out final inspection and testing.

LSTK Contractor/Vendor shall ensure that all instruments associated with testing of the equipment are calibrated by a competent testing authority and the calibration certificates are valid at the time of carrying out the testing of equipment.

After successful completion of inspection and testing, Vendor/LSTK Contractor shall furnish all as-built documents in required number of sets. Final documents shall be furnished before dispatch of material.

All equipments shall be subjected to various acceptance tests as per standards but not limited to the following :

- General visual inspection
- Dimensional inspection
- Verification of mechanical & electrical operations
- Dielectric tests
- Routine pressure test as per IEC 60079-1 (for Flp plugs & sockets)
- Any other routine and acceptance tests as per applicable stds.

LSTK Contractor shall furnish certificates for all Flameproof (Ex type) equipment as required but not limited to following:



- Certificate from approved testing authority like CMRI/ CPRI/ BASEEFA/ PTB/ UL/ FM/ LCIE for installation in hazardous area.
- Approval from statutory authority like PESO/CCOE for use in hazardous area.
- Certificate for test for degree of protection for enclosure.

6.0 PERFORMANCE GUARANTEE


The performance figures which will be indicated by Vendor/LSTK Contractor in Part-II are guaranteed subject to the tolerance permitted by standards.



If any equipment supplied by Vendor fails at site during erection, testing, commissioning or service (within guarantee period), the vendor 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 LSTK Contractor/Owner.



However, the vendor will be given an opportunity to rectify his equipment at his own cost. Also Owner reserves the right to use rejected equipment till it is rectified.

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INDUSTRIAL JUNCTION BOX (POWER & LIGHTING)		Make : As per Vendor List- Electrical	
		System voltage & voltage variation : ____ V +/- 10%	*
		System frequency : 50Hz +/- 5%	
		Power System : 3 Phase, 4 wires TPN / 1ph, 3 wire SPN	*
		Material: CRCA sheet steel	
		Min. size: 120mm x 120mm, with undrilled gland plate	
		Type: Industrial, weatherproof	
		Location: Outdoor/Indoor	*
		Cable entry: Bottom	
		Cable size:	*
		Gland type: double compression nickel plated brass	
		Sealing plug: 1 no. nickel plated brass plug per JB	
		Enclosure Protection: IP 55 (minimum)	
		Canopy:	*
		Material of canopy: 2.5 mm thick GI	
		Gasket: Rubber / Neoprene	
		Paint Shade: IS 632	
		Hardware: SS304 (nut, bolt, washer etc.)	
		Accessories: 2 nos. earthing terminals (1no. internal and 1no. external) with necessary hardware industrial type cable entry blanking plug for unused cable entry	
		Appropriate termination arrangement as per the incoming and outgoing cables to be terminated shall be provided	
	No of ways: 4 ways / 3 ways	*	
FLAMEPROOF JUNCTION BOXES (POWER & LIGHTING)		Make : As per Vendor List- Electrical	
		System voltage & voltage variation : ____ V +/- 10%	*
		System frequency : 50Hz +/- 5%	
		Power System : 3 Phase, 4 wires TPN / 1ph, 3 wire SPN	
		Material: Die cast aluminium (LM6)	
		Min. size: ____ mm x ____ mm, with undrilled gland plate (for Power)	*
		____ mm x ____ mm, with undrilled gland plate (for Lighting)	*
		Type: Flameproof	
		Location: Outdoor/Indoor	*
		Hazardous Area Classification	
		Zone :	*
		Gas Group :	*
		Enclosure Protection: IP 55 (minimum)	
		Temp Class : T3 (minimum)	
		Ex protection for flp : Ex 'd'	
		Cable entry: Bottom	
		Cable size:	*
		Gland type: double compression nickel plated brass	
		Sealing plug: 1 no. nickel plated brass plug per JB	
		Canopy:	*
		Material of canopy: 2.5 mm thick GI	
		Gasket: Rubber / Neoprene	
		Paint Shade: IS 632	
		Hardware: SS304	
		Accessories: 2 nos. earthing terminals (1no. internal and 1no. external) with necessary hardware flameproof type cable entry blanking plug for unused cable entry	
		Appropriate termination arrangement as per the incoming and outgoing cables to be terminated shall be provided	
		Nameplate for flameproof JB shall include : Testing agency details, test certificate no. with date, statutory approval no. with date and agency, BIS license no & date, applicable gas group etc.	
		No of ways : 4 (for lighting JB's)	
	3 (for power JB's)		
	Notes		
	1) For items marked " * " thus, data to be furnished / confirmed by LSTK Contractor.		

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				Contract no.		66-6695	
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SOCKET OUTLET	Power Socket Outlets (Industrial)						
	Make: As per Vendor List- Electrical *						
	Quantity : *						
	Type: Industrial, weatherproof, IP55, with integral canopy						
	Location: Outdoor/Indoor *						
	System voltage: 415V						
	Power system: 3 phase						
	Material of construction: CRCA sheet steel						
	Equipment : 3ph, 5pin, TPNE 63A socket with rotary switch						
	Internal wiring : Suitable for ___ / ___ sq.mm conductor with loop in and loop out terminals *						
	Cable entry : Suitable for _____sq.mm cable *						
	Interlock : Switch interlocked with plug top such that plug cannot be inserted or removed when the switch is in ON position.						
	Accessories: 63A 5 pin plug,						
	switch-fuse interlocked with plug top,						
	2 nos. external earthing terminals with necessary hardware						
	cap with chain for socket						
	industrial type cable entry blanking plug for one no. cable entry,						
	ELCB						
	Power Socket Outlets (Flameproof)						
	Make: As per Vendor List- Electrical *						
	Quantity : *						
	Location: Outdoor/Indoor *						
	Type : Flameproof suitable for hazardous area classification						
	System voltage: 415V						
	System frequency : 50 Hz						
	Hazardous Area classification : Zone : * Temp class : T3 (minimum)						
	Gas Group : * Ex protection type : Ex 'd'						
	Material of construction: CRCA sheet steel						
	Equipment : 3ph, 5pin, TPNE 63A socket with rotary switch						
	Internal wiring: Suitable for ___ sq.mm conductor with loop in and loop out terminals *						
	Cable entry: Suitable for _____sq.mm cable *						
	Interlock : Switch interlocked with plug top such that plug cannot be inserted or removed when the switch is in ON position.						
	Accessories: 63A 5 pin plug,						
switch-fuse interlocked with plug top,							
2 nos. external earthing terminals with necessary hardware							
cap with chain for socket							
Flameproof type cable entry blanking plug for one no. cable entry,							
ELCB							
Notes							
1) For items marked " * " thus, data to be furnished / confirmed by LSTK Contractor.							

 	BULK MATERIAL PART - II (E2) DESIGN DATA SHEET : SOCKET OUTLETS (IND / FLP)	Code	NAL		
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SOCKET OUTLET	1 phase Socket Outlets (Industrial)				
	Make: As per Vendor List- Electrical				*
	Type: Industrial, weatherproof, IP55, with integral canopy				
	Quantity :				
	Location: Outdoor/Indoor				*
	System voltage: 415V				
	Power system: 1 phase				
	Material of construction: CRCA sheet steel				
	Equipment : 1ph, 3pin(phase, neutral & ground), 20A socket with DPMCB / rotary switch				
	Internal wiring: Suitable for ____ sq.mm conductor with loop in and loop out terminals				*
	Cable entry: Suitable for _____ cable				*
	Accessories: 20A 3 pin plug,				
	2 nos. external earthing terminals with necessary hardware				
	cap with chain for socket				
	industrial type cable entry blanking plug for one no. cable entry,				
	ELCB				
	1 phase Socket Outlets (Flameproof)				
	Make: As per Vendor List- Electrical				
	Quantity :				*
	Type : Flameproof suitable for hazardous area classification				
	Location: Outdoor/Indoor				*
	System voltage: 240V				
	Power system: 1 phase (SPN)				
	Hazardous Area classification : Zone :		*	Temp class : T3 (minimum)	
	Gas Group :		*	Ex protection type : Ex 'd'	
	Material of construction: Die cast aluminium (LM6)				
	Equipment : 1ph, 3pin,(phase, neutral & ground) 20A socket with DPMCB / rotary switch				
	Internal wiring: Suitable for ____ sq.mm conductor with loop in and loop out terminals				*
	Cable entry: Suitable for _____ Cu cable				*
	Accessories: 20A 3 pin plug,				
	2 nos. external earthing terminals with necessary hardware				
	cap with chain for socket				
	Flameproof type cable entry blanking plug for one no. cable entry,				
	ELCB				
	1 phase Socket Outlets (Flameproof)				
	Make: As per Vendor List- Electrical				
	Quantity :				*
	Type : Flameproof				
	Location: Outdoor/Indoor				*
	System voltage: 240V				
	Power system: 1 phase (SPN)				
	Hazardous Area classification : Zone :		*	Temp class : T3 (minimum)	
	Gas Group :		*	Ex protection for Flp : Ex 'd'	
	Material of construction: CRCA sheet steel				
	Equipment : 5A socket with switch, with built in transformer 100VA				
	Internal wiring: Suitable for ____ sq.mm conductor with loop in and loop out terminals				*
	Cable entry: Suitable for _____ cable				*
	Accessories: 5A 3 pin plug,				
	2 nos. external earthing terminals with necessary hardware, cap with chain for socket				
	Flameproof type cable entry blanking plug for one no. cable entry,				
	ELCB				
	Notes				
	1) For items marked " * " thus, data to be furnished / confirmed by LSTK Contractor.				

		BULK MATERIAL PART - II (E3) DESIGN DATA SHEET : MISCELLANEOUS ITEMS		Code	NAL	
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EMERG. STOP PUSH BUTTON		Make :	*	Paint Shade: 631 of IS-5		
		Type : Stop-Red, Mushroom head latched type,		INTERNAL WIRING:		
		turn to release with locking facility	*	Voltage grade: 650V		
		Material: Stain steel (SS-304)		Conductor & Size: Electrolytic grade stranded copper, min. 2.5 mm ²		
		Type: Industrial Weatherproof/ Flameproof (Ex-d)	*	Cable Entry: Bottom, Termination: With tinned copper lugs		
		Enclosure Protection: IP-55 (minimum)		INDICATING LAMPS:		
		Contacts: 2 NO + 2 NC		Indicating lamps required: Yes / No *		
		Canopy: Same as enclosure	*	Make: *		
		Gasket: Rubber/ Neoprene		Type & Wattage: Clustered LED, _____ W *		
EXHAUST FAN		Exhaust Fans (Industrial)		Exhaust Fans (Flameproof)		
		Make:	*	Make: *		
		Rating: 240 V, 50 Hz, 1 Ph		Rating: 240 V, 50 Hz, 1 Ph		
		Size / Sweep:	*	Size / Sweep: *		
		Enclosure: Industrial, Weatherproof, Sheet steel		Enclosure: Flameproof, Ex-d, IIC, T3(minimum), Die-cast aluminium LM6 enclosure		
		Ingress Protection: IP55 (minimum)		Ingress Protection: IP55 (minimum)		
		Mounting: on Wall Cutout		Mounting: on Wall Cutout		
		Cable / Gland Entry: Side, 2 Nos		Cable / Gland Entry: Side, 2 Nos		
		Painting: As per Manufacturer's standard		Painting: As per Manufacturer's standard		
		Final Paint Shade: RAL7032		Final Paint Shade: RAL7032		
		Earthing: 1 No. internal and 1 No. external earthing terminals with suitable fixing hardwares		Earthing: 1 No. internal and 1 No. external earthing terminals with suitable fixing hardwares		
		Accessories: Wire mesh, Bird screen, Brackets suitable for wall cut-out mounting, Internally pre-wired with all required accessories, Terminals of suitable type & size for internal wiring & external cable connections		Accessories: Wire mesh, Bird screen, Brackets suitable for wall cut-out mounting, Internally pre-wired with all required accessories, Terminals of suitable type & size for internal wiring & external cable connections		
SPLIT/ WINDOW TYPE AC UNITS & CONDUITS		Split / Window type AC units		Conduits and Accessories		
		Make:	*	Make: *		
		Rating: 240 V, 50 Hz, 1 Ph/ 415V, 3Ph	*	Material (Type): GI (Medium Duty) / PVC (Heavy Duty, Grey Color)		
		Type: Split/ Window	*			
		Specification: Air Conditioner with voltage stabilizer with Auto / Cool / Fan / Dry / sleep and power saving modes, automated vertical swing for horizontal louvers, antifreeze thermostat, activated carbon cartridge, dust proof and anti-bacteria filter, powder coated/high quality paint finish with associated tubing as required		Accessories: All required accessories such as joints, bends, tees, reducers / adaptors, etc., including edge protection grommets		
EARTHING MATERIAL & ANCHOR FASTNER		Material - G.I.Strip		Anchor Fasteners:		
		Earth Bus - Cu		Make: *		
		Main EarthGrid Size : mm x mm	*	Specification: Post Installed, HST type, HILTI Make or equivalent		
		Tank or equipment Earthing , size : mm x mm	*			
		Cable Type: GI wire rope				
CANOPY		Canopies for Equipment				
		Make: *				
		Material: GI/ FRP *				
		Thickness: GI - 2mm / FRP - 3mm				
		Construction: Canopies with louvers backed up with wire mesh and MS supporting members as required, dimensions exactly suitable for the equipment to be protected, designed so as natural cooling of the equipment is not affected, along with associated SS304 hardware (nut, bolts and washers) for installation of canopy MS supporting members to be applied with epoxy based primer and 2 coats of epoxy based paint of required shade				
		Remark: Outdoor equipment such as motors, socket outlets, etc., shall be provided with canopies. Fabrication shall be done after checking motor and foundation dimension at site. The contractor shall obtain the approval of owner for one sample canopy before fabricating all canopies. Suitable fixing arrangement shall be provided with nut bolts.				

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SYNTHETIC INSULATING MAT & HV		Insulation Coat Paint			HV Discharge Rod			
		Make: *			Make: *			
		Voltage Grade: *			Specification: Single pole HV discharge rod of fibreglass material (for soft damp discharge of cables and / or equipment under test), of appropriate voltage grade, designed for rated clearance against physical contact with high voltage equipment, with extra-flexible multi-strand copper cable for connection to station earth, and heavy duty brass clamp for easy earth connection			
		Applicable standard: applicable IS standard						
		Width: 1000mm (minimum)						
		Color: RAL 7032 (To be matched with respective switchgear panel)						
		Length: To cover entire length of switchboard.(Front & Back)						
TOOL CABINET & KEY CABINET		Tool Cabinet			Key Cabinet			
		Make: *			Make: *			
		Specification: Wall Mounted, sheet steel enclosure, key lockable, Tool Cabinet with appropriate arrangement (e.g. hooks for hanging, etc.) for storage of operating tools such as racking handles, spring charging handles, fuse pullers, etc. for all switchgear panels in the substation			Specification: Wall Mounted, sheet steel enclosure, key lockable, Key Cabinet with appropriate arrangement for storage of 'lock-out / tag-out' locks & keys for all feeders of all switchgear panels in the substation. Equipped with adequate number of accessories such as key tags, visible index for keys, etc.			
INSULATED STEP LADDER		Insulated Step Ladder			Caution Boards			
		Make: Refer Vendor List			Material: Mild steel, at least 1.6 mm thick and vitreous enamelled white, Letters, figures, conventional skull and cross-bones shall be in signal red colour (as per IS : 5-1978) on the front side.			
		Specification: Portable, with lockable wheels, insulated step ladder of fibreglass plastic material, heavy duty, industrial type, min. 4 nos. industrial alloy steps, heavy-duty glassfibre side stiles and box-section glassfibre rear legs			The rear side of the plate shall also be enamelled.			
					The caution board shall be written in Hindi, local language and English			
LIGHTNING PROTECTION		lightning Protection						
		Make: Refer Vendor List						
		Applicable Standards: IEC 62305						
		Specification: Conventional type lightning protection system (inclusive of lightning rods, lightning down conductors with insulating supports, supporting arrangement etc.) conforming to applicable standards						
		Notes: 1) Lightning protection system shall be provided for Special buildings / structures in the project.						
		2) Detailed engineering for the lightning protection system shall be done by LSTK Contractor.						
		3) PU Vendor shall obtain the proposal for lightning protection system from MANUFACTURER, which shall include following :						
		- Calculation for risk analysis						
		- Calculation for proposed lightning protection system						
		- Layout drawing for proposed lightning protection system						
		- Estimated Bill of Material for proposed lightning protection system						
		- Delivery schedule						
		4) Material shall be supplied as per relevant documents from MANUFACTURER, duly approved by TKIS-I						
			Notes:					
		1. Documents to be submitted for Misc items by Vendor are as follows:						
		a. GA Drawings						
		b. Manufacturer's catalogue						
		c. Test certificated as applicable						
	d. Technical data sheet as applicable							

 नालको NALCO निराल एलुमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.		BULK MATERIAL SPECIFICATION PART - III INSPECTION TEST PLAN (JUNCTION BOXES, SOCKET OUTLETS & HAND LAMPS)			Code	INDMAX		
					Contract no.	66-6695		
					Doc.	6695-ELT-G00-EC-0033		
					Rev.	0	Page	1 OF 1
 thyssenkrupp		Tests	Reference Documents	Sample size	Scope of Inspection			
					Manufacturer / LSTK Contractor	Owner / Third Party	Remarks	
	A	Type Tests						
	i	Ingress Protection	IS/IEC- 60529	Each type	P _{PROTO}	R		
	ii	Test for Flameproofness	IS/IEC 60079-1	Each type	P _{PROTO}	R		
	iii	Test for Temperature rise	IS/IEC 60079-0	Each type	P _{PROTO}	R		
	B	Routine Tests						
	i	Visual & Dimensional check	GA drawings	100%	P	R		
	ii	Insulation Resistance Test	IS/IEC-60947		P	R		
	iii	Dielectric test (2 KV for 1 min.)	IS/IEC-60947		P	R		
	iv	Bill of material / Make of component Check	Approved vendor dwgs./ datasheets		P	W		
	v	Operation checks for all control functions and safety interlocks	Schematics		P	W		
	vi	Checking protection circuit & electrical continuity of protection circuit	Schematics		P	W		
	vii	Verification of Constructional requirements	IS 8623, IS/IEC 60947		P	W		
	viii	Clearances & creepage distances	-do-		P	W		
	ix	Functional tests	-do-		P	W		
	x	High Voltage Test (Dielectric test)	-do-		P	W		
	xi	Insulation resistance of Main, auxiliary & control circuits before & after HV test.	IS/IEC-60947		P	W		
	C	Acceptance Tests						
	i	Visual inspection and dimensional check-up	Approved GA drawings	5 nos. of each type in each lot	P	W		
	ii	Static Hydraulic Test	IS-2206		P	W		
	iii	Impact test	IS/IEC 60079-1		P	W		
	iv	Thermal shock test	IS/IEC 60079-0		P	W		
	v	Durability test	-		P	W		
	vi	Insulation resistance test	IS/IEC-60947		P	W		
	vii	Dielectric test (2kV for 1 min.)	IS/IEC-60947		P	W		
viii	Electrical operation test	-	P		W			
	Notes:							
	1) W = Witness, R = Review, P = Perform (on project equipment), P _{PROTO} = Perform (on prototype).							