

Plant 1.0 MTPA ALUMINA REFINERY STREAM-5	Client NALCO	Contract Code NAL	Document ID 6695-ELT-G00-EC-0020	Contract No. 66-6695
	TECHNICAL SPECIFICATIONS – MISC. LOW VOLTAGE SWITCHGEAR PANELS (UP TO 650V)			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
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<p>tkIS India / Vendor</p> <p>Category Codes (Submission Purpose)</p> <table style="width: 100%;"> <tr><td><input type="checkbox"/></td><td>1</td><td>For Approval</td></tr> <tr><td><input type="checkbox"/></td><td>2</td><td>For Review / Comments</td></tr> <tr><td><input type="checkbox"/></td><td>3</td><td>For Information</td></tr> <tr><td><input type="checkbox"/></td><td>4</td><td>For Engineering</td></tr> <tr><td><input type="checkbox"/></td><td>5</td><td>For Enquiry</td></tr> <tr><td><input type="checkbox"/></td><td>6</td><td>For Order Placement</td></tr> <tr><td><input type="checkbox"/></td><td>7</td><td>Final & Approved</td></tr> <tr><td><input type="checkbox"/></td><td>8</td><td>Released for Construction</td></tr> </table> <hr/> <p>Acceptance Codes (Approval Codes)</p> <table style="width: 100%;"> <tr><td><input type="checkbox"/></td><td>1</td><td>Approved</td></tr> <tr><td><input type="checkbox"/></td><td>2</td><td>Approved for Manufacturing / Fabrication with Comments as marked</td></tr> <tr><td><input type="checkbox"/></td><td>3</td><td>Not Approved / Resubmit</td></tr> <tr><td><input type="checkbox"/></td><td>4</td><td>Retained for Information / Records</td></tr> <tr><td><input type="checkbox"/></td><td>5</td><td>Reviewed</td></tr> <tr><td><input type="checkbox"/></td><td>6</td><td>Reviewed as Noted / Resubmit</td></tr> </table> <p>Remarks for AC2 : This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-sbmitted 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>	<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	<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	<p>tkIS India / Owner / Client</p> <p>Category Codes (Submission Purpose)</p> <table style="width: 100%;"> <tr><td><input type="checkbox"/></td><td>1</td><td>For Approval</td></tr> <tr><td><input type="checkbox"/></td><td>2</td><td>For Review / Comments</td></tr> <tr><td><input type="checkbox"/></td><td>3</td><td>For Information</td></tr> <tr><td><input checked="" type="checkbox"/></td><td>4</td><td>For Engineering</td></tr> <tr><td><input type="checkbox"/></td><td>5</td><td>For Enquiry</td></tr> <tr><td><input type="checkbox"/></td><td>6</td><td>For Order Placement</td></tr> <tr><td><input type="checkbox"/></td><td>7</td><td>Final & Approved</td></tr> <tr><td><input type="checkbox"/></td><td>8</td><td>Released for Construction</td></tr> </table> <hr/> <p>Acceptance Codes (Approval Codes)</p> <table style="width: 100%;"> <tr><td><input type="checkbox"/></td><td>1</td><td>Approved</td></tr> <tr><td><input type="checkbox"/></td><td>2</td><td>Approved for Manufacturing / Fabrication with Comments as marked</td></tr> <tr><td><input type="checkbox"/></td><td>3</td><td>Not Approved / Resubmit</td></tr> <tr><td><input type="checkbox"/></td><td>4</td><td>Retained for Information / Records</td></tr> <tr><td><input type="checkbox"/></td><td>5</td><td>Reviewed</td></tr> <tr><td><input type="checkbox"/></td><td>6</td><td>Reviewed as Noted / Resubmit</td></tr> </table> <p>Date : ___/___/___ Name : _____</p>	<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	<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
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Rev.	Status	Description	Date	Prepared	Date	Checked	Date	Approved	AC
Based on: PIN-LES-ELT-1051, Rev.0, 12-2015				Barcode					Category Code: -04
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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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Part	Docu Size	Description	No. Of Pages	Rev. No.	Revised Clauses
	A4	Index sheet and status of revision	2	0	-
Part-I	A4	General specifications	6	0	-
Part-IIA	A4	Design Data Sheet (General)	2	0	-
Part-IIB	A4	Design Data Sheet (Specific Boardwise)	2	0	
Part-III	A4	Inspection Test Plan	1	0	-

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1.0 INTRODUCTION

This specification covers the design, manufacturing, inspection and testing of miscellaneous Low Voltage switchgear panels (up to 650V) such as Main Lighting Distribution Board (MLDB), Auxiliary Power Distribution Board (APDB), UPS AC Power Distribution Board (ACDB), Sub Lighting Distribution Board (SLDB), Power Distribution Board (PDB) etc.. Equipment to be supplied shall comply with latest revision of applicable Indian Standards (IS) and specific codes and standards mentioned in clause 'Codes and standards' of Part-II of this specification.

Scope of supply and services covered under this specification shall be as per various parts of this specification. Standard and descriptive requirement is covered in Part-I while specific requirement is covered in Part-II. Requirements for testing at vendor's work are covered in Part-III.

2.0 GENERAL REQUIREMENTS

2.1 Construction

- a. MLDB/ ACDB/ APDBs shall be metal clad, compartmentalized, floor mounted, self supporting type, totally enclosed CRCA sheet steel cubicles. SLDBs and PDBs shall be wall mounted type fabricated from CRCA sheet steel or FRP suitable for indoor/outdoor installation as specified under Part-II. All distribution boards shall be fixed type.
- b. Each cubicle shall be provided with front access hinged door of adequate strength. Rear compartment door/cover shall be provided with bolting facility. Hinged doors shall have the swing restricted to 90°, when viewed from the front, by means of suitable stoppers.
- c. Compartment door shall be interlocked mechanically with the switch such that the door cannot be opened unless the switch is in OFF position, also means shall be provided for defeating the interlock. Padlocking facility shall also be provided.
- d. Sheet steel partition shall be provided between compartments such that failure of any equipment does not affect the equipment in adjacent compartment.
- e. The design and construction of MLDB/ EMLDB/ ACDB/ APDB shall be such as to allow extension at either end.
- f. Relays, meters and control switches shall be located at height which shall be convenient for monitoring. The operating height from the floor shall not exceed 1800 mm. Switches and lamps shall be flush/semi flush mounted on the front door of the cubicle.
- g. The Distribution Boards shall be made vermin proof and dust proof.
- h. Each panel shall have independent cable alley for each vertical section of cubicles. Vertical busbar chamber can be made common for two adjacent vertical sections of cubicles if vertical busbars are rated accordingly.
- i. Each panel shall be provided with 240V, single phase thermostat controlled panel space heater.
- j. Panels/ SLDBs/ PDBs to be located in hazardous area shall be as per area classification requirement specified in Part-II. These Panels shall have valid test

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certificates by authorized testing agency and approval for use from concerned statutory authority

2.2 Busbars and Bus Taps

- a. Busbars shall be of uniform cross-section throughout the length, rated for continuous and short time currents as specified in Part-II. Busbar material shall be as indicated in Part-II. Size of the busbar tapping to individual vertical section shall be same for entire switchboard.

Busbars and bus taps shall be adequately insulated for working voltages & provided with PVC sleeves. Busbars shall be colour coded. Wherever joints between dissimilar materials are envisaged, silver paste or bi-metallic strips shall be provided on the surface.

All busbars and busbar joints shall be easily accessible for periodic inspection without requirement of dismantling any components like CTs etc. SMC/DMC/FRP or cast resin two part box clamp type shrouds shall be provided for bus joints. Busbars shall be covered with insulating barrier to prevent accidental contact.

- b. Bus support insulator shall be non-hygroscopic type epoxy/SMC/DMC with adequate creepage distance.
- c. Busbars shall not be painted. All performance characteristics specified shall be obtained with unpainted busbars with PVC sleeves and bus joints covered with cast resin or SMC/DMC shrouds.
- d. Neutral bus shall be minimum half the size of phase bus.

2.3 Earth Bus

- a. A separate copper Earth Bus rated to carry maximum fault current for the specified time shall be provided along the full length of each board.
- b. Hinged doors shall be earthed through flexible earthing braids. All non-current carrying metal parts shall be effectively bonded to the earth bus.
- c. Earthing terminals each complete with washers, nuts etc. shall be provided at either end of earth bus for connection to Owner/LSTK Contractor's earth conductor.

2.4 Switchgear Components

Make of Switchgear Components shall be as specified in Part-II. Technical particulars of switchgear component shall be as per various parts of this specification.

2.4.1 **Current Transformer & Potential Transformer**

- a. The current & potential transformer shall be epoxy resin cast type. All current transformers shall be provided with shorting terminals and links.
- b. Accuracy class, ratio shall be as required. VA burden of current and Potential Transformer shall suit the connected load with minimum 20% margin in case the VA burden is not specified.
- c. CTs shall have polarity indelibly marked on each transformer and at the associated ferrules on terminal block.

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- d. Earthing of CT secondary shall be done through separate earth link on terminal block.
- e. Bar primary type current transformer shall be capable of safely withstanding the mechanical short circuit stresses corresponding to the fault level as indicated.

2.4.2 Meters

- a. Accuracy class, mounting, type, size and scale of the meters shall be as per Part-II / SLD.
- b. Instrument dials shall be parallax free, with black numerals on white dial.
- c. Current coils of all panel mounted meters shall be suitable to operate on 1A CT secondary.
- d. Pressure coils of meters shall be rated to operate on 110V/230V AC.

2.4.3 Secondary Wiring

- a. Control wiring shall be carried out with flexible heat resistant switchboard wires of minimum size 1.5 mm² for control circuits and 2.5 mm² for CT circuits. Wires connected to earth shall be of green color only. Potential tappings from busbar for PT, Voltmeter, etc. shall be taken by HRPVC wires only.
- b. Each 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.
- c. All wire terminations except for Elmex or equivalent type terminal blocks shall be made with ring / fork tongue compression type connectors. Wires shall not be tapped in between terminal points. Type of lug shall suit relevant application.

The wiring inside the panel shall be properly laid and fixed in wiring ducts with removable covers. The wiring ducts shall be properly insulated and shielded from high voltage areas. Wires shall be accessible from the front without removing the component mounting plate. Routing of wires behind the component mounting plate is not acceptable.

- d. Openings provided in sheet steel partitions for carrying out the inter-panel wiring shall be provided with rubber grommets.
- e. All spare contacts of relays, switches and other components shall be wired up to terminal blocks. Wiring of spare modules shall be complete in all respects and ready for external connection.

Wiring between fixed portion of cubicle and door mounted equipment shall be routed through flexible PVC conduits.

2.4.4 Terminal Block

- a. Terminal blocks of different voltage classes shall be segregated. Minimum clear space of 200 mm shall be provided between gland plate and terminal block.
- b. The terminal block shall be grouped and segregated according to circuit functions and voltage, and shall have 20% spare terminals. Individual terminals in each block in each group shall be serially numbered in accordance with the drawings. Such numbering

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shall be legible, permanent and indelible. Terminal block for CTs shall be provided with drop out facility for testing purposes and for shorting.

- c. The terminals shall be 650V grade clamp/stud/clip on type, suitable for connection of at least 2 nos. copper wire per terminal at each side of the terminal. Screw type terminals, with screw directly impinging on conductor, is not acceptable.
- d. Not more than two wires shall be connected to any terminal. If necessary, a number of terminals shall be jumpered together to provide wiring points. Minimum current rating for the terminal block shall be 6A. Busbar type terminals shall be provided for wire / cables size above 16 sqmm.

2.4.5 Miniature Circuit Breakers

MCB shall be of minimum fault breaking capacities of 9kA (rms). If the fault level on the SLDB is greater than 9kA (rms), then HRC type fuses shall be provided before MCB in each outgoing circuit as backup protection for the MCB. Alternatively, MCBs having higher fault breaking capacity shall be provided.

2.4.6 Earth Leakage Circuit Breakers

ELCB rating shall be as per Typical detail SLD(6665-ELT-G00-FA-0003) attached elsewhere in tender .

2.4.7 Switch and fuse

- a. Switch shall be 3 pole and neutral, or 1 pole and neutral, load break, heavy duty type conforming to duty class as specified in Part-II.
- b. Fuse shall be HRC cartridge knife type with rupturing capacity 80kA. Visual indication shall be provided on blowing of the fuse.

2.4.8 Contactors

Contactors shall be three pole, double break electromagnetic air break, non-gravity type with AC-3 category of duty. Rated coil voltage shall be as specified in Part-II.

2.4.9 Moulded Case Circuit Breaker (MCCB)

- a. MCCBs shall be provided with spring assisted quick make /break, manually operated with trip free mechanism.
- b. It shall have magnetic and thermal trip. MCCBs shall be of Current limiting type and type tested for type-2 coordination as per [IS/IEC 60947](#).
- c. MCCBs shall be provided with shunt trip, auxiliary contacts and contact for trip indication / alarm as per requirement specified in Part II.
- d. It shall be provided with rotary handle for ease of operation

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2.5 Cable Termination

- a. All external power and control cables shall enter from the bottom of the distribution board unless specifically mentioned in the data sheet. Sufficient space shall be provided for ease of connection and termination. Provision shall be made for cable entry from top/bottom for SLDB and PDBs.
- b. The control cable terminals shall be suitable for 650/1100 volts grade YWY cables. Cable supporting arrangement at an interval not exceeding 1000mm shall be provided in the cable compartment.

2.6 Miscellaneous Equipment

2.6.1 **Control fuses and Indicating Lamps**

Control fuses and Indicating Lamps shall comply with specifications in Part-II.

2.6.2 **Selector Switches**

Selector Switches shall be rotary type, with stay-put contacts. Ammeter Selector Switch shall have make before break contact arrangements. Switches shall be complete with legend plate and operating handle. The rating should be suitable for duty for which these are employed.

2.6.3 **Time Switch**

Time Switch shall be of single dial, 24 hrs programmable type with time indication and built in rechargeable nickel cadmium battery for 150 hrs backup. It shall have 1NO & 1NC contacts rated as specified in Part-II.

2.6.4 **Photocell relay**

Photocell relay unit shall be electronic type and provided with 2 nos. (1NO + 1NC) potential-free output contacts for wiring the same in coil circuit of auxiliary contactors. Hence, the ratings of photocell relay output contacts shall be adequate enough to make, carry and break the inrush, rated and hold on currents of auxiliary contactor coil. The photocell relay shall be mounted inside MLDB enclosure.

Photocell sensor, with an intensity adjuster to adjust the intensity shall be housed in a 2.5 mm thick weatherproof box made of stainless steel with IP-55 degree of protection. Elmex make clip-on type terminals suitable for 2.5 mm² shall be provided in photocell sensor box for termination of purchaser's YWY control cables. The box shall be supplied loose and shall be suitable for mounting in an outdoor location.

2.6.5 **Space Heater**

Thermostat controlled space heater shall be provided in each cable alley.

2.7 Painting

Vendor has to furnish complete details of painting procedure and painting facilities available. The final paint shade shall be as indicated in Part-II. Sufficient quantity of touch up paint shall be furnished for application after installation at the site.

2.8 Name Plate

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- a. Main name plate shall be provided on top of the distribution board. Panel no. shall be indicated on a separate label both in front & rear.
- b. Rating plates for each component mounted on the face and inside the cubicle shall also be furnished. All internally mounted components shall be identified with painting marks as per approved drawings.
- c. Material for name plates shall be as specified in Part-II or approved equivalent. Name plates shall be held by self tapping screws.
- d. Caution name plate "Caution Live Terminals" shall be provided at all points where terminals are likely to remain live.

3.0 INSPECTION

LSTK Contractor/Owner/Consultant shall have the option to carry out the stage inspection.

Tests as specified in Part III shall be carried out during final inspection. Fifteen days advance notice shall be given for carrying out final inspection.

Vendor/ LSTK Contractor shall ensure that all meters associated with testing of the equipment shall be calibrated by competent authority and this calibration certificate shall be valid at the time of carrying the testing of equipment.

4.0 GUARANTEED PERFORMANCE

The performance figures quoted in the Technical Particulars sheets shall be guaranteed within the tolerance permitted by relevant standards. In case of failure of the equipment to meet the guarantee, the LSTK Contractor/Owner reserves the right to reject the equipment. However, LSTK Contractor/Owner reserves the right to use the rejected equipment until the new equipment meeting the guarantee requirement is supplied by the vendor . However the vendor will be given an opportunity to rectify his equipment at his own cost. Also LSTK Contractor/Owner reserves the right to use rejected equipment till it is rectified. The period of guarantee of the equipment shall be as per 'Commercial Terms and Conditions enclosed along with Enquiry Document'.

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					Contract no.		66-6695	
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GENERAL	001	Make	: As per Vendor list - Electrical					
	002	System voltage & voltage variation	: 415 V +/- 10 %					
	003	System frequency	: 50 Hz +3 % / - 5 %					
	004	Power System	: 3 Phase, 4 Wires					
	005	Individual panel details	: As per Part II B (To be developed by LSTK Contractor)					
	006	Qty.	: *					
	007							
CODES	007	IS/IEC-60947 - Specification for low voltage Switchgear and Controlgear.						
	008	IS : 8623 - Factory built assemblies of Switchgear & Control gear for voltage upto & including 1000 V AC						
	009	IS : 3043 - Code of practise for earthing ; - IS 13703 - Low voltage fuses						
	010	IS : 10118 - Code of practise for installation and maintenance of switchgear						
	011	IS : 2705 - Current Transformers ; IS : 3156 - Voltage Transformers						
	012	IS : 5571 - Guide for selection of electrical equipment for hazardous areas						
	013	IS : 5572 - Classification of hazardous areas (other than mines) for electrical installations:Areas having						
	014	flammable gases& vapours						
CONSTRUCTION	015	Material of Construction	: CRCA Sheet steel					
	016	Ingress protection	: IP 41 for indoor, IP55 for outdoor					
	017	Name plate thick ness and material	: min. 2 mm thick Stainless steel					
	018	Thickness of sheet steel						
		a) Frame / Door/ Covers	: min. 2 mm					
		b) Gland plates	: min. 3 mm					
	019	Material for Gland plate	: sheet steel for 3 core Cables and non magnetic for 1C cables.					
020	Details of hazardous area : *							
BUS BARS	021	Bus bar material	: Aluminium					
	022	Grade	: Electrolytic					
	023	Max. Allowable temperature						
		a) At rated current	: As per IS/IEC-60947					
		b) During short circuit conditions	: 200 Deg C					
	024	Clearance for busbars & connectors :						
		a) Phase to phase (min. 25 mm)	: mm					
		b) Phase to ground (min. 19 mm)	: mm					
	025	(a) Bus bar to be sleeved	: Yes, Colour coded Heat shrinkable sleeves.					
		(b) Rated withstand temperature of sleeves	: °C *					
	026	Shrouding of Bus bar joints	: Yes					
	027	Material of Shrouds	: SMC/ DMC/ FRP/ Epoxy					
	028	Support insulator						
		a) Voltage class	: 1.1 kV					
	b) Material	: SMC / EPOXY / DMC *						
029	1 minute power frequency withstand voltage	: 2.5 kV						
030								
COMPONENTS	031	Switch Category	: AC 22					
	032	POWER FUSES						
		Type	: High rupturing					
		Rupturing capacity	: 80kA					
	033	Indicating Lamps type : Clustered LED type						

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COMPONENTS	034	Indicating meters			
		a) Voltmeter/ Ammeter	: Analog / Digital	*	
		b) Kwh meter	: Digital		
	035	Size (of analog meters)	: 72 x 72 mm		
	036	Push Button			
		a) Start / Reset	: spring return		
		b) Stop	: Stay put type, Mushroom head, turn to release		
PAINTING	037	Spaceheater supply	: 1-ph, 230V		
	038	Primer	: 2 coats of epoxy based primer, powder coating		
	039	Final paint	: 2 coats of epoxy based primer, powder coating		
	040	Painting process	: 7 tanks process for surface preparation		
	041	Final paint shade	: Shade 632 of IS-5(For Outdoor) / RAL 7032 (For Indoor)		
	042	Minimum thickness of paint	: 60 Microns		
MAKE OF MISC. COMPONENTS	043	Power fuses	: Siemens / L&T / GE Power controls / ABB / Schneider	*	
	044	Instrument transformers	: AE/Indcoil/Precise/Kappa/ Translec/Pragati/Siemens/Jyoti	*	
	045	Bus bar support insulator	: DOLF / FIBROCHEM / GLASSFIBRO /SINTEX	*	
	046	Digital / Composite / Multi function meter	: Conserv/ Secure/ Siemens/ HPL/ L&T	*	
	047	Analog meters	: AE/ SIMCO/ IMP/ Rishabh/ MECO/Vaishno/ HAGER (L&T)	*	
	048	Switch	: Kaycee / Siemens / L&T / GE Power / Schneider / ABB	*	
	049	Contactora	: Siemens / L&T / ABB / Schneider/GE Power control	*	
	050	Control selector switch	: Kaycee/ Siemens / L&T / Recom / Vaishno / Fuji/GE Power	*	
	051	Terminal block	: Elmex/ Connectwell/ Allen Bradley / Fuji/ WAGO/GEWISS	*	
	052	Internal wiring	: BIS compliance	*	
	053	Lugs	: Dowell/ Jainson	*	
	054	Push Buttons	: Siemens/ L&T/Teknik/ GE Power / Hensel / Vaishno	*	
	055	Indication lamps	: Tecknik/ L&T/ Siemens /Altos / Vaishno/Fuji/GE Power	*	
	056	MCCB	: GE Power controls / L&T / Schneider / Siemens	*	
	057	Timer for outdoor light control	: GE Power controls / L&T / Schneider / Siemens/MINILEC	*	
058	Photocell for outdoor light control	:	*		
DRAWINGS & DOCUMENTS		Description	For Review & Approval	Final, As-built Documents	
	059	GA & Foundation drawings indicating static & dynamic load details, outline of panel, space required in front & rear of panel	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		
	060	List of parts & complete bill of material.			
	061	SLD/ schematics of boards showing protection, metering etc.			
	062	Wiring diagram with terminal block disposition, ferrule nos. etc.			
	063	Illustrative & descriptive literature of all components			
	064	List of recommended spares			
	065	Manufacturing bar chart.			
	066	Type test certificates			
	067	Routine test certificates			
	068	Installation, operation & maintenance manual for all equipment			
069	Quality Plan and Inspection Test Plan				
	070	Note :			
		1) For items marked " * " thus, data to be furnished / confirmed by LSTK Contractor during detail Engineering.			

 नालको NALCO नेपाल एलुमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.		MISC. LOW VOLTAGE SWITCHGEAR PANELS (UPTO 650V) PART - II B DESIGN DATA SHEET (BOARDWISE)			Code		NAL	
					Contract no.		66-6695	
					Doc.		6695-ELT-G00-EC-0020	
					Rev.		0	
GENERAL	001	Panel designation	MLDB	ACDB	APDB			
	002	Reference SLD					*	
	003	Quantity					*	
	004	Module construction (Drawout / Fixed)	Fixed	Fixed	Fixed			
	005	Mounting (Floor / wall)	Floor	Floor	Floor			
	006	Front (single / Double)	Single	Single	Single			
	007	Cable entry (Top / Bottom)	Bottom	Bottom	Bottom			
	008	Location (Indoor / Outdoor)	Indoor	Indoor	Indoor			
	009	Degree of protection	IP 41	IP 41	IP 41		*	
	010	Space heater	Yes	Yes	Yes			
	011	Dimension (L x B x H mm)					*	
	012	Weight (kg.)					*	
	BUS BARS	014	Size & No. of bus bar in parallel					
		a) Per phase (nos)					*	
		b) Neutral (nos)					*	
015		Continuous current rating (A)					*	
016		Short time current rating					*	
017		Dynamic current rating kA (peak)					*	
018		Earth Bus Material & size	25 x 6 mm Cu	25 x 6 mm Cu	25 x 6 mm Cu			
019								
GENERAL	021	Panel designation	SLDB	PDB				
	022	Reference SLD					*	
	023	Quantity					*	
	024	Module construction (Drawout / Fixed)	Fixed	Fixed	Fixed			
	025	Mounting (Floor / wall)	Wall	Wall	Wall			
	026	Front (single / Double)	Single	Single	Single			
	027	Cable entry (Top / Bottom)					*	
	028	Location (Indoor / Outdoor)					*	
	029	Degree of protection					*	
	030	Space heater	Yes	Yes	Yes			
	031	Dimension (L x B x H mm)					*	
	032	Weight (kg.)					*	
	BUS BARS	035	Size & No. of bus bar in parallel					
		a) Per phase (nos)					*	
		b) Neutral (nos)					*	
036		Continuous current rating (A)					*	
037		Earth Bus Material & size	25 x 6 mm Cu	25 x 6 mm Cu	25 x 6 mm Cu			
038								
039								
040								

LSTK CONTRACTOR TO PREPARE AS PER PROJECT REQUIREMENT

