2X60 MW VVASI HYDRO ELECTRIC PROJECT (UJVN LIMITED)

TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARDS

DOC. NO. PE-TS-407-558-E002

REVISION 0

BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

	TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARDS	SPECIFICATION NO. PE-TS-407-558-E002
		VOLUME II
		CONTENTS SHEET
	2X60 MW VYASI HYDRO ELECTRIC PROJECT (UJVN LIMITED)	REV. 0 / DATE: 18.10.2021
		SHEET 1 OF 1

CONTENTS

S. NO.	DESCRIPTION	NO. OF SHEETS
	COVER SHEET	1
	CONTENTS SHEET	1
01	**SECTION - I**	
	COMPLIANCE CERTIFICATE	1
	SPECIFIC TECHNICAL REQUIREMENT	3
	DATA SHEET-A	8
	ATTACHMENT I	37
	SUB-VENDOR LIST	3
	PACKING SPEC	2
02	**SECTION - II**	
	GENERAL TECHNICAL REQUIRMENTS	22
	CUSTOMER QUALITY PLAN	2
	BHEL QUALITY PLAN	4

TOTAL NUMBER OF SHEETS INCLUDING COVER SHEET: 84

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.

2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'.

3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.

4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.

5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in BOQ-Cum-Price schedule of the specification shall not be considered (i.e. technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE

SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS

1.0 SCOPE OF SUPPLY

1.1 Design, manufacture, assembly, inspection & testing at vendor's/ sub-vendor's works, proper packing, delivery to site and guarantee for two years of LIGHTING DB/ WELDING DB & LIGHTING PANELS as mentioned in different sections of this specification, complete with all accessories for efficient and trouble-free operation.

1.2 Standard technical requirements of LIGHTING DBs/ WELDING DBs & LIGHTING PANELS are indicated in Section-II. Project specific requirements/changes are listed in Section-I.

1.3 The stipulations of Section-I, followed by those of Data Sheet-A shall prevail and govern in case of conflict between the corresponding requirements of Section-I and Section-II.

1.4 Review of sub-vendor's documents by the vendor shall not relieve the vendor from the responsibility of design & supply.

1.5 The documents shall be in English language and MKS system of units.

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per BOQ-cum-price schedule as part of NIT.

3.0 SPECIFIC TECHNICAL REQUIREMENTS

S.No.	*Reference Clause No. of Section- II*	*Specific Requirement/ Change*
1.0	Clause no. 6.5 related to paint shade	Paint shade for LDB shall be finalised during detailed engineering without any delivery/ commercial implication.
2.0	Additional clause	The lighting distribution boards shall be made of sheet steel not less than 3 mm thick and provided with front hinged cover for further enabling the board to be unscrewed for inspection of wiring in the board.
3.0	Additional clause	Following lighting panels are already available at site: Lighting Panel Indoor Type LP-A (6) – 4 Nos. Lighting Panel Indoor Type LP-A (12) – 4 Nos. Lighting Panel Indoor Type LP-A (18) – 2 Nos. Lighting Panel Outdoor Type LP-A (12) – 2 Nos. Lighting Panel Street Type LP-S (6) – 2 Nos. Drawings of all these LPs are enclosed with technical specification (refer Attachment-I).

		Vendor to provide mandatory spares for these 16 Nos. LPs as per BOQ cum unpriced schedule. Mandatory spares for LBBs & additional LPs as per BOQ cum unpriced schedule shall also be in scope of vendor.
4.0		BHEL standard quality plan & customer quality plan are enclosed with technical specification, vendor to follow both BHEL standard QP as well as customer QP, in case of any conflict between BHEL standard QP and customer QP, vendor to follow stringent requirement between the BHEL standard QP and customer QP.

4.0 DOCUMENTATION

4.1 Documents required after award of contract shall be as per NIT.

Note:

1. Vendor shall submit the dates for drawing/document submission/BHEL comments/resubmission after approval of documents.
2. In BOM each of the item to be uniquely identified with item code no. or item Sl. No. Supplier to ensure that all the items which will find separate mention in the packing list are covered in detailed BOM. Supplier to give following undertaking in BOM: " The BOM provided here completes the scope (in content and intent) of material supply under PO no. ---- dtd ----- Any additional material which may become necessary for the intended application of supplied item/package will be supplied free of cost in most reasonable time."

DATA SHEET –A

S. No.	Description	Unit	Value
1.0	**SYSTEM DESIGN DATA**		
1.1	Design ambient	^{0}C	40
1.2	**AC Supply**		
a)	Rated voltage	V	415
b)	Rated frequency	Hz	50
c)	Voltage variation (permissible)	%	+10% to -10%
d)	Frequency variation (permissible)	%	+5% to -5%
e)	Combined voltage & frequency variation (sum of absolutes permissible)	%	10%
f)	System fault level & duration	kA, sec.	40kA for 1 sec.
1.3	**DC Supply**		
a)	Rated voltage	V	220
b)	Voltage variation (permissible)	%	+20% to -20%
c)	System fault level & duration	kA, sec.	20kA for 1 sec.
2.0	APPLICABLE STANDARDS IS 60947 Low voltage switchgear and control gear. IS 11171 Dry type transformers IS 13703 Low voltage fuses for voltages not exceeding 1000V AC or 1500 V IS 10118 Code of practice for selection, installation and maintenance of switchgear and control gear. IS 60898 Electrical Accessories - circuit breakers for over protection for household and similar installations IS 1901 Visual indicator lamps IS 60079 Explosive atmospheres IS 5572 Classification of hazardous areas (other than mines) having flammable gases and vapours for electrical installation IS:2551 Danger notice plates		

3.0	**LIGHTING DISTRIBUTION BOARDS**		
3.1	Operational Front		Single Front
3.2	Type of execution of modules (functional unit)		[√] Fixed [ ] Draw out
3.3	Type of sheet steel		CRCA
3.4	Sheet metal thickness (minimum)		
a)	Non-load bearing covers	mm	3.0 mm
b)	Non-load bearing partitions	mm	3.0 mm
c)	Load bearing members	mm	3.0 mm
d)	Frames	mm	3.0 mm
e)	Door	mm	3.0 mm
f)	Withdrawable unit (if applicable)	mm	3.0 mm
3.5	Cable alley width (minimum)	mm	300
3.6	Bus bar material		[√] Aluminium grade E 91E [ ] High Conductivity Copper (ETC)
3.7	Earth bus bar material		[√] GI Strip [ ] Aluminium [ ] Copper
3.8	Degree of Protection		
a)	Main Panel		IP-52
b)	Transformer cubicle		IP-42
3.9	Gland plate thickness	mm	3.0
3.10	**AC LDB**		
a)	No. of Incomers		[√] One [ ] Two
b)	Bus coupler required		[ ] Yes [√] No
c)	Incomer and Bus coupler rating	A	For 100 KVA – 200 A & for 50 KVA – 100 A
d)	Type of Incomer and Bus coupler		[ ] TPN SFU [√] MCCB
e)	Type of Outgoing Feeders		[ ] TPN SFU [√] MCCB
f)	Outgoing feeders rating	A	63
g)	Cable entry		[√] Bottom [ ] Top

3.11	**Lighting Transformer**		
a)	Rating	kVA	50, 100
b)	Type of cooling		Air natural
c)	Voltage ratio	V	415/415
d)	Rated frequency	Hz	50
e)	No. of phases		3
f)	Vector group		Dyn1
g)	Off circuit taps		
	Tap range, steps	%	+5% to -5% in steps of 2.5%
	Voltage of each tap	V	As per manufacturer's data
h)	Impedance at rated current, frequency at 75 ^{o}C	%	100kVA – 4% 50kVA – 3%
i)	Rated current		
	Primary	A	As per manufacturer's data
	Secondary	A	As per manufacturer's data
j)	Transformer type		[ ] Cast resin [ ] Encapsulated [√] Non-Encapsulated
k)	Transformer winding insulation		Class-F or better
l)	Transformer winding insulation temperature rise limit		Class-B
n)	Type of ventilation arrangement provided for transformer enclosure		As per manufacturer's data
o)	Winding conductor material		Copper
p)	Iron loss at 50 Hz and 100% rated voltage	kW	As per manufacturer's data
q)	Copper loss at rated load at 75 ^{o}C	kW	As per manufacturer's data
r)	Regulation at full load at 75 ^{o}C and 0.8 p.f. lagging		As per manufacturer's data
s)	Weight	kg	As per manufacturer's data

3.12	**DC LDB**		
a)	No. of Incomers		[√] One [ ] Two
b)	Bus coupler required		[ ] Yes [√] No
c)	Incomer and Bus coupler rating	A	32
d)	Type of Incomer and Bus coupler		[√] DP SFU WITH CONTACTOR [ ] DP MCCB
e)	Type of Outgoing Feeders		[√] DP SFU [ ] MCCB
f)	Outgoing Feeders rating	A	16
g)	Changeover required in DC LDB		[√] Yes [ ] No
h)	Under voltage relay required		[√] Yes [ ] No
4.1	**AC Lighting Panel**		
a)	As per GA drawing of respective LP as enclosed with technical specification (refer Attachment-I)		
4.12	**DC Lighting Panel**		
a)	Incomer rating	A	16
b)	Type of Incomer		[√] DP SFU [ ] DP MCCB
c)	Type of Outgoing Feeders (non-flameproof panel)		[√] DP SFU [ ] DP MCCB
d)	Type of Outgoing Feeders (Flameproof panel)		[√] DP SFU
e)	Outgoing feeders rating	A	6
5.0	**COMPONENTS OF LIGHTING SYSTEM EQUIPMENT**		
5.1	**Moulded Case Circuit Breaker (MCCB)**		
a)	Rated voltage	V	415
b)	Number of poles		TPN
c)	Rated short circuit duty	kA	50
d)	Rated breaking capacity (rms)	kA	50
e)	Rated making current (peak)	kA	105
f)	Release with short circuit		[√] Yes [ ] No
g)	Release with overload		[√] Yes [ ] No

h)	Release with under voltage		[ ] Yes [√] No
i)	Auxiliary contacts		
	Numbers	NO+NC	2NO + 2NC
	Rating	A	As per manufacturer data
5.2	**Switch-Fuse Unit**		
a)	Utilisation category for main contacts		AC23
5.3	**Miniature Circuit Breaker**		
a)	SPN MCB rating (min)	A	20
b)	DP MCB rating (min)	A	20
c)	TPN MCB rating (min)	A	63
d)	Short time rating	kA	10
e)	Magnetic short circuit protection required		[√] Yes [ ] No
f)	Thermal overload protection required		[√] Yes [ ] No
5.4	**Current Transformer**		
a)	Type		Cast resin
b)	Secondary current rating	A	[√] 1 [ ] 5
c)	Burden	VA	10
d)	Accuracy class		1.0
e)	Instrument Safety Factor		<5
5.5	**Voltage Transformer**		
a)	Type		Cast resin
b)	Secondary terminal voltage (phase-phase)	V	110 V
c)	Burden	VA	10
d)	Accuracy class		1.0
e)	Winding configuration		Star/ Star
f)	System grounding		[√] Effective [ ] Non-effective
5.6	**Indicating Meters**		

5.6.1	**Ammeter**		
a)	Type		Analog
b)	Shape		Square
c)	Size		96mm x 96mm
d)	Accuracy		1.0
e)	Current coil rating	A	1
f)	Angle of deflection	deg	90
5.6.2	**Voltmeter**		
a)	Type		Analog
b)	Shape		Square
c)	Size		96mm x 96mm
d)	Accuracy		1.0
e)	AC voltage coil rating	V	0-500
f)	DC voltage coil rating	V	0-250
g)	Angle of deflection	deg	90
5.6.3	**Energy meter (if applicable)**		
a)	Type		[√] Analog [ ] Digital
b)	Accuracy		1.0
c)	Current coil rating	A	1
d)	Voltage coil rating	V	0-500
5.7	**Power Contactors**		
a)	Coil voltage (nominal)		
	AC contactors	V	240
	DC contactors	V	220
b)	Current rating of contacts		
	Power	A	As per manufacturer data
	Control	A	As per manufacturer data
5.8	**Under voltage relay**		
a)	Type		[√] Electromagnetic [ ] Static

b)	Coil voltage rating	V	110
c)	Means for in-built testing provided		As per manufacturer data
5.9	**Timer**		
5.9.1	**Time switch**		
a)	Type		Synchronous
b)	Range	hr	0-24
c)	Coil voltage rating	V	240
5.9.2	**Timer for AC-DC changeover**		
a)	No. of contacts		
	ON time delay	NO+NC	As per scheme requirement
	OFF time delay	NO+NC	As per scheme requirement
	Instantaneous	NO+NC	As per scheme requirement
b)	Coil voltage rating		
	AC timer	V	240
	DC timer	V	220
c)	Time delay range		
	AC timer	sec	0-5
	DC timer	Sec	0-180
5.10	**Selector switch**		
a)	Type of selector switch		[√] Stay put [ ] Wing knob
b)	Lockable		[ ] Yes [√] No
5.11	**Push Button**		
a)	Voltage grade	V	500
b)	Potential free contacts		2NO+2NC
5.12	**Indicating Lamps**		
a)	Lens Colour		
	ON condition		Red
	OFF condition		Green
b)	Circuit voltage	V	240V

5.13	**Cable Glands**		**By vendor for all incoming and outgoing cables**
a)	Type		[√] Double compression [ ] Single compression
b)	Material		Brass
c)	Nickel Plating provided		[√] Yes [ ] No
d)	Flameproof glands with flameproof equipment		[√] Yes [ ] No
5.14	**Cable Lugs**		**By vendor for all incoming and outgoing cables**
a)	Type		Crimping type
b)	Material		Tinned copper
6.0	**PAINTING**		
6.1	**Paint shade**		
a)	LDBs		Shall be provided to successful bidder
b)	LPs		As per drawing
6.2	**Paint Finish**		
a)	Interior		[√] Matt [ ] Semi-glossy
b)	Exterior		[√] Semi-glossy [ ] Full-glossy
6.3	**Paint Thickness**	Microns	Minimum 80 (Total DFT min 100 microns)

	TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARDS	SPECIFICATION NO. PE-TS-407-558-E002	
		VOLUME II	
		ATTACHMENT-I	
	2X60 MW VYASI HYDRO ELECTRIC PROJECT (UJVN LIMITED)	REV. 0	DATE: 18.10.2021
		SHEET 1 OF 37	

ATTACHMENT-I

S. NO.	DESCRIPTION	SHEETS
1	LIST OF GA DRAWING (INDOOR LPs)	2
2	GA DRAWING AC NORMAL/EMG. INDOOR TYPE LP-A (6)	3-8
3	GA DRAWING AC NORMAL/EMG. INDOOR TYPE LP-A (12)	9-15
4	GA DRAWING AC NORMAL/EMG. INDOOR TYPE LP-A (22)	16-22
5	LIST OF GA DRAWING (OUTDOOR LPs)	23
6	GA DRAWING AC NORMAL/EMG. OUTDOOR TYPE LP-A (12)	24-30
7	GA DRAWING STREET LIGHING PANEL TYPE LP-S (6)	31-37

SL. NO.	LIST OF GA DRAWINGS	Quantity avail-able at site
1	GA DRAWING OF LIGHTING PANEL AC NORMAL / EMERGENCY INDOOR TYPE LP-A(6)	4
2	GA DRAWING OF LIGHTING PANEL AC NORMAL / EMERGENCY INDOOR TYPE LP-A(12)	4
3	GA DRAWING OF LIGHTING PANEL AC NORMAL / EMERGENCY INDOOR TYPE LP-A(18)	2

GA DRAWING OF
LGT PANEL AC NORMAL/EMG. INDOOR TYPE LP-A (6)

GENERAL NOTES

A. FABRICATION

1. ALL DIMENSIONS ARE IN mm.
2. THE PANEL BOARD SHALL BE CUBICAL DESIGN, NON–COMPARTMENTALIZED, COLUMN MOUNTED, AS SHOWN IN GA DRAWING.
3. THE PANEL BOARD SHALL BE SUITABLE FOR DEGREE OF PROTECTION AS FOLLOWING :
   (A) INDOOR PANEL – IP54
   (B) OUTDOOR PANEL – IP55 WITH CANOPY
4. THE PANEL SHALL BE FABRICATED WITH :
   (A) LOADBEARINGMEMBERS – 2.5MM CRCA.
   (B) DOOR – 2.0MM CRCA.
   (C) REMOVABLE GLAND PLATE – 3.0MM HR
   (D) BASE CHANNEL – N/A
   (E) CABLE ENTRIES SHALL BE TOP/BOTTOM
   (F) TOLERANCE SHALL BE AS PER IS STANDARDS.

B. PAINTING

1. PRE– TREATMENT OF PANEL BOARD SHALL BE CARRIED OUT BEFORE PAINTING WITH EIGHT TANK PROCESS i.e DEGREASING, WATER RINSING–I, DERUSTING, WATER RINSING–II, PHOSPHATING, WATER RINSING–III AND PASSIVATION.
2. THE PANEL SHALL BE PAINTED WITH (POWDER COATING)
   (A) ENCLOSURE – SIEMENS GREY RAL–7035 (EPOXY PAINT)
   (B) MOUNTING PLATE – ORANGE FOR CRCA SHEET / UNPAINTED FOR GP SHEET
3. POWDER COATING SHALL BETWEEN 60–80 MICRONS.

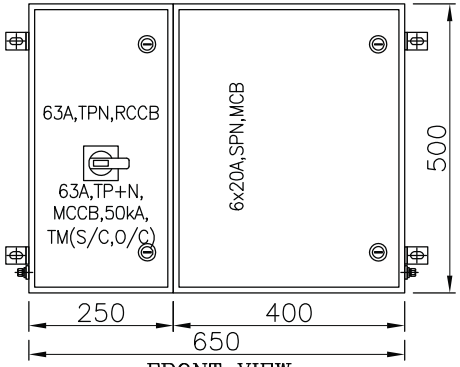
C. ASSEMBLY

1. THE PANEL BOARD SHALL BE SUITABLE FOR 3PHASE, 4WIRE 415±10%, 50HZ±5%, AC SUPPLY
2. MAIN AL. BUS BAR LINKS SHALL BE PROVIDED WITH HEAT SHRINKABLE PVC SLEEVES WITH RED, YELLOW, BLUE, & BLACK COLOUR CODING.
3. NEOPRENE GASKET SHALL BE PROVIDED INSIDE THE DOOR TO MAKE THE DUST & VERMIN PROOF.
4. THE MINIMUM CLEARANCE SHALL BE AS FOLLOWING :
   (A) BETWEEN PHASE TO PHASE – 25mm
   (B) BETWEEN PHASE TO NEUTRAL – 20mm
   (C) BETWEEN PHASE TO EARTH – 20mm
   (D) BETWEEN NEUTRAL TO EARTH – 20mm
5. BUSBAR SUPPORTS SHALL BE OF NON HYGROSCOPIC DMC/SMC SUPPORTS.

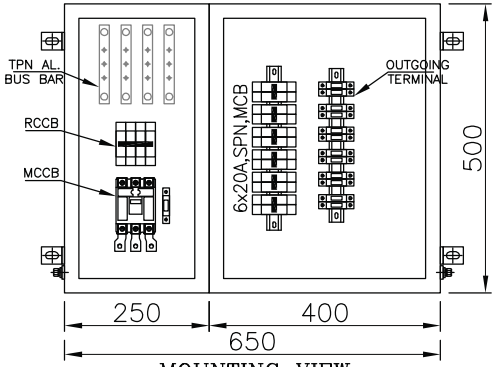
D. WIRING

1. ALL CONTROL WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) AC CONTROL CIRCUIT : 2.5 Sq. mm Cu. WIRE (GREY / BLACK COLOUR)
   (C) EARTH WIRE CIRCUIT : 2.5 Sq.mm Cu. mm (GREEN COLOUR)
2. ALL POWER WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) UPTO 20A : 4.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (B) 21A TO 32A : 6.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (C) 35A TO 40A : 10.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
   (D) 41A TO 63A : 16.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
3. ALL DOOR SHALL BE EARTH WITH GREEN COLOUR COPPER WIRE.
4. ALL LIVE PART SHALL BE SHROUDED BY BAKELITE/ACRYLIC/PVC SHEET.
5. DESIGNATION AND CAUTION NOTICE PLATES SHALL FIXED ON FRONT COVER AND A DIRECTORY FIXED ON INSIDE OF THE FRONT COVER. THE PLATE SHALL BE OF ANODIZED ALUMINIUM WITH INSCRIPTIONS INDELIBLY ETCHED
6. MCCB SHALL BE PROVIDED FULLY RATED FOR SHORT CIRCUIT LEVEL & MCB SHALL BE OVERLOAD & SHORT CIRCUIT PROTECTION, AND SHORT CIRCUIT LEVEL 10kA (MAXIMUM)
7. BUS BAR SHALL BE ELECTROLYTIC GRADE HARD DRAWN ALUMINUM, COLOUR CODED FOR EASY IDENTIFICATION AND DESIGNED FOR A MAXIMUM TEMPERATURE OF 85°C. THE CURRENT DENSITY OF ALUMINUM BUS BAR SHALL BE 0.8AMP/SQ.MM.
8. TWO GROUND PADS WITH M10 G.I. BOLTS AND NUTS SHALL BE PROVIDED IN BOTH SIDE.
9. ALL MCCB (APPLICABLE FOR AC LIGHTING PANEL ONLY) SHALL BE SINGLE THROW, AIR BREAK AND HEAVY DUTY TYPE HAVING QUICK–MAKE QUICK–BREAK CONTACTS FUSES SHALL BE HRC LINK TYPE.
10. ALL WIRING FROM LIGHTING PANELS TO FIXTURES AND RECEPTACLES SHALL BE CARRIED OUT BY PVC WIRES IN G.I. CONDUITS BY BHEL
11. 4SWG WIRE SHALL BE USED FOR EARTHING THE AC LIGHTING PANEL AT TWO POINTS. SUPPLY OF WIRE AND EARTHING WORK FOR THE SAME WILL BE IN BHEL SCOPE

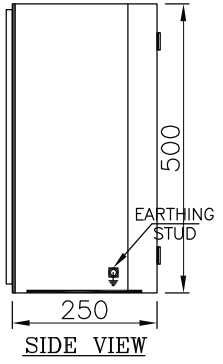
1.	MCCB SHALL BE THERMAL MAGNETIC RELEASE (OVERLOAD, SHORT CIRCUIT) RATED SHORT CIRCUIT 50kA, Ics=50% Icu WITH DOOR INTERLOCK IN OFF POSITION
2.	RCCB TPN, 100mA
3.	MCB SHALL BE MANUAL OPERATION AND AUTOMATIC TRIP ON OVERLOAD & SHORT CIRCUIT. SHORT CIRCUIT LEVEL SHALL BE 10kA (MAXIMUM) C–CURVE
4.	POWER TERMINAL BLOCK UP TO 32A SCREW TYPE & 40A TO 63A M6 STUD TYPE.
5.	DOUBLE COMPRESSION CABLE GLAND AND LUGS SHALL BE SUPPLIED BY CMKL 1. GLANDS FOR 3.5x50SQMM AL. ARMD CABLE (1.1/2" OR EQ.) 2. GLANDS FOR 2x6SQMM CU. WIRE (3/4" OR EQ.)



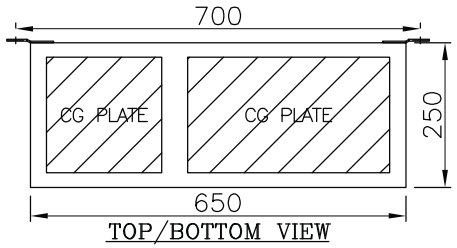
FRONT VIEW



MOUNTING VIEW
WITH OUTER DOOR OPENED



SIDE VIEW

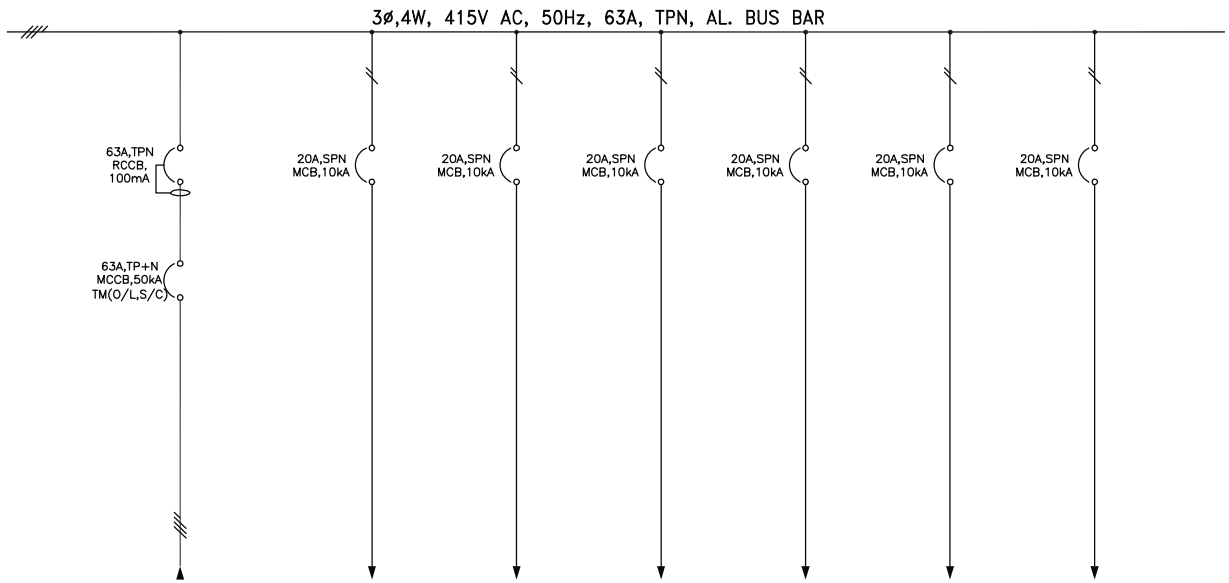


TOP/BOTTOM VIEW

ALL COMPONENTS POSITION, SHOWN IN MOUNTING VIEW IS ONLY INDICATIVE, IT MAY VARY ACC. TO SPACE AVAILABLE WHILE MANUFACTURING.

NOTES :-

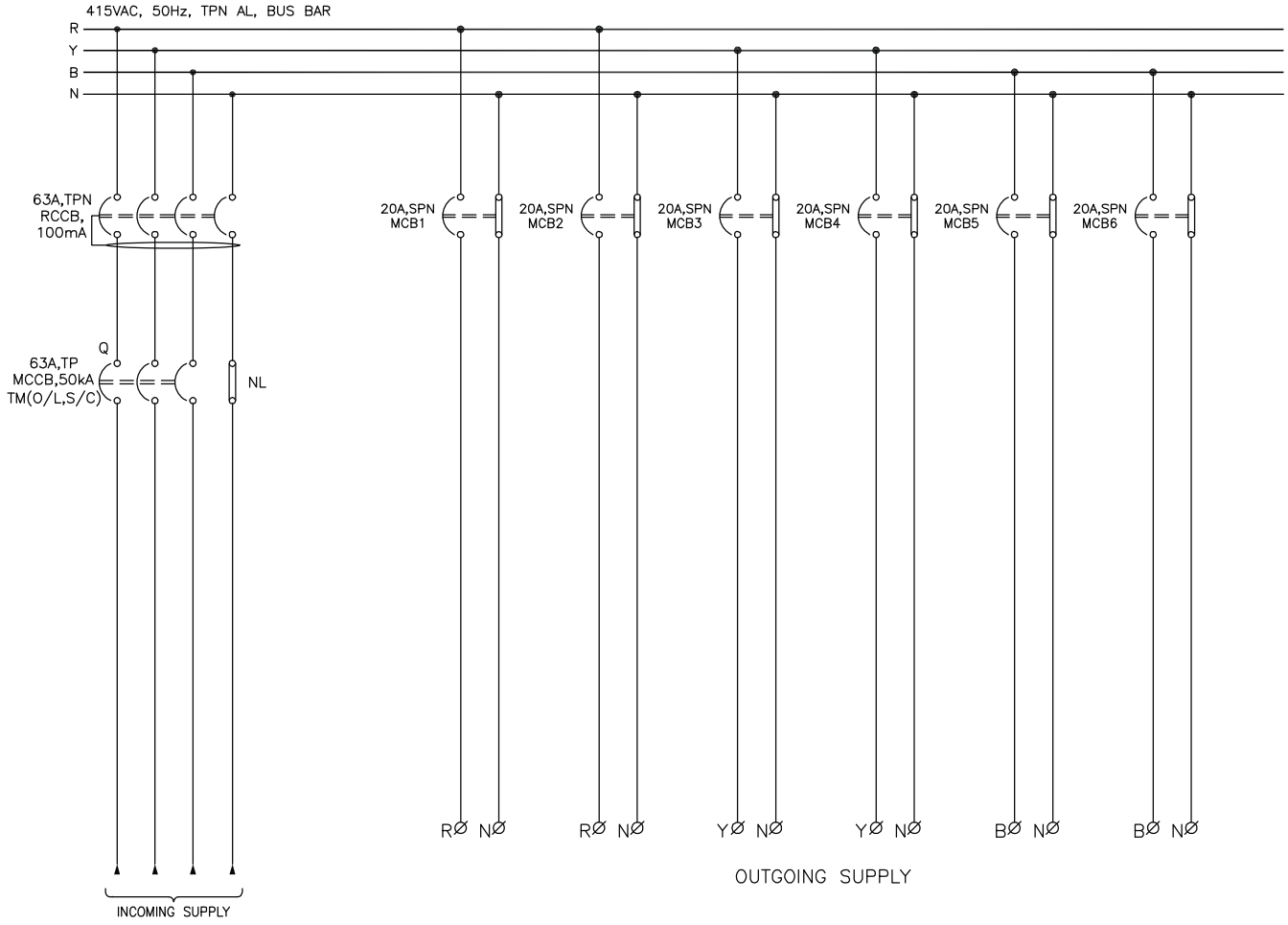
01. CABLE ENTRY	: TOP/BOTTOM (UNDRILLED GLAND PLATE-3.0mm)	
02. MAIN BUS BAR	: PHASE - 1x25x6mm AL. OR EQ.	63A,TPN
3PHASE, 4WIRE	: NEUTRAL - 1x25x3mm AL. OR EQ.	
	: EARTHING - M10 GI BOLT	
03. FABRICATION	: ENCLOSURE BODY - 2.5 MM CRCA	
	: DOORS - 2.0 MM CRCA	
	: DEGREE OF PROTECTION - IP54 (INDOOR)	
04. INSTALLATION	: WALL / COLUMN MOUNTED	
05. MCCB	: ROTARY OPERATING HANDLE FOR MCCB	



FEEDER NO.	1	2	3	4	5	6	7
FEEDER TYPE	MCCB INCOMER	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	INCOMER	*	*	*	*	*	*
FEEDER RATING	63A,TP+N	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	1F1	2F1.1	2F1.2	2F1.3	2F1.4	2F1.5	2F1.6
O/G CABLE SIZE/PH.	3.5Cx50 SQ.MM AL.ARM.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

REQUIRE OF CABLE SIZE
* REQUIRE OF FEEDER NAME

S. No.	LEGEND	DESCRIPTION	MAKE	QTY.
5		**LIGHTING PANELS AC NORMAL/EMERGENCY INDOOR TYPE LP - A (6)**		
		INCOMER FEEDER		**1**
1	MCCB	MCCB 63A, TP+N, 50kA THERMAL MAGNETIC RELEASE WITH O/C & S/C PROTECTION	C&S/L&T/SCH./SIEMENS/GE	1
2	MCCB H	ROTARY HANDLE FOR 63A MCCB	C&S/L&T/SCH./SIEMENS/GE	1
3	RCCB	RCCB 63A, TPN, 100mA	C&S/L&T/SCH./SIEMENS/ABB/ MDS/INDOASIAN	1
4	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	4
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 1.1/2"	INCAB/DOWELLS/COMMET/ BALIGA	1
6	LUGS	ALUMINIUM LUGS 50MM RING Ø 8MM	DOWELLS/UNIVERSAL	3
7	LUGS	ALUMINIUM LUGS 25MM RING Ø 8MM	DOWELLS/UNIVERSAL	1
		OUTGOING		
		MCB 20A SPN		**6**
1	MCB	MCB 20A, SPN, 10kA, C-CURVE	SCH./MDS/INDOASIAN/S&S	6
2	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	12
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 3/4"	INCAB/DOWELLS/COMMET/ BALIGA	6
6	LUGS	ALUMINIUM LUGS 6MM RING Ø 8MM	DOWELLS/UNIVERSAL	12


415VAC, 50Hz, TPN AL, BUS BAR
R
Y
B
N
63A,TPN
RCCB,
100mA
Q
63A,TP
MCCB,50kA
TM(O/L,S/C)
NL
20A,SPN
MCB1
20A,SPN
MCB2
20A,SPN
MCB3
20A,SPN
MCB4
20A,SPN
MCB5
20A,SPN
MCB6
RØ NØ
RØ NØ
YØ NØ
YØ NØ
BØ NØ
BØ NØ
OUTGOING SUPPLY
INCOMING SUPPLY

GA DRAWING OF
LGT. PANEL AC NORMAL/EMG. INDOOR TYPE LP-A (12)

IF IN DOUBT PLEASE ASK

GENERAL NOTES

A. FABRICATION

1. ALL DIMENSIONS ARE IN mm.
2. THE PANEL BOARD SHALL BE CUBICAL DESIGN, NON–COMPARTMENTALIZED, COLUMN MOUNTED, AS SHOWN IN GA DRAWING.
3. THE PANEL BOARD SHALL BE SUITABLE FOR DEGREE OF PROTECTION AS FOLLOWING :
   (A) INDOOR PANEL – IP54
   (B) OUTDOOR PANEL – IP55 WITH CANOPY
4. THE PANEL SHALL BE FABRICATED WITH :
   (A) LOADBEARINGMEMBERS – 2.5MM CRCA.
   (B) DOOR – 2.0MM CRCA.
   (C) REMOVABLE GLAND PLATE – 3.0MM HR
   (D) BASE CHANNEL – N/A
   (E) CABLE ENTRIES SHALL BE TOP/BOTTOM
   (F) TOLERANCE SHALL BE AS PER IS STANDARDS.

B. PAINTING

1. PRE– TREATMENT OF PANEL BOARD SHALL BE CARRIED OUT BEFORE PAINTING WITH EIGHT TANK PROCESS i.e DEGREASING, WATER RINSING–I, DERUSTING, WATER RINSING–II, PHOSPHATING, WATER RINSING–III AND PASSIVATION.
2. THE PANEL SHALL BE PAINTED WITH (POWDER COATING)
   (A) ENCLOSURE – SIEMENS GREY RAL–7035 (EPOXY PAINT) R2
   (B) MOUNTING PLATE – ORANGE FOR CRCA SHEET / UNPAINTED FOR GP SHEET
3. POWDER COATING SHALL BETWEEN 60–80 MICRONS.

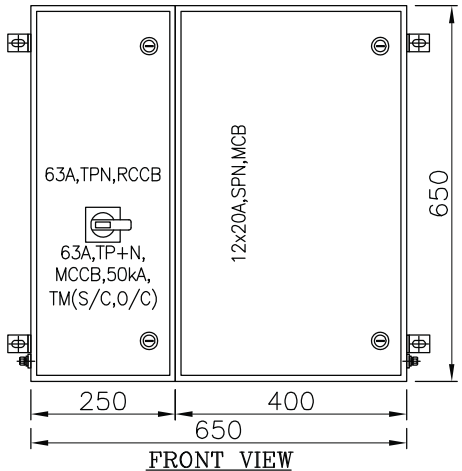
C. ASSEMBLY

1. THE PANEL BOARD SHALL BE SUITABLE FOR 3PHASE, 4WIRE 415±10%, 50HZ±5%, AC SUPPLY
2. MAIN AL. BUS BAR LINKS SHALL BE PROVIDED WITH HEAT SHRINKABLE PVC SLEEVES WITH RED, YELLOW, BLUE, & BLACK COLOUR CODING.
3. NEOPRENE GASKET SHALL BE PROVIDED INSIDE THE DOOR TO MAKE THE DUST & VERMIN PROOF.
4. THE MINIMUM CLEARANCE SHALL BE AS FOLLOWING :
   (A) BETWEEN PHASE TO PHASE – 25mm
   (B) BETWEEN PHASE TO NEUTRAL – 20mm
   (C) BETWEEN PHASE TO EARTH – 20mm
   (D) BETWEEN NEUTRAL TO EARTH – 20mm
5. BUSBAR SUPPORTS SHALL BE OF NON HYGROSCOPIC DMC/SMC SUPPORTS.

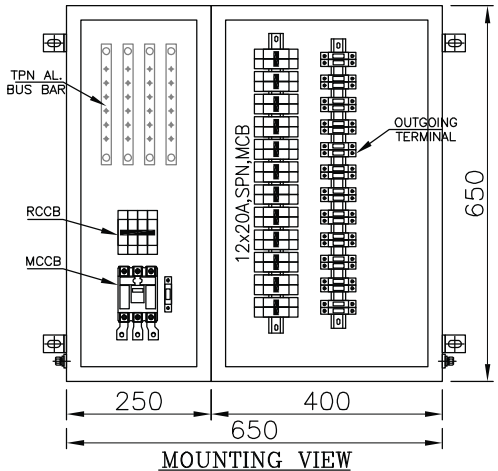
D. WIRING

1. ALL CONTROL WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) AC CONTROL CIRCUIT : 2.5 Sq. mm Cu. WIRE (GREY / BLACK COLOUR)
   (C) EARTH WIRE CIRCUIT : 2.5 Sq.mm Cu. mm (GREEN COLOUR)
2. ALL POWER WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) UPTO 20A : 4.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (B) 21A TO 32A : 6.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (C) 35A TO 40A : 10.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
   (D) 41A TO 63A : 16.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
3. ALL DOOR SHALL BE EARTH WITH GREEN COLOUR COPPER WIRE.
4. ALL LIVE PART SHALL BE SHROUDED BY BAKELITE/ACRYLIC/PVC SHEET.
5. DESIGNATION AND CAUTION NOTICE PLATES SHALL FIXED ON FRONT COVER AND A DIRECTORY FIXED ON INSIDE OF THE FRONT COVER. THE PLATE SHALL BE OF ANODIZED ALUMINIUM WITH INSCRIPTIONS INDELIBLY ETCHED
6. MCCB SHALL BE PROVIDED FULLY RATED FOR SHORT CIRCUIT LEVEL & MCB SHALL BE OVERLOAD & SHORT CIRCUIT PROTECTION, AND SHORT CIRCUIT LEVEL 10kA (MAXIMUM)
7. BUS BAR SHALL BE ELECTROLYTIC GRADE HARD DRAWN ALUMINUM, COLOUR CODED FOR EASY IDENTIFICATION AND DESIGNED FOR A MAXIMUM TEMPERATURE OF 85°C. THE CURRENT DENSITY OF ALUMINUM BUS BAR SHALL BE 0.8AMP/SQ.MM.
8. TWO GROUND PADS WITH M10 G.I. BOLTS AND NUTS SHALL BE PROVIDED IN BOTH SIDE.
9. ALL MCCB (APPLICABLE FOR AC LIGHTING PANEL ONLY) SHALL BE SINGLE THROW, AIR BREAK AND HEAVY DUTY TYPE HAVING QUICK–MAKE QUICK–BREAK CONTACTS FUSES SHALL BE HRC LINK TYPE. R2
10. ALL WIRING FROM LIGHTING PANELS TO FIXTURES AND RECEPTACLES SHALL BE CARRIED OUT BY PVC WIRES IN G.I. CONDUITS BY BHEL R2
11. 4SWG WIRE SHALL BE USED FOR EARTHING THE AC LIGHTING PANEL AT TWO POINTS. SUPPLY OF WIRE AND EARTHING WORK FOR THE SAME WILL BE IN BHEL SCOPE R2

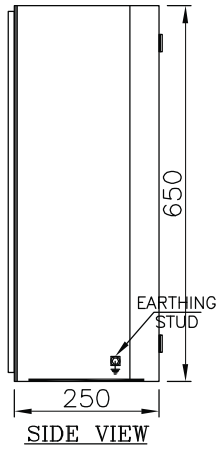
1.	MCCB SHALL BE THERMAL MAGNETIC RELEASE (OVERLOAD, SHORT CIRCUIT) RATED SHORT CIRCUIT 50kA, Ics=50% Icu WITH DOOR INTERLOCK IN OFF POSITION
2.	RCCB TPN, 100mA
3.	MCB SHALL BE MANUAL OPERATION AND AUTOMATIC TRIP ON OVERLOAD & SHORT CIRCUIT. SHORT CIRCUIT LEVEL SHALL BE 10kA (MAXIMUM) C–CURVE
4.	POWER TERMINAL BLOCK UP TO 32A SCREW TYPE & 40A TO 63A M6 STUD TYPE.
5.	DOUBLE COMPRESSION CABLE GLAND AND LUGS SHALL BE SUPPLIED BY CMKL 1. GLANDS FOR 3.5x50SQMM AL. ARMD CABLE (1.1/2" OR EQ.) 2. GLANDS FOR 2x6SQMM CU. WIRE (3/4" OR EQ.)



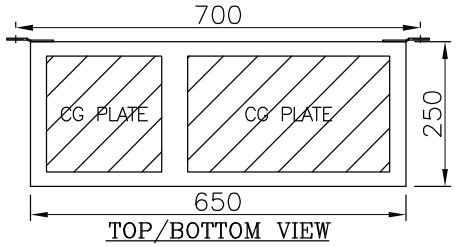
FRONT VIEW



MOUNTING VIEW
WITH OUTER DOOR OPENED



SIDE VIEW

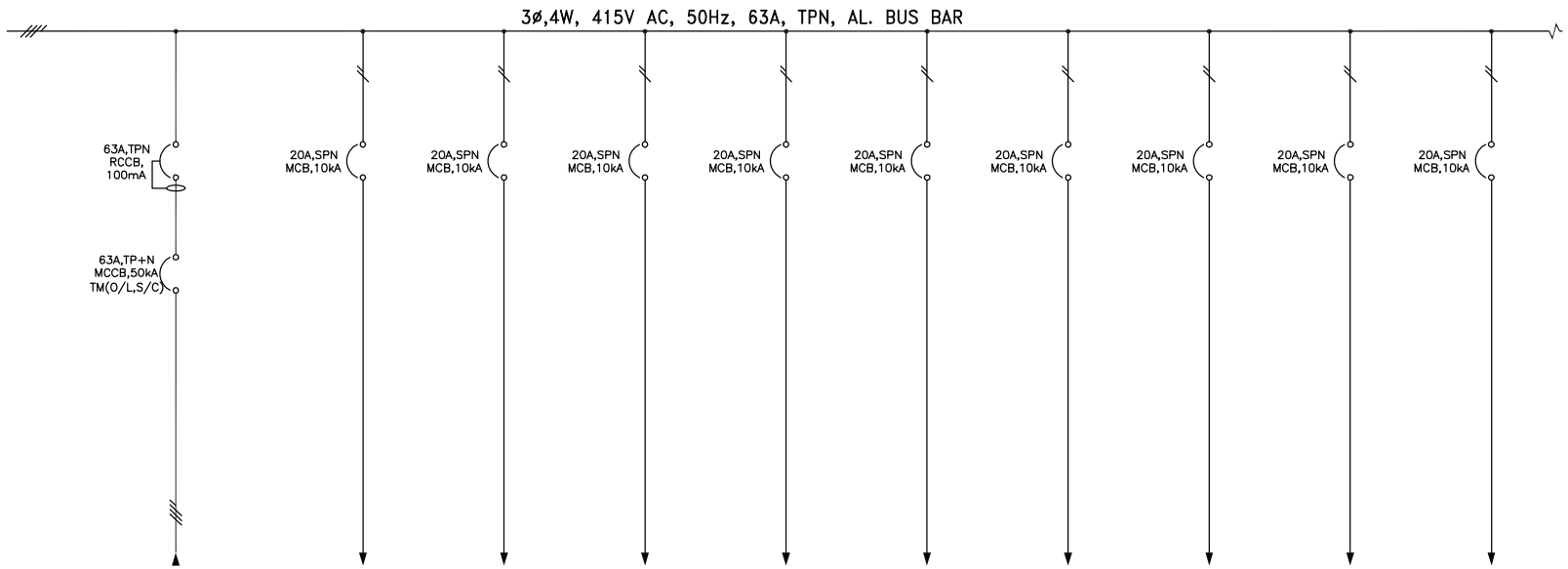


TOP/BOTTOM VIEW

ALL COMPONENTS POSITION, SHOWN IN MOUNTING VIEW IS ONLY INDICATIVE, IT MAY VARY ACC. TO SPACE AVAILABLE WHILE MANUFACTURING.

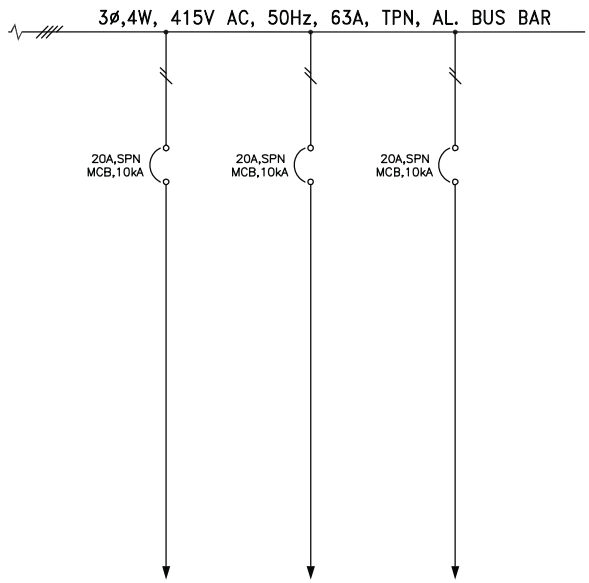
NOTES :-

01. CABLE ENTRY	: TOP/BOTTOM (UNDRILLED GLAND PLATE-3.0mm)	
02. MAIN BUS BAR	: PHASE - 1x25x6mm AL. OR EQ.	63A,TPN
3PHASE, 4WIRE	: NEUTRAL - 1x25x3mm AL. OR EQ.	
	: EARTHING - M10 GI BOLT	
03. FABRICATION	: ENCLOSURE BODY - 2.5 MM CRCA	
	: DOORS - 2.0 MM CRCA	
	: DEGREE OF PROTECTION - IP54 (INDOOR)	
04. INSTALLATION	: WALL / COLUMN MOUNTED	
05. MCCB	: ROTARY OPERATING HANDLE FOR MCCB	



FEEDER NO.	1	2	3	4	5	6	7	8	9	10
FEEDER TYPE	MCCB INCOMER	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	INCOMER	*	*	*	*	*	*	*	*	*
FEEDER RATING	63A,TP+N	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	1F1	2F1.1	2F1.2	2F1.3	2F1.4	2F1.5	2F1.6	2F1.7	2F1.8	2F1.9
O/G CABLE SIZE/PH.	3.5Cx50 SQ.MM AL.ARM.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

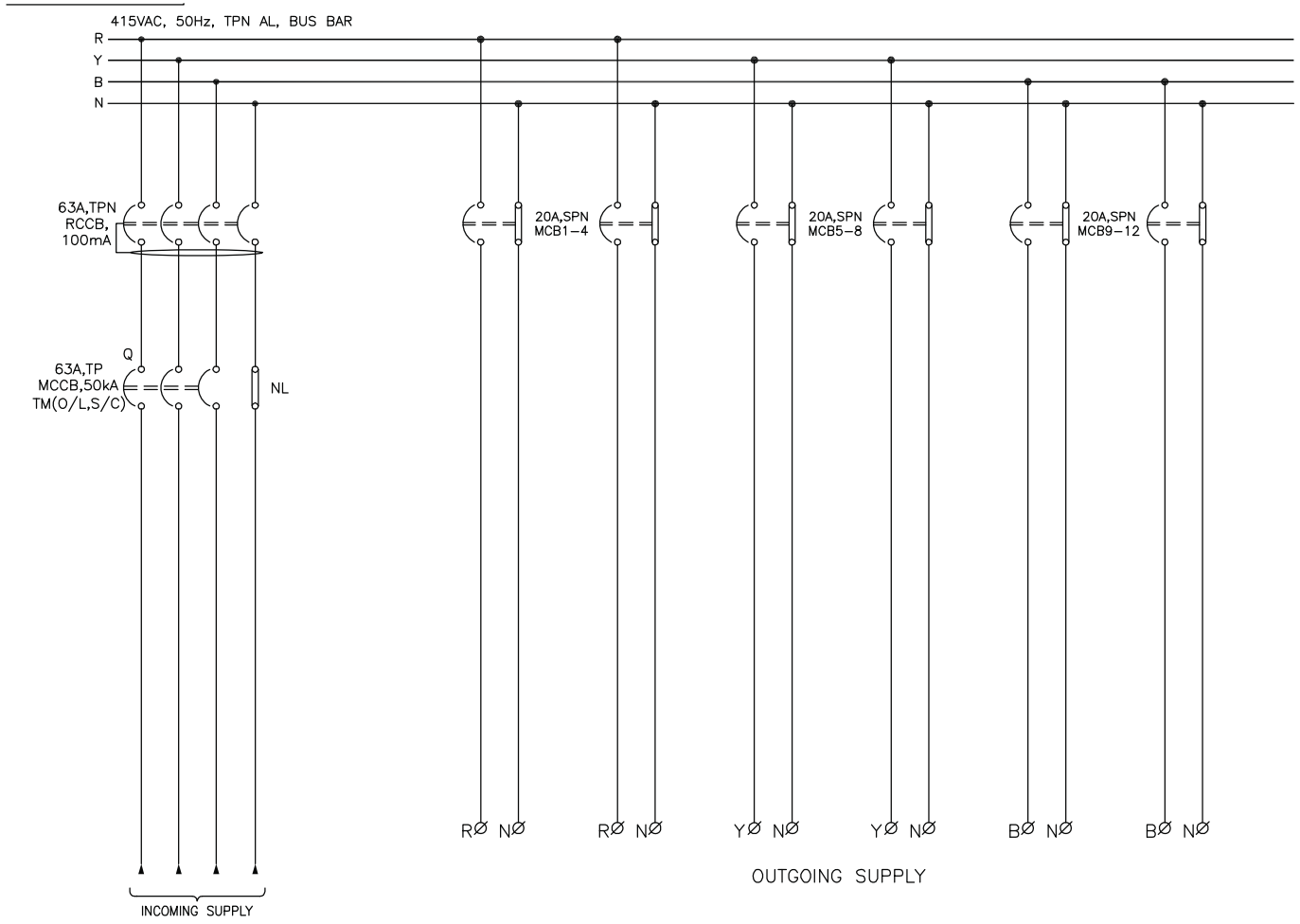
* REQUIRE OF FEEDER NAME



FEEDER NO.	11	12	13
FEEDER TYPE	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	*	*	*
FEEDER RATING	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	2F1.10	2F1.11	2F1.12
O/G CABLE SIZE/PH.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

* REQUIRE OF FEEDER NAME

S. No.	LEGEND	DESCRIPTION	MAKE	QTY.
7		**LIGHTING PANELS AC NORMAL/EMERGENCY INDOOR TYPE LP - A (12)**		
		INCOMER FEEDER		**1**
1	MCCB	MCCB 63A, TP+N, 50kA THERMAL MAGNETIC RELEASE WITH O/C & S/C PROTECTION	C&S/L&T/SCH./SIEMENS/GE	1
2	MCCB H	ROTARY HANDLE FOR 63A MCCB	C&S/L&T/SCH./SIEMENS/GE	1
3	RCCB	RCCB 63A, TPN, 100mA	C&S/L&T/SCH./SIEMENS/ABB/ MDS/INDOASIAN	1
4	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	8
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 1.1/2"	INCAB/DOWELLS/COMMET/ BALIGA	1
6	LUGS	ALUMINIUM LUGS 50MM RING Ø 8MM	DOWELLS/UNIVERSAL	3
7	LUGS	ALUMINIUM LUGS 25MM RING Ø 8MM	DOWELLS/UNIVERSAL	1
		OUTGOING		
		MCB 20A SPN		**12**
1	MCB	MCB 20A, SPN, 10kA, C-CURVE	SCH./MDS/INDOASIAN/S&S	12
2	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	24
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 3/4"	INCAB/DOWELLS/COMMET/ BALIGA	12
6	LUGS	ALUMINIUM LUGS 6MM RING Ø 8MM	DOWELLS/UNIVERSAL	24


415VAC, 50Hz, TPN AL, BUS BAR
R
Y
B
N
63A,TPN
RCCB,
100mA
Q
63A,TP
MCCB,50kA
TM(O/L,S/C)
NL
20A,SPN
MCB1–4
20A,SPN
MCB5–8
20A,SPN
MCB9–12
RØ NØ
RØ NØ
YØ NØ
YØ NØ
BØ NØ
BØ NØ
OUTGOING SUPPLY
INCOMING SUPPLY

GA DRAWING OF
LGT. PANEL AC NORMAL/EMG. INDOOR TYPE LP-A (18)

IF IN DOUBT PLEASE ASK

GENERAL NOTES

A. FABRICATION

1. ALL DIMENSIONS ARE IN mm.
2. THE PANEL BOARD SHALL BE CUBICAL DESIGN, NON–COMPARTMENTALIZED, COLUMN MOUNTED, AS SHOWN IN GA DRAWING.
3. THE PANEL BOARD SHALL BE SUITABLE FOR DEGREE OF PROTECTION AS FOLLOWING :
   (A) INDOOR PANEL – IP54
   (B) OUTDOOR PANEL – IP55 WITH CANOPY
4. THE PANEL SHALL BE FABRICATED WITH :
   (A) LOADBEARINGMEMBERS – 2.5MM CRCA.
   (B) DOOR – 2.0MM CRCA.
   (C) REMOVABLE GLAND PLATE – 3.0MM HR
   (D) BASE CHANNEL – N/A
   (E) CABLE ENTRIES SHALL BE TOP/BOTTOM
   (F) TOLERANCE SHALL BE AS PER IS STANDARDS.

B. PAINTING

1. PRE– TREATMENT OF PANEL BOARD SHALL BE CARRIED OUT BEFORE PAINTING WITH EIGHT TANK PROCESS i.e DEGREASING, WATER RINSING–I, DERUSTING, WATER RINSING–II, PHOSPHATING, WATER RINSING–III AND PASSIVATION.
2. THE PANEL SHALL BE PAINTED WITH (POWDER COATING)
   (A) ENCLOSURE – SIEMENS GREY RAL–7035 (EPOXY PAINT) R2
   (B) MOUNTING PLATE – ORANGE FOR CRCA SHEET / UNPAINTED FOR GP SHEET
3. POWDER COATING SHALL BETWEEN 60–80 MICRONS.

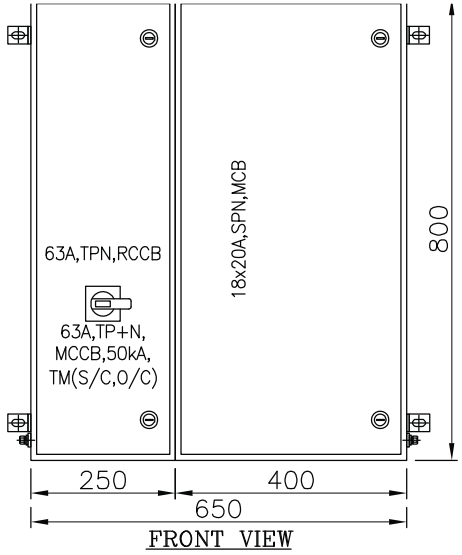
C. ASSEMBLY

1. THE PANEL BOARD SHALL BE SUITABLE FOR 3PHASE, 4WIRE 415±10%, 50HZ±5%, AC SUPPLY
2. MAIN AL. BUS BAR LINKS SHALL BE PROVIDED WITH HEAT SHRINKABLE PVC SLEEVES WITH RED, YELLOW, BLUE, & BLACK COLOUR CODING.
3. NEOPRENE GASKET SHALL BE PROVIDED INSIDE THE DOOR TO MAKE THE DUST & VERMIN PROOF.
4. THE MINIMUM CLEARANCE SHALL BE AS FOLLOWING :
   (A) BETWEEN PHASE TO PHASE – 25mm
   (B) BETWEEN PHASE TO NEUTRAL – 20mm
   (C) BETWEEN PHASE TO EARTH – 20mm
   (D) BETWEEN NEUTRAL TO EARTH – 20mm
5. BUSBAR SUPPORTS SHALL BE OF NON HYGROSCOPIC DMC/SMC SUPPORTS.

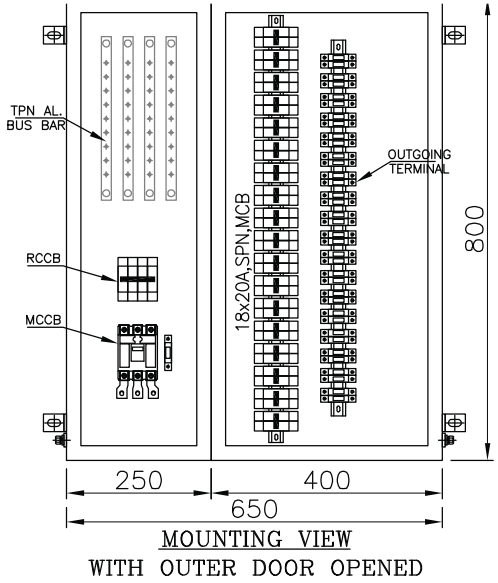
D. WIRING

1. ALL CONTROL WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) AC CONTROL CIRCUIT : 2.5 Sq. mm Cu. WIRE (GREY / BLACK COLOUR)
   (C) EARTH WIRE CIRCUIT : 2.5 Sq.mm Cu. mm (GREEN COLOUR)
2. ALL POWER WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) UPTO 20A : 4.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (B) 21A TO 32A : 6.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (C) 35A TO 40A : 10.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
   (D) 41A TO 63A : 16.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
3. ALL DOOR SHALL BE EARTH WITH GREEN COLOUR COPPER WIRE.
4. ALL LIVE PART SHALL BE SHROUDED BY BAKELITE/ACRYLIC/PVC SHEET.
5. DESIGNATION AND CAUTION NOTICE PLATES SHALL FIXED ON FRONT COVER AND A DIRECTORY FIXED ON INSIDE OF THE FRONT COVER. THE PLATE SHALL BE OF ANODIZED ALUMINIUM WITH INSCRIPTIONS INDELIBLY ETCHED
6. MCCB SHALL BE PROVIDED FULLY RATED FOR SHORT CIRCUIT LEVEL & MCB SHALL BE OVERLOAD & SHORT CIRCUIT PROTECTION, AND SHORT CIRCUIT LEVEL 10kA (MAXIMUM)
7. BUS BAR SHALL BE ELECTROLYTIC GRADE HARD DRAWN ALUMINUM, COLOUR CODED FOR EASY IDENTIFICATION AND DESIGNED FOR A MAXIMUM TEMPERATURE OF 85°C. THE CURRENT DENSITY OF ALUMINUM BUS BAR SHALL BE 0.8AMP/SQ.MM.
8. TWO GROUND PADS WITH M10 G.I. BOLTS AND NUTS SHALL BE PROVIDED IN BOTH SIDE.
9. ALL MCCB (APPLICABLE FOR AC LIGHTING PANEL ONLY) SHALL BE SINGLE THROW, AIR BREAK AND HEAVY DUTY TYPE HAVING QUICK–MAKE QUICK–BREAK CONTACTS FUSES SHALL BE HRC LINK TYPE. R2
10. ALL WIRING FROM LIGHTING PANELS TO FIXTURES AND RECEPTACLES SHALL BE CARRIED OUT BY PVC WIRES IN G.I. CONDUITS BY BHEL R2
11. 4SWG WIRE SHALL BE USED FOR EARTHING THE AC LIGHTING PANEL AT TWO POINTS. SUPPLY OF WIRE AND EARTHING WORK FOR THE SAME WILL BE IN BHEL SCOPE R2

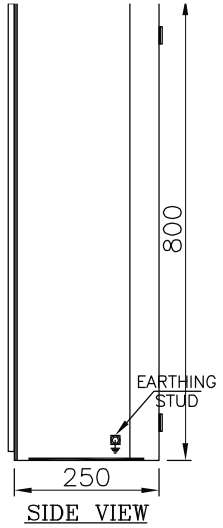
1.	MCCB SHALL BE THERMAL MAGNETIC RELEASE (OVERLOAD, SHORT CIRCUIT) RATED SHORT CIRCUIT 50kA, Ics=50% Icu WITH DOOR INTERLOCK IN OFF POSITION
2.	RCCB TPN, 100mA
3.	MCB SHALL BE MANUAL OPERATION AND AUTOMATIC TRIP ON OVERLOAD & SHORT CIRCUIT. SHORT CIRCUIT LEVEL SHALL BE 10kA (MAXIMUM) C–CURVE
4.	POWER TERMINAL BLOCK UP TO 32A SCREW TYPE & 40A TO 63A M6 STUD TYPE.
5.	DOUBLE COMPRESSION CABLE GLAND AND LUGS SHALL BE SUPPLIED BY CMKL 1. GLANDS FOR 3.5x50SQMM AL. ARMD CABLE (1.1/2" OR EQ.) 2. GLANDS FOR 2x6SQMM CU. WIRE (3/4" OR EQ.)



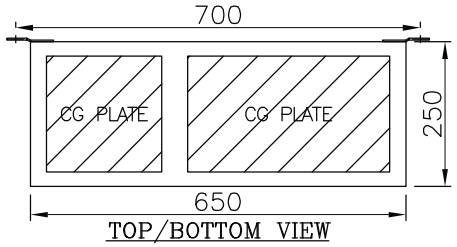
FRONT VIEW



MOUNTING VIEW
WITH OUTER DOOR OPENED



SIDE VIEW

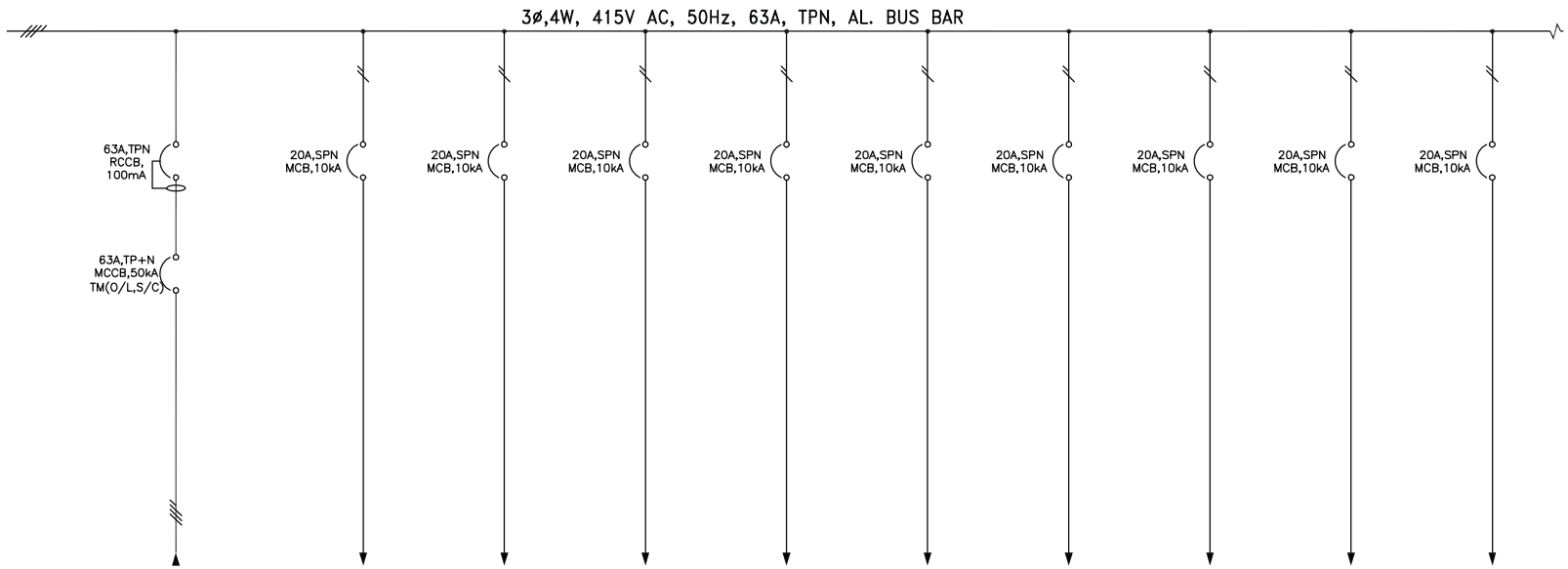


TOP/BOTTOM VIEW

ALL COMPONENTS POSITION, SHOWN IN MOUNTING VIEW IS ONLY INDICATIVE, IT MAY VARY ACC. TO SPACE AVAILABLE WHILE MANUFACTURING.

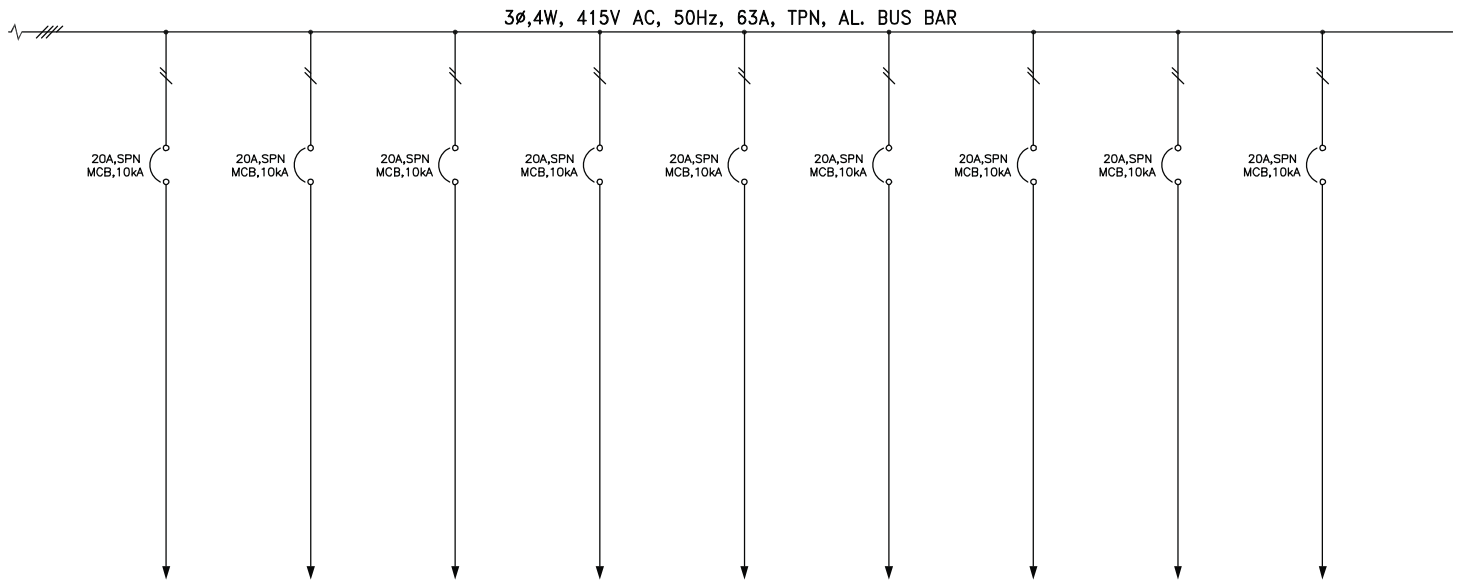
NOTES :-

01. CABLE ENTRY	: TOP/BOTTOM (UNDRILLED GLAND PLATE-3.0mm)	
02. MAIN BUS BAR	: PHASE - 1x25x6mm AL. OR EQ.	63A,TPN
3PHASE, 4WIRE	: NEUTRAL - 1x25x3mm AL. OR EQ.	
	: EARTHING - M10 GI BOLT	
03. FABRICATION	: ENCLOSURE BODY - 2.5 MM CRCA	
	: DOORS - 2.0 MM CRCA	
	: DEGREE OF PROTECTION - IP54 (INDOOR)	
04. INSTALLATION	: WALL / COLUMN MOUNTED	
05. MCCB	: ROTARY OPERATING HANDLE FOR MCCB	



FEEDER NO.	1	2	3	4	5	6	7	8	9	10
FEEDER TYPE	MCCB INCOMER	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	INCOMER	*	*	*	*	*	*	*	*	*
FEEDER RATING	63A,TP+N	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	1F1	2F1.1	2F1.2	2F1.3	2F1.4	2F1.5	2F1.6	2F1.7	2F1.8	2F1.9
O/G CABLE SIZE/PH.	3.5Cx50 SQ.MM AL.ARM.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

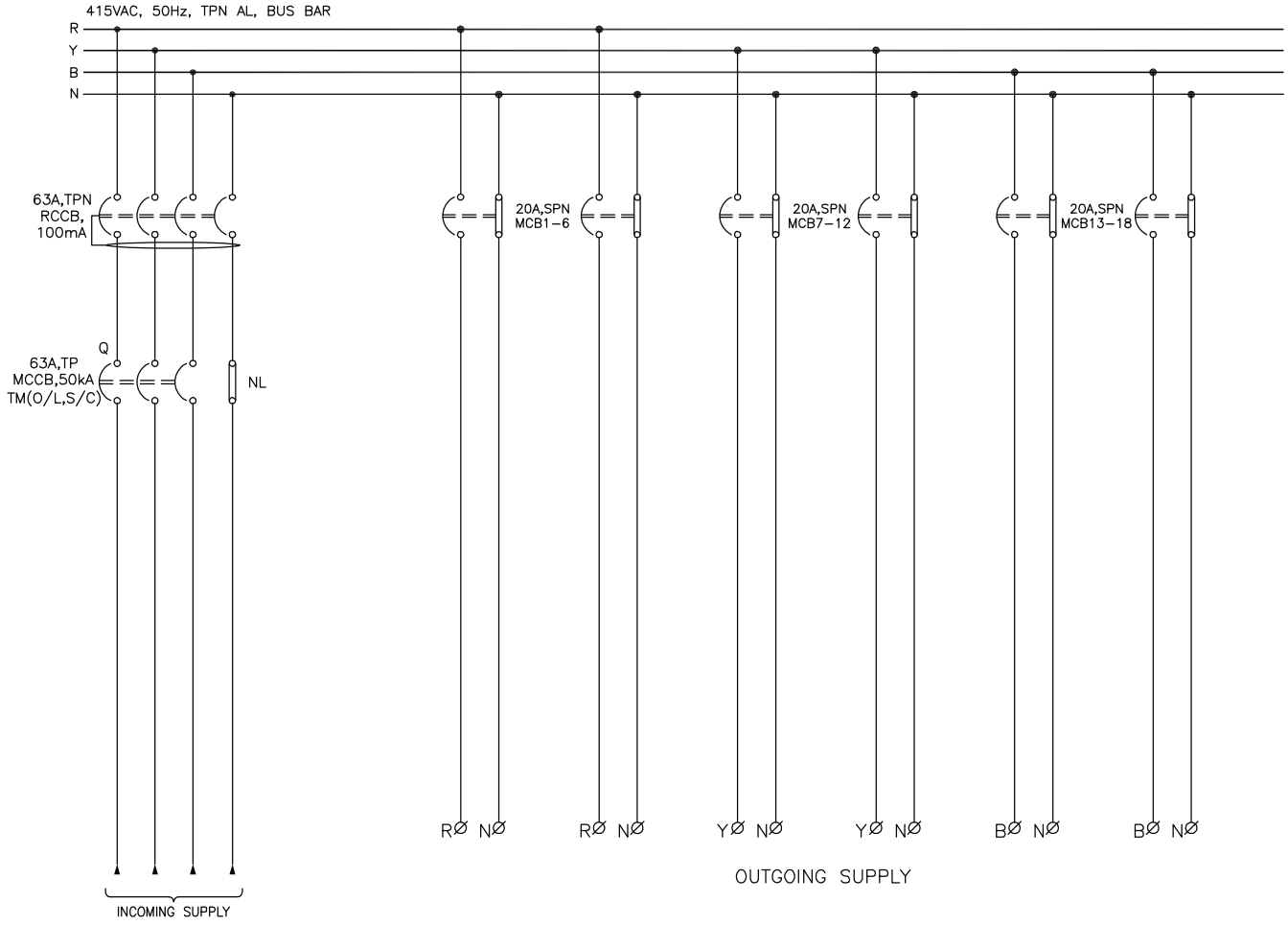
* REQUIRE OF FEEDER NAME



FEEDER NO.	11	12	13	14	15	16	17	18	19
FEEDER TYPE	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	*	*	*	*	*	*	*	*	*
FEEDER RATING	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	2F1.10	2F1.11	2F1.12	2F1.13	2F1.14	2F1.15	2F1.16	2F1.17	2F1.18
O/G CABLE SIZE/PH.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

* REQUIRE OF FEEDER NAME

S. No.	LEGEND	DESCRIPTION	MAKE	QTY.
10		**LIGHTING PANELS AC NORMAL/EMERGENCY INDOOR TYPE LP - A (18)**		
		INCOMER FEEDER		**1**
1	MCCB	MCCB 63A, TP+N, 50kA THERMAL MAGNETIC RELEASE WITH O/C & S/C PROTECTION	C&S/L&T/SCH./SIEMENS/GE	1
2	MCCB H	ROTARY HANDLE FOR 63A MCCB	C&S/L&T/SCH./SIEMENS/GE	1
3	RCCB	RCCB 63A, TPN, 100mA	C&S/L&T/SCH./SIEMENS/ABB/ MDS/INDOASIAN	1
4	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	8
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 1.1/2"	INCAB/DOWELLS/COMMET/ BALIGA	1
6	LUGS	ALUMINIUM LUGS 50MM RING Ø 8MM	DOWELLS/UNIVERSAL	3
7	LUGS	ALUMINIUM LUGS 25MM RING Ø 8MM	DOWELLS/UNIVERSAL	1
		OUTGOING		
		MCB 20A SPN		**18**
1	MCB	MCB 20A, SPN, 10kA, C-CURVE	SCH./MDS/INDOASIAN/S&S	18
2	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	36
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 3/4"	INCAB/DOWELLS/COMMET/ BALIGA	18
6	LUGS	ALUMINIUM LUGS 6MM RING Ø 8MM	DOWELLS/UNIVERSAL	36


415VAC, 50Hz, TPN AL, BUS BAR
R
Y
B
N
63A,TPN
RCCB,
100mA
Q
63A,TP
MCCB,50kA
TM(O/L,S/C)
NL
20A,SPN
MCB1–6
20A,SPN
MCB7–12
20A,SPN
MCB13–18
RØ NØ
RØ NØ
YØ NØ
YØ NØ
BØ NØ
BØ NØ
OUTGOING SUPPLY
INCOMING SUPPLY

561262/2021/PS-PEM-EL

SL. NO.	LIST OF GA DRAWINGS	Quantity available at site
1	GA DRAWING OF LIGHTING PANEL AC NORMAL / EMERGENCY OUTDOOR TYPE LP-A(12)	2
2	GA DRAWING OF STREET LIGHTING PANEL TYPE LP-S(6)	2

GA DRAWING OF
LGT. PANEL AC NORMAL/EMG. OUTDOOR TYPE LP-A (12)

GENERAL NOTES

A. FABRICATION

1. ALL DIMENSIONS ARE IN mm.
2. THE PANEL BOARD SHALL BE CUBICAL DESIGN, NON–COMPARTMENTALIZED, COLUMN MOUNTED, AS SHOWN IN GA DRAWING.
3. THE PANEL BOARD SHALL BE SUITABLE FOR DEGREE OF PROTECTION AS FOLLOWING :
   (A) INDOOR PANEL – IP54
   (B) OUTDOOR PANEL – IP55 WITH CANOPY
4. THE PANEL SHALL BE FABRICATED WITH :
   (A) LOADBEARINGMEMBERS – 2.5MM CRCA.
   (B) DOOR – 2.0MM CRCA.
   (C) REMOVABLE GLAND PLATE – 3.0MM HR
   (D) BASE CHANNEL – N/A
   (E) CABLE ENTRIES SHALL BE TOP/BOTTOM
   (F) TOLERANCE SHALL BE AS PER IS STANDARDS.

B. PAINTING

1. PRE– TREATMENT OF PANEL BOARD SHALL BE CARRIED OUT BEFORE PAINTING WITH EIGHT TANK PROCESS i.e DEGREASING, WATER RINSING–I, DERUSTING, WATER RINSING–II, PHOSPHATING, WATER RINSING–III AND PASSIVATION.
2. THE PANEL SHALL BE PAINTED WITH (POWDER COATING)
   (A) ENCLOSURE – SIEMENS GREY RAL–7035 (EPOXY PAINT)
   (B) MOUNTING PLATE – ORANGE FOR CRCA SHEET / UNPAINTED FOR GP SHEET
3. POWDER COATING SHALL BETWEEN 60–80 MICRONS.

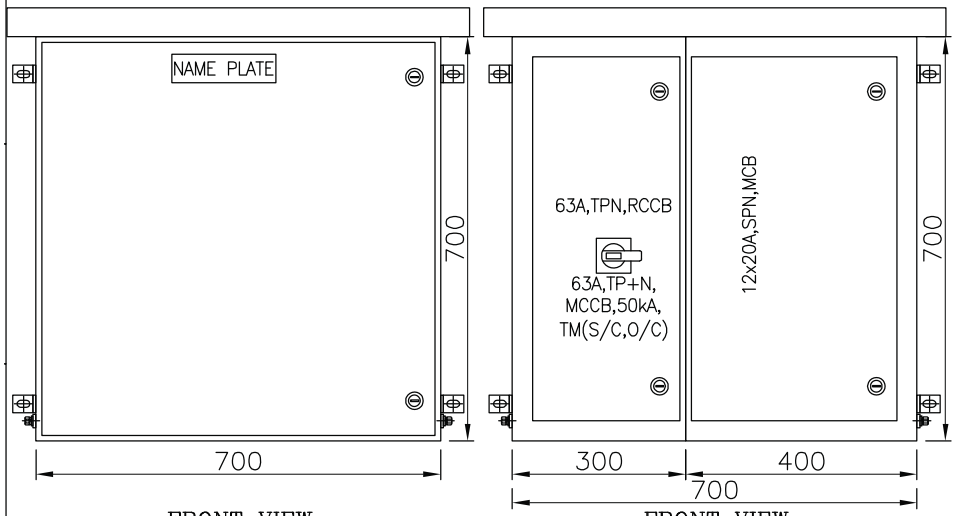
C. ASSEMBLY

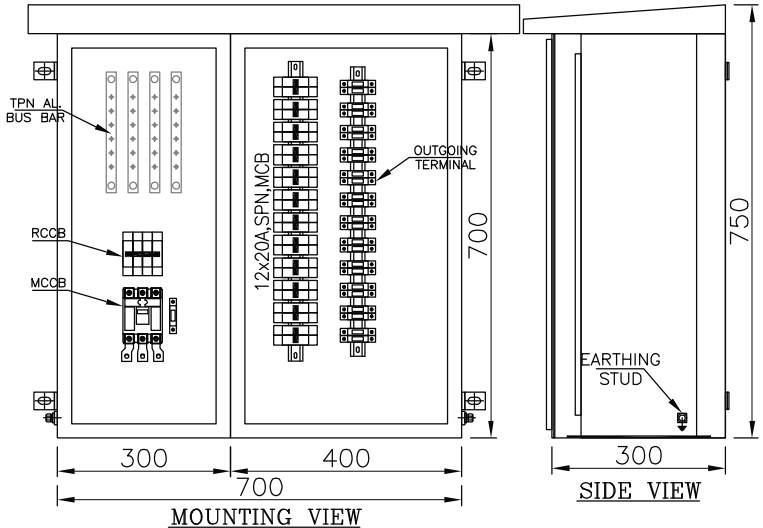
1. THE PANEL BOARD SHALL BE SUITABLE FOR 3PHASE, 4WIRE 415±10%, 50HZ±5%, AC SUPPLY
2. MAIN AL. BUS BAR LINKS SHALL BE PROVIDED WITH HEAT SHRINKABLE PVC SLEEVES WITH RED, YELLOW, BLUE, & BLACK COLOUR CODING.
3. NEOPRENE GASKET SHALL BE PROVIDED INSIDE THE DOOR TO MAKE THE DUST & VERMIN PROOF.
4. THE MINIMUM CLEARANCE SHALL BE AS FOLLOWING :
   (A) BETWEEN PHASE TO PHASE – 25mm
   (B) BETWEEN PHASE TO NEUTRAL – 20mm
   (C) BETWEEN PHASE TO EARTH – 20mm
   (D) BETWEEN NEUTRAL TO EARTH – 20mm
5. BUSBAR SUPPORTS SHALL BE OF NON HYGROSCOPIC DMC/SMC SUPPORTS.

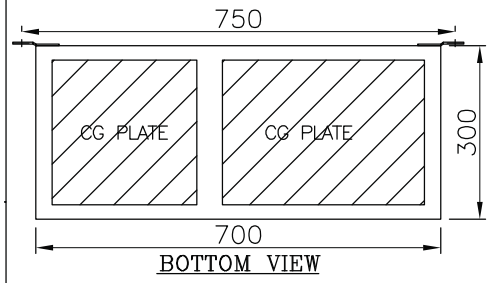
D. WIRING

1. ALL CONTROL WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) AC CONTROL CIRCUIT : 2.5 Sq. mm Cu. WIRE (GREY / BLACK COLOUR)
   (C) EARTH WIRE CIRCUIT : 2.5 Sq.mm Cu. mm (GREEN COLOUR)
2. ALL POWER WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) UPTO 20A : 4.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (B) 21A TO 32A : 6.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (C) 35A TO 40A : 10.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
   (D) 41A TO 63A : 16.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
3. ALL DOOR SHALL BE EARTH WITH GREEN COLOUR COPPER WIRE.
4. ALL LIVE PART SHALL BE SHROUDED BY BAKELITE/ACRYLIC/PVC SHEET.
5. DESIGNATION AND CAUTION NOTICE PLATES SHALL FIXED ON FRONT COVER AND A DIRECTORY FIXED ON INSIDE OF THE FRONT COVER. THE PLATE SHALL BE OF ANODIZED ALUMINIUM WITH INSCRIPTIONS INDELIBLY ETCHED
6. MCCB SHALL BE PROVIDED FULLY RATED FOR SHORT CIRCUIT LEVEL & MCB SHALL BE OVERLOAD & SHORT CIRCUIT PROTECTION, AND SHORT CIRCUIT LEVEL 10kA (MAXIMUM)
7. BUS BAR SHALL BE ELECTROLYTIC GRADE HARD DRAWN ALUMINUM, COLOUR CODED FOR EASY IDENTIFICATION AND DESIGNED FOR A MAXIMUM TEMPERATURE OF 85°C. THE CURRENT DENSITY OF ALUMINUM BUS BAR SHALL BE 0.8AMP/SQ.MM.
8. TWO GROUND PADS WITH M10 G.I. BOLTS AND NUTS SHALL BE PROVIDED IN BOTH SIDE.
9. ALL MCCB (APPLICABLE FOR AC LIGHTING PANEL ONLY) SHALL BE SINGLE THROW, AIR BREAK AND HEAVY DUTY TYPE HAVING QUICK–MAKE QUICK–BREAK CONTACTS FUSES SHALL BE HRC LINK TYPE.
10. ALL WIRING FROM LIGHTING PANELS TO FIXTURES AND RECEPTACLES SHALL BE CARRIED OUT BY PVC WIRES IN G.I. CONDUITS BY BHEL
11. 4SWG WIRE SHALL BE USED FOR EARTHING THE AC LIGHTING PANEL AT TWO POINTS. SUPPLY OF WIRE AND EARTHING WORK FOR THE SAME WILL BE IN BHEL SCOPE

1.	MCCB SHALL BE THERMAL MAGNETIC RELEASE (OVERLOAD, SHORT CIRCUIT) RATED SHORT CIRCUIT 50kA, Ics=50% Icu WITH DOOR INTERLOCK IN OFF POSITION
2.	RCCB TPN, 100mA
3.	MCB SHALL BE MANUAL OPERATION AND AUTOMATIC TRIP ON OVERLOAD & SHORT CIRCUIT. SHORT CIRCUIT LEVEL SHALL BE 10kA (MAXIMUM) C–CURVE
4.	POWER TERMINAL BLOCK UP TO 32A SCREW TYPE & 40A TO 63A M6 STUD TYPE.
5.	DOUBLE COMPRESSION CABLE GLAND AND LUGS SHALL BE SUPPLIED BY CMKL 1. GLANDS FOR 3.5x50SQMM AL. ARMD CABLE (1.1/2" OR EQ.) 2. GLANDS FOR 2x6SQMM CU. WIRE (3/4" OR EQ.)



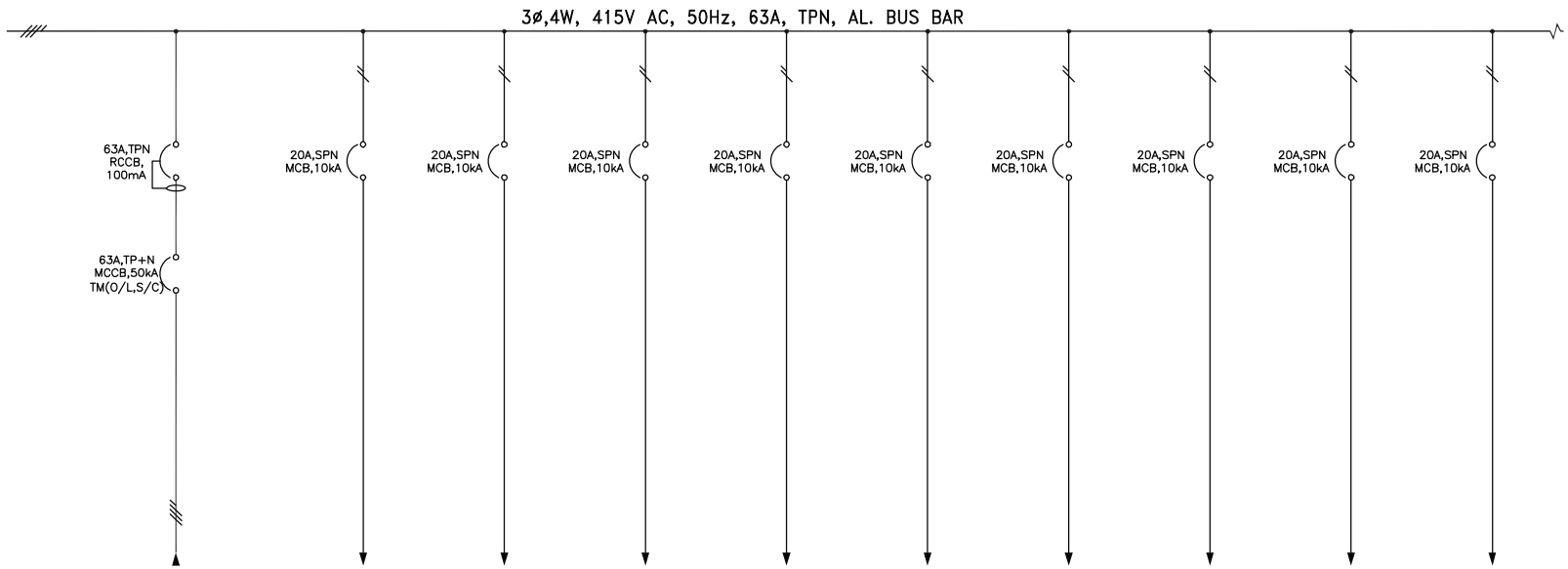




ALL COMPONENTS POSITION, SHOWN IN MOUNTING VIEW IS ONLY INDICATIVE, IT MAY VARY ACC. TO SPACE AVAILABLE WHILE MANUFACTURING.

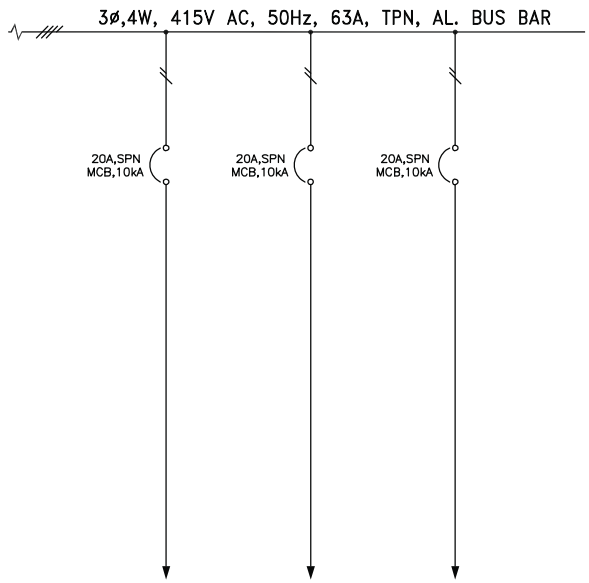
NOTES :-

01. CABLE ENTRY	: BOTTOM ONLY (UNDRILLED GLAND PLATE-3.0mm)	
02. MAIN BUS BAR	: PHASE - 1x25x6mm AL. OR EQ.	63A,TPN
3PHASE, 4WIRE	: NEUTRAL - 1x25x3mm AL. OR EQ.	
	: EARTHING - M10 GI BOLT	
03. FABRICATION	: ENCLOSURE BODY - 2.5 MM CRCA	
	: DOORS - 2.0 MM CRCA	
	: DEGREE OF PROTECTION - IP55 (OUTDOOR)	
04. INSTALLATION	: WALL / COLUMN MOUNTED	
05. MCCB	: ROTARY OPERATING HANDLE FOR MCCB	



FEEDER NO.	1	2	3	4	5	6	7	8	9	10
FEEDER TYPE	MCCB INCOMER	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	INCOMER	*	*	*	*	*	*	*	*	*
FEEDER RATING	63A,TP+N	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	1F1	2F1.1	2F1.2	2F1.3	2F1.4	2F1.5	2F1.6	2F1.7	2F1.8	2F1.9
O/G CABLE SIZE/PH.	3.5Cx50 SQ.MM AL.ARM.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

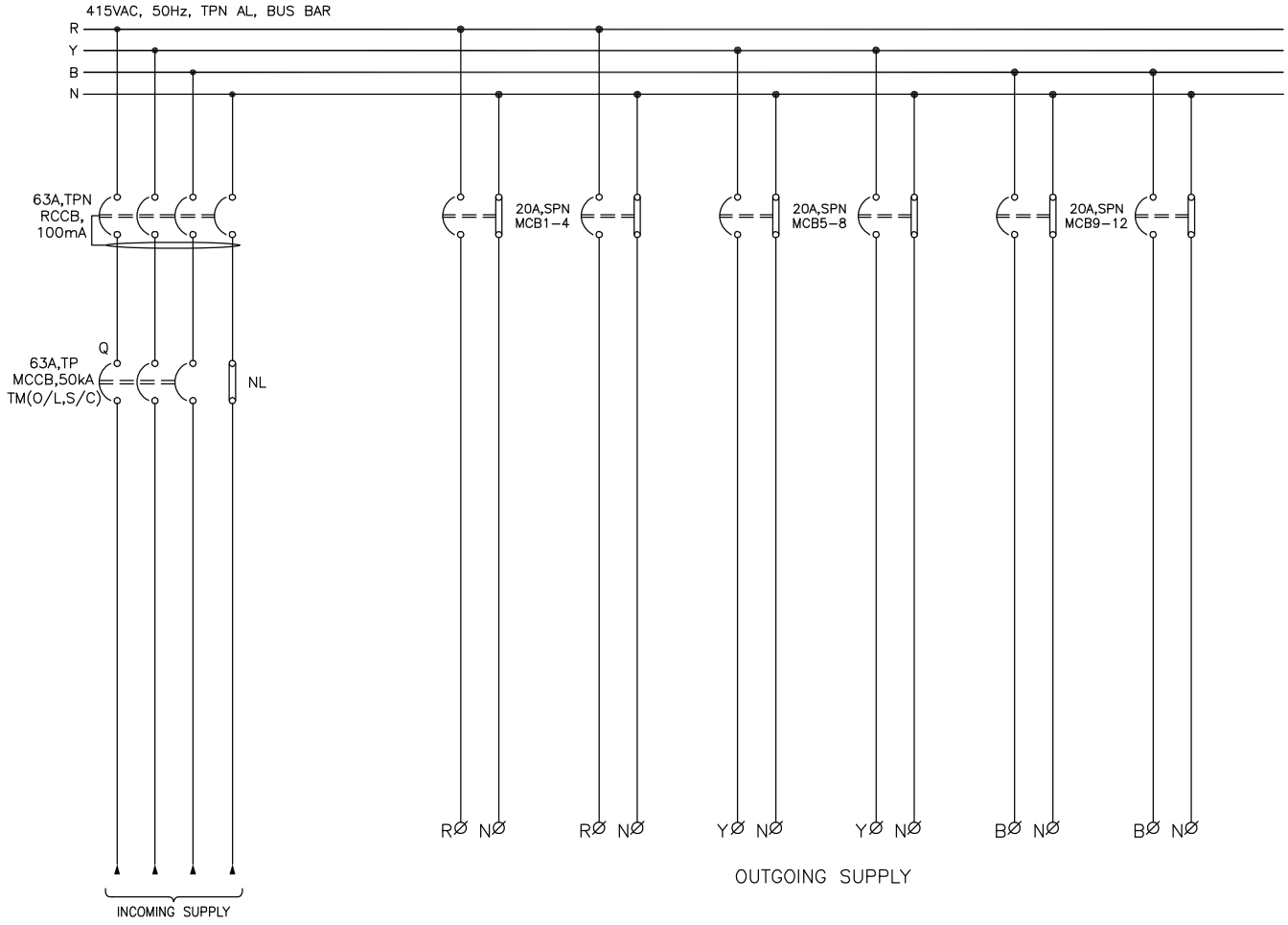
* REQUIRE OF FEEDER NAME



FEEDER NO.	11	12	13
FEEDER TYPE	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	*	*	*
FEEDER RATING	20A, SPN	20A, SPN	20A, SPN
FEEDER LOCATION	2F1.10	2F1.11	2F1.12
O/G CABLE SIZE/PH.	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE	2.5/4/6SQ.MM CU. WIRE

* REQUIRE OF FEEDER NAME

S. No.	LEGEND	DESCRIPTION	MAKE	QTY.
8		**LIGHTING PANELS AC NORMAL/EMERGENCY OUTDOOR TYPE LP - A (12)**		
		INCOMER FEEDER		**1**
1	MCCB	MCCB 63A, TP+N, 50kA THERMAL MAGNETIC RELEASE WITH O/C & S/C PROTECTION	C&S/L&T/SCH./SIEMENS/GE	1
2	MCCB H	ROTARY HANDLE FOR 63A MCCB	C&S/L&T/SCH./SIEMENS/GE	1
3	RCCB	RCCB 63A, TPN, 100mA	C&S/L&T/SCH./SIEMENS/ABB/ MDS/INDOASIAN	1
4	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	8
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 1.1/2"	INCAB/DOWELLS/COMMET/ BALIGA	1
6	LUGS	ALUMINIUM LUGS 50MM RING Ø 8MM	DOWELLS/UNIVERSAL	3
7	LUGS	ALUMINIUM LUGS 25MM RING Ø 8MM	DOWELLS/UNIVERSAL	1
		OUTGOING		
		MCB 20A SPN		**12**
1	MCB	MCB 20A, SPN, 10kA, C-CURVE	SCH./MDS/INDOASIAN/S&S	12
2	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	24
5	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 3/4"	INCAB/DOWELLS/COMMET/ BALIGA	12
6	LUGS	ALUMINIUM LUGS 6MM RING Ø 8MM	DOWELLS/UNIVERSAL	24


415VAC, 50Hz, TPN AL, BUS BAR
R
Y
B
N
63A,TPN
RCCB,
100mA
Q
63A,TP
MCCB,50kA
TM(O/L,S/C)
NL
20A,SPN
MCB1–4
20A,SPN
MCB5–8
20A,SPN
MCB9–12
RØ NØ
RØ NØ
YØ NØ
YØ NØ
BØ NØ
BØ NØ
OUTGOING SUPPLY
INCOMING SUPPLY

GA DRAWING OF
STREET LIGHTING PANEL TYPE LP-S (6)

GENERAL NOTES

A. FABRICATION

1. ALL DIMENSIONS ARE IN mm.
2. THE PANEL BOARD SHALL BE CUBICAL DESIGN, NON–COMPARTMENTALIZED, COLUMN MOUNTED, AS SHOWN IN GA DRAWING.
3. THE PANEL BOARD SHALL BE SUITABLE FOR DEGREE OF PROTECTION AS FOLLOWING :
   (A) INDOOR PANEL – IP54
   (B) OUTDOOR PANEL – IP55 WITH CANOPY
4. THE PANEL SHALL BE FABRICATED WITH :
   (A) LOADBEARINGMEMBERS – 2.5MM CRCA.
   (B) DOOR – 2.0MM CRCA.
   (C) REMOVABLE GLAND PLATE – 3.0MM HR
   (D) BASE CHANNEL – N/A
   (E) CABLE ENTRIES SHALL BE TOP/BOTTOM
   (F) TOLERANCE SHALL BE AS PER IS STANDARDS.

B. PAINTING

1. PRE– TREATMENT OF PANEL BOARD SHALL BE CARRIED OUT BEFORE PAINTING WITH EIGHT TANK PROCESS i.e DEGREASING, WATER RINSING–I, DERUSTING, WATER RINSING–II, PHOSPHATING, WATER RINSING–III AND PASSIVATION.
2. THE PANEL SHALL BE PAINTED WITH (POWDER COATING)
   (A) ENCLOSURE – SIEMENS GREY RAL–7035 (EPOXY PAINT)
   (B) MOUNTING PLATE – ORANGE FOR CRCA SHEET / UNPAINTED FOR GP SHEET
3. POWDER COATING SHALL BETWEEN 60–80 MICRONS.

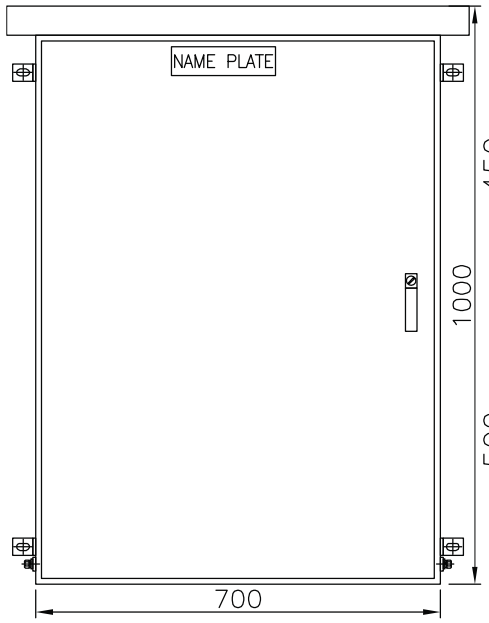
C. ASSEMBLY

1. THE PANEL BOARD SHALL BE SUITABLE FOR 3PHASE, 4WIRE 415±10%, 50HZ±5%, AC SUPPLY
2. MAIN AL. BUS BAR LINKS SHALL BE PROVIDED WITH HEAT SHRINKABLE PVC SLEEVES WITH RED, YELLOW, BLUE, & BLACK COLOUR CODING.
3. THE AL. BUS BAR SHALL BE HIGH CONDUCTIVITY ELECTROLYTE GRADE E91E
4. NEOPRENE GASKET SHALL BE PROVIDED INSIDE THE DOOR TO MAKE THE DUST & VERMIN PROOF.
5. THE MINIMUM CLEARANCE SHALL BE AS FOLLOWING :
   (A) BETWEEN PHASE TO PHASE – 25mm
   (B) BETWEEN PHASE TO NEUTRAL – 20mm
   (C) BETWEEN PHASE TO EARTH – 20mm
   (D) BETWEEN NEUTRAL TO EARTH – 20mm
6. BUSBAR SUPPORTS SHALL BE OF NON HYGROSCOPIC DMC/SMC SUPPORTS.

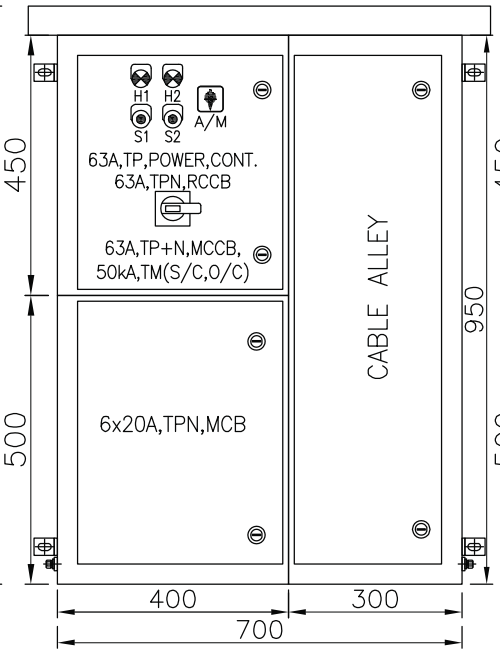
D. WIRING

1. ALL CONTROL WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) AC CONTROL CIRCUIT : 2.5 Sq. mm Cu. WIRE (GREY / BLACK COLOUR)
   (C) EARTH WIRE CIRCUIT : 2.5 Sq.mm Cu. mm (GREEN COLOUR)
2. ALL POWER WIRING SHALL BE DONE USING 1.1kV WITH Cu. FLEXIBLE (PVC) WIRE AS UNDER :–
   (A) UPTO 20A : 4.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (B) 21A TO 32A : 6.0 Sq. mm Cu. WIRE (RED, YELLOW, BLUE & BLACK COLOUR)
   (C) 35A TO 40A : 10.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
   (D) 41A TO 63A : 16.0 Sq. mm Cu. WIRE (BLACK COLOR WITH COLOUR SLEEVE OF EACH)
3. ALL DOOR SHALL BE EARTH WITH GREEN COLOUR COPPER WIRE.
4. ALL LIVE PART SHALL BE SHROUDED BY BAKELITE/ACRYLIC/PVC SHEET.
5. DESIGNATION AND CAUTION NOTICE PLATES SHALL FIXED ON FRONT COVER AND A DIRECTORY FIXED ON INSIDE OF THE FRONT COVER. THE PLATE SHALL BE OF ANODIZED ALUMINIUM WITH INSCRIPTIONS INDELIBLY ETCHED
6. MCCB SHALL BE PROVIDED FULLY RATED FOR SHORT CIRCUIT LEVEL & MCB SHALL BE OVERLOAD & SHORT CIRCUIT PROTECTION, AND SHORT CIRCUIT LEVEL 10kA (MAXIMUM)
7. BUS BAR SHALL BE ELECTROLYTIC GRADE HARD DRAWN ALUMINUM, COLOUR CODED FOR EASY IDENTIFICATION AND DESIGNED FOR A MAXIMUM TEMPERATURE OF 85°C. THE CURRENT DENSITY OF ALUMINUM BUS BAR SHALL BE 0.8AMP/SQ.MM.
8. TWO GROUND PADS WITH M10 G.I. BOLTS AND NUTS SHALL BE PROVIDED IN BOTH SIDE.
9. ALL MCCB (APPLICABLE FOR AC LIGHTING PANEL ONLY) SHALL BE SINGLE THROW, AIR BREAK AND HEAVY DUTY TYPE HAVING QUICK–MAKE QUICK–BREAK CONTACTS FUSES SHALL BE HRC LINK TYPE.
10. ALL WIRING FROM LIGHTING PANELS TO FIXTURES AND RECEPTACLES SHALL BE CARRIED OUT BY PVC WIRES IN G.I. CONDUITS BY BHEL
11. 4SWG WIRE SHALL BE USED FOR EARTHING THE AC LIGHTING PANEL AT TWO POINTS. SUPPLY OF WIRE AND EARTHING WORK FOR THE SAME WILL BE IN BHEL SCOPE

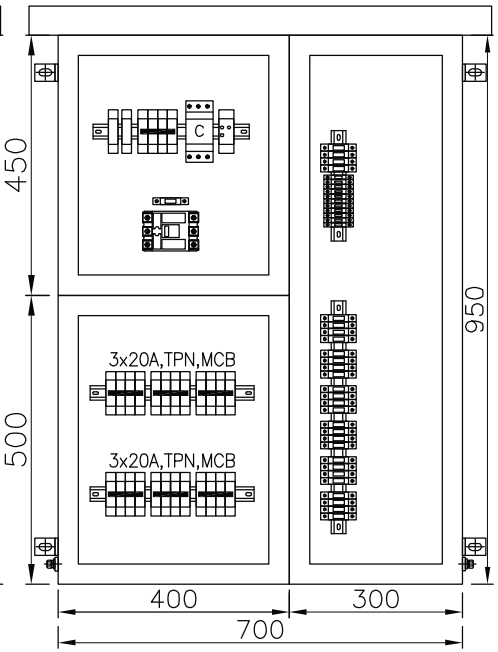
1.	MCCB SHALL BE THERMAL MAGNETIC RELEASE (OVERLOAD, SHORT CIRCUIT) RATED SHORT CIRCUIT 50kA, Ics=50% Icu WITH DOOR INTERLOCK IN OFF POSITION
2.	RCCB 100mA
3.	POWER CONTACTOR AC–1 DUTY
4.	A/M SEL. SW. STAY PUT, 2POLE, 2WAY WITH OFF
5.	INDICATION LAMP LED TYPE
6.	MCB SHALL BE MANUAL OPERATION AND AUTOMATIC TRIP ON OVERLOAD & SHORT CIRCUIT. SHORT CIRCUIT LEVEL SHALL BE 10kA (MAXIMUM) C–CURVE
7.	TIMER SWITCH WITH PHOTOCELL TYPE INBUILT AUTOMATIC VOLTAGE STABILIZER AND NECESSARY ELECTRONIC UNITWITH PROVISION FOR SENSITIVITY ADJUSTMENT DEPENDING ON EXTERNAL LIGHT INTENSITY
8.	POWER TERMINAL BLOCK UP TO 32A SCREW TYPE & 40A TO 63A M6 STUD TYPE.
9.	DOUBLE COMPRESSION CABLE GLAND AND LUGS SHALL BE SUPPLIED BY CMKL 1. GLANDS FOR 3.5x50SQMM AL. ARMD CABLE (1.1/2" OR EQ.) 2. GLANDS FOR 3.5x25SQMM AL. ARMD CABLE (1" OR EQ.)



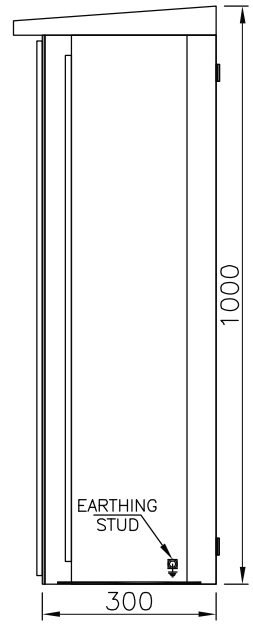
FRONT VIEW
WITH OUTER DOOR CLOSED



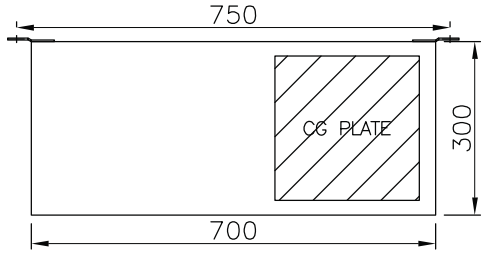
FRONT VIEW
WITH OUTER DOOR OPENED



FRONT VIEW
WITH OUTER DOOR OPENED



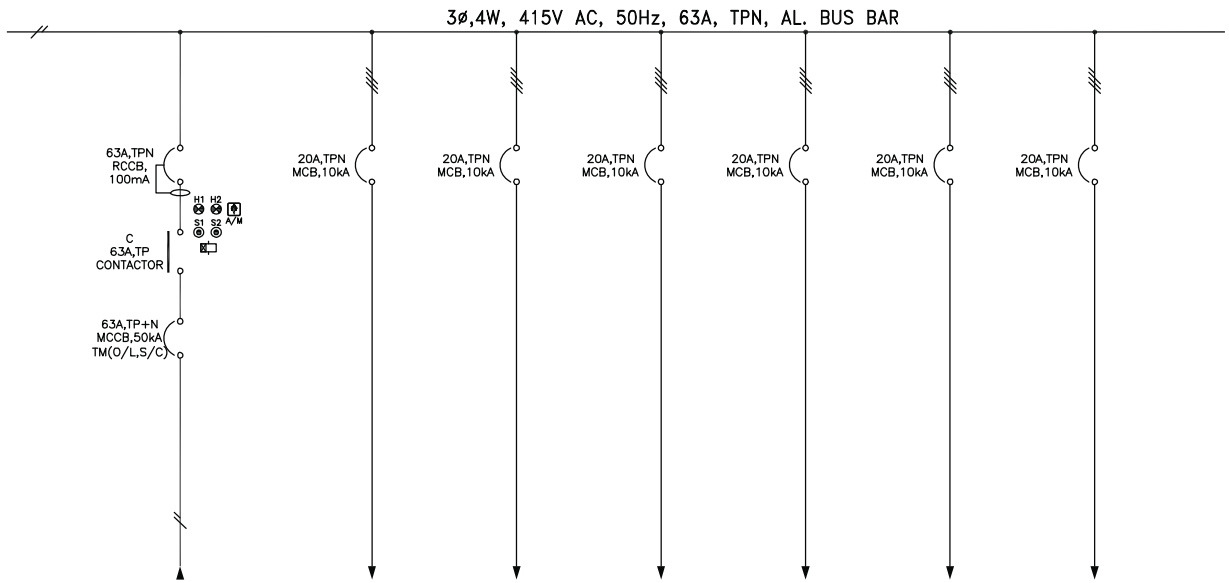
SIDE VIEW



BOTTOM VIEW

NOTES :-

01. CABLE ENTRY : BOTTOM ONLY (UNDRILLED GLAND PLATE-3.0mm)
02. MAIN BUS BAR : PHASE - 1x25x6mm AL. OR EQ.] 63A,TPN
3PHASE, 4WIRE : NEUTRAL - 1x25x3mm AL. OR EQ.]
: EARTHING - M10 GI BOLT
03. FABRICATION : ENCLOSURE BODY - 2.5 MM CRCA
: DOORS - 2.0 MM CRCA
: DEGREE OF PROTECTION - IP55 (OUTDOOR)
04. INSTALLATION : WALL / COLUMN MOUNTED
05. MCCB : ROTARY OPERATING HANDLE FOR MCCB



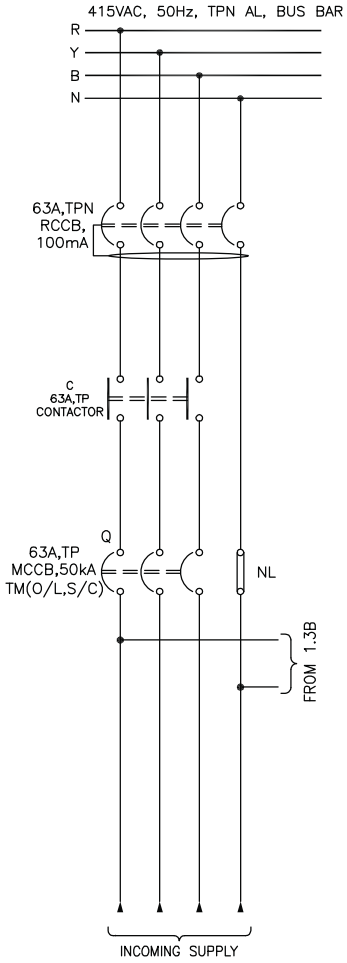
FEEDER NO.	1	2	3	4	5	6	7
FEEDER TYPE	MCCB INCOMER	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G	MCB O/G
FEEDER NAME	INCOMER	*	*	*	*	*	*
FEEDER RATING	63A,TP+N	20A, TPN	20A, TPN	20A, TPN	20A, TPN	20A, TPN	20A, TPN
FEEDER LOCATION	1F1	2F1.1	2F1.2	2F1.3	2F1.4	2F1.5	2F1.6
O/G CABLE SIZE/PH.	3.5Cx50 SQ.MM AL.ARM.	3.5Cx25SQ.MMAL.ARM.	3.5Cx25SQ.MMAL.ARM.	3.5Cx25SQ.MMAL.ARM.	3.5Cx25SQ.MMAL.ARM.	3.5Cx25SQ.MMAL.ARM.	3.5Cx25SQ.MMAL.ARM.

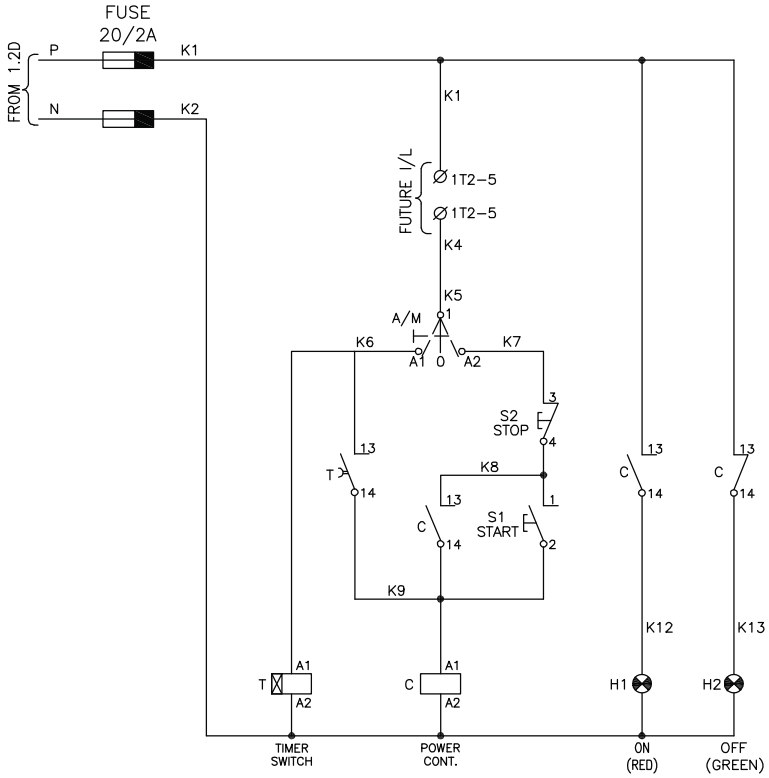
* REQUIRE OF FEEDER NAME

ALL DIMENSIONS ARE IN MM

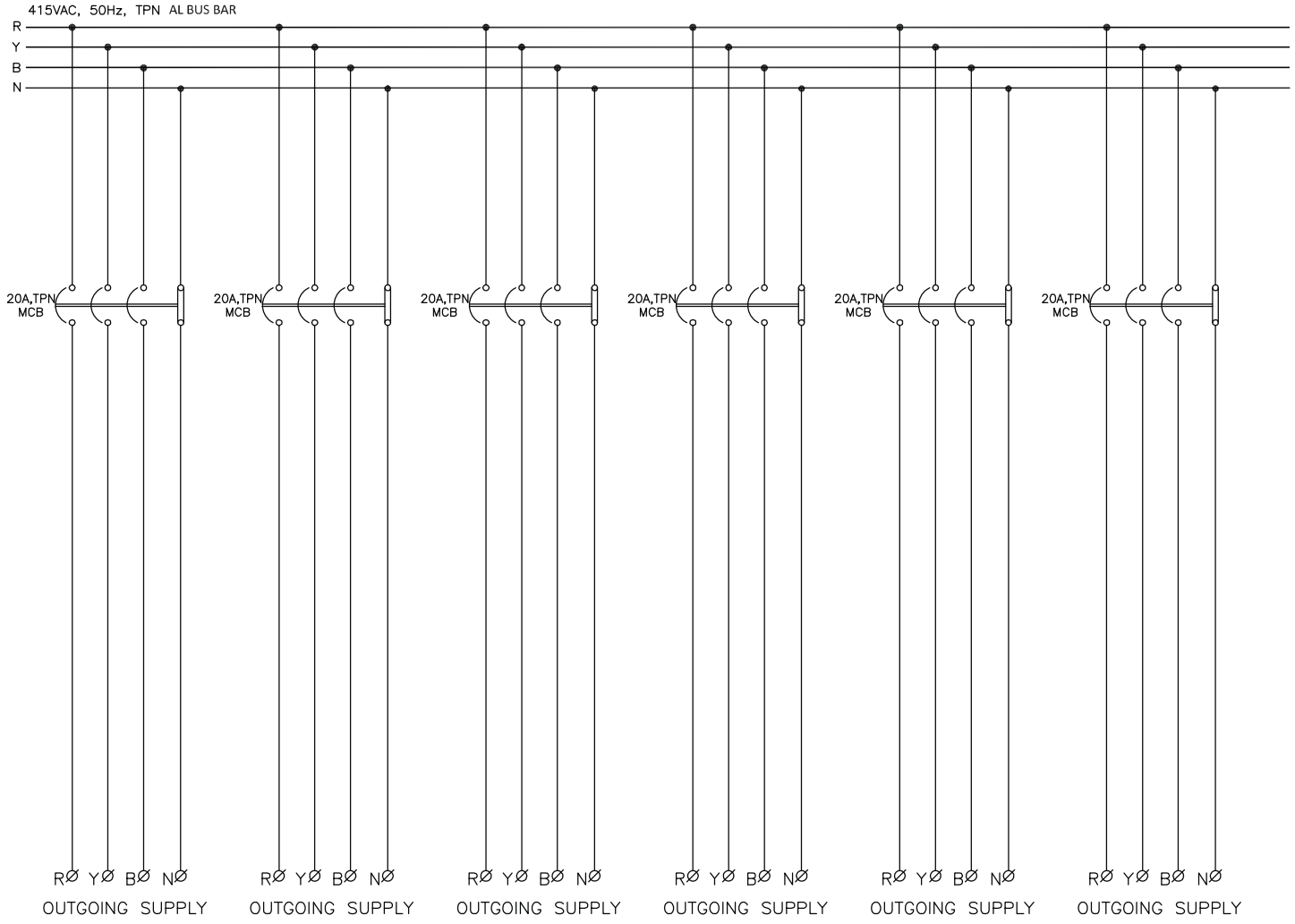
S. No.	LEGEND	DESCRIPTION	MAKE	QTY.
14		**STREET LIGHTING TYPE LP-S (6)**		
		INCOMER FEEDER		**1**
1	MCCB	MCCB 63A, TP-N, 50kA THERMAL MAGNETIC RELEASE WITH O/C & S/C PROTECTION	C&S/L&T/SCH./SIEMENS/GE	1
2	MCCBH	ROTARY HANDLE FOR 63A MCCB	C&S/L&T/SCH./SIEMENS/GE	1
3	RCCB	RCCB 63A, TPN, 100mA	C&S/L&T/SCH./SIEMENS/ABB/ MDS/INDOASIAN	1
4	CONT.	POWER CONTACTOR 63 TP, WITH AUX. CONTACT	L&T/SCH./SIEMENS/GE/BCH	1
5	T	24Hrs. TIMER WITH PHOTOCELL TYPE, 1C/O, 230V AC	ESSEN/BCH/ALSTOM/L&T/ SCHNEIDER	1
6	SS	A/M SELECTOR SWITCH 6A, 2P, 2W WITH OFF	KAYSEE/GE/ALSTOM/SCHNEIDER /SHRENIK	1
7	PB	PUSH BUTTON START-GREEN, STOP-RED WITH 1NO+1NC ELE.	C&S/VAISHNO/SCH./SIEMENS	2
8	LED	INDICATION LED TYPE ON-RED, OFF-GREEN 230V AC	C&S/VAISHNO/SCH./SIEMENS	2
9	CF	CONTROL FUSE WITH BASE 20/2A	C&S/L&T/SCH./SIEMENS/ABB/ INDOASIAN	1
10	REP.	NEUTRAL LINK 32A	REPUTED	1
11	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	8
12	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 1.1/2"	INCAB/DOWELLS/COMMET/ BALIGA	1
13	LUGS	ALUMINIUM LUGS 50MM RING Ø 8MM	DOWELLS/UNIVERSAL	3
14	LUGS	ALUMINIUM LUGS 25MM RING Ø 8MM	DOWELLS/UNIVERSAL	1
		OUTGOING		
		MCB 20A TPN		**6**
1	MCB	MCB 20A, TPN, 10kA, C-CURVE	SCH./MDS/INDOASIAN/S&S	6
2	TB	TERMINAL BLOCK	WAGO/CONNECTWELL/ELMEX/ ESSEN/PHOENIX	24
3	CB	DOUBLE COMPRESSION TYPE CABLE GLAND 1"	INCAB/DOWELLS/COMMET/ BALIGA	6
4	LUGS	ALUMINIUM LUGS 25MM RING Ø 8MM	DOWELLS/UNIVERSAL	18
5	LUGS	ALUMINIUM LUGS 16MM RING Ø 8MM	DOWELLS/UNIVERSAL	6

SCHEME
INCOMER





SCHEME
OUTGOING



561262/2021/PS-PEM-EL

SUB-VENDOR LIST

ITEM DESCRIPTION	VENDOR NAME	REMARKS
AC CONTACTORS	SIEMENS	
	GE-POWER	
	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	TAKEN OVER BY SCHNEIDER
	L&T	
	BCH	
AC MCCB	C&S ELECTRIC LTD.	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	SIEMENS	
	GE-POWER	
	L&T	
	CROMPTON GREAVES	
AUXILIARY RELAYS	ABB	
	ALSTOM LTD	
	JYOTI LTD.	
	OEN INDIA LTD	
	SIEMENS	
CABLE CLAMPS & CABLE TIES	ELECTROMAC IND.CORPN.	
	INCAB	
	NOVOFLEX MARKETING PVT. LTD.	
CABLE GLANDS	ALLIED TRADERS & EXPORTERS	
	ARUP ENGG & FOUNDARY WORKS	
	BALIGA LIGHTING EQPT.PVT.LTD.	
	COMMET BRASS PRODUCTS	
	DOWELLS	
	ELECTROMAC INDUSTRIES	
	INCAB	
CABLE LUGS	DOWELLS	
	UNIVERSAL MACHINES LTD.	
EARTH LEAKAGE CB	L&T	
	SIEMENS	
	GE-POWER	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	C&S ELECTRIC LTD.	
	ABB	
	INDO ASIAN	
	MDS SWITCHGEAR LTD	
	S&S POWER SWITCHGEAR LTD,	
DC CONTACTORS	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	BHEL (BHOPAL)	
	ELECTROMAC INDUSTRIES	
	L&T	
	SIEMENS	
	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	TAKEN OVER BY SCHNEIDER
	GE-POWER	

CONTROL SWITCHES/ SELECTOR SWITCH	KAYCEE	
	GE-POWER	
	ALSTOM LTD	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	M/s Shrenik & Co.	
LT- CURRENT TRANSFORMER	SIEMENS	
	AUTOMATIC ELECTRIC LTD.	
	INDCOIL	
	KAPPA ELECTRICALS	
	PRAGATI ELECTRICALS	
	PRECISE ELECTRICALS	
	SILKAANS ELECT.MFG.CO.PVT.LTD	
	PRAYOG ELECTRICALS PVT. LTD.	
	C&S ELECTRIC LTD.	
	M/s Newtek Electricals	
LT- POTENTIAL TRANSFORMER	SIEMENS	
	AUTOMATIC ELECTRIC LTD.	
	INDCOIL	
	KAPPA ELECTRICALS	
	PRAGATI ELECTRICALS	
	PRECISE ELECTRICALS	
	SILKAANS ELECT.MFG.CO.PVT.LTD	
	PRAYOG ELECTRICALS PVT. LTD.	
	M/s Newtek Electricals	
DC SWITCH	GE-POWER	
	KAYCEE	
	SIEMENS	
FUSE BASE	INDO ASIAN	
	GE-POWER	
	L&T	
	C&S ELECTRIC LTD.	
	SIEMENS	
	ABB	
	SPACEAGE SWITCHGEARS LTD.	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	ALSTOM LTD	
	ESSEN DEINKI	
HRC FUSES	INDO ASIAN	
	GE-POWER	
	L&T	
	C&S ELECTRIC LTD.	
	SIEMENS	
	ABB	
	SPACEAGE SWITCHGEARS LTD.	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	ALSTOM LTD	
	ESSEN DEINKI	

INDICATING LAMPS	BCH	
	C&S ELECTRIC LTD.	
	ESSEN DEINKI	
	VAISHNO(HOTLINE SWGR.& CONTROL)	
	GE-POWER	
	SIEMENS	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
LIGHTING TRANSFORMER	AUTOMATIC ELECTRIC LTD.	
	INDCOIL	
	POWER PACK ENTERPRISES	
	VIJAY ELECTRICALS LTD.	
	GILBERT & MAXWELL	
	KAPPA ELECTRICALS	
	Ames Impex Electricals Pvt. Ltd	
MCB	MDS SWITCHGEAR LTD	
	INDO ASIAN	
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	S&S POWER SWITCHGEAR LTD,	
TERMINAL BLOCKS	WAGO-CONTROLS	
	CONNECT WELL	
	ELMEX CONTROLS PVT. LTD.	
	ESSEN DEINKI	
	TECHNOPLAST	
	M/s PHOENIX MECANO LTD.,	
	ESSEN DEINKI	
TIMERS - PNEUMATIC	BCH	
	ALSTOM LTD	
	L&T	
	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	TAKEN OVER BY SCHNEIDER
	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
	ELECTRONIC AUTOMATION PVT. LTD.	
TIMERS - ELECTRONIC	ESSEN DEINKI	
AMMETER	AUTOMATIC ELECTRIC LTD.	
	RISHABH INST.PVT LTD	
	M/s Newtek Electricals	
VOLTMETER	AUTOMATIC ELECTRIC LTD.	
	RISHABH INST.PVT LTD	
	M/s Newtek Electricals	
PVC WIRES	BIS APPROVED MAKE	
PHOTOELECTRIC SWITCH	REPUTED MAKE	

Note:

The makes of all equipment/ instrument under this specification shall be subject to owner's approval in the event of order. Owner reserves the right to accept/ reject any make or sub-vendor and to add new sub-vendors for the project after award of contract. Approval, rejection or addition of makes shall not have any price implication to the owner after award of contract.

561262/2021/PS-PEM-EL

PACKING SPECIFICATION FOR DISTRIBUTION BOARDS PACKAGE (LIGHTING DISTRIBUTION BOARDS AND LIGHTING PANELS)

DISTRIBUTION BOARDS (LDB & LP) shall be despatched in “Crate Packing” using wood.

1.0 PREPARATION OF PACKING CASES:

1.1 **DIMENSIONS:**

1.1.1 Minimum number of planks shall be used for a shook.
1.1.2 Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm
1.1.3 Horizontal, vertical, diagonal planks shall be given for binding
1.1.4 Width of binding planks shall be minimum 100mm
1.1.5 Distance between any 2 binding planks shall be less than 750mm
1.1.6 Diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
1.1.7 Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
1.1.8 Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

1.2 JOINTING OF PLANKS**:**

Single length planks shall be used for cubicles whose overall length is less than 2400 mm. For cubicles of length more than 2400 mm, jointing is permitted. The jointing shall be done with one single or maximum of 2 planks of wood same as other planks of width 250 mm (minimum) with two rows of nails on either side of the joint in zigzag manner. From the joint along height side, it shall be of lap joint with overlap of at least the width of plank.

1.3 PERMISSIBLE DEFECTS

Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc.

End splits: Longest end splits at each end shall be measured and lengths added together. The added length shall not exceed 60mm per meter run of shook’s. Wood pins shall be used to prevent further development of split.

Surface cracks: Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

1.4 OTHER MATERIALS

1.5.1 NAILS

Nils of suitable dia and length shall be used for joining the planks.

1.5.2 BLUE NAILS

If applicable, these shall be used for nailing bituminized Kraft paper/hessian cloth to the planks.

1.5.3 HOOP IRON STRIPS
These are used for strapping the boxes. The material shall be free from rust. If sufficient nailing is done for bigger boxes, strapping need not be done.

1.5.4 CLIPS

These shall be used for strapping the hoop iron strips on the boxes.

1.5.5 BRACKETS

Brackets of suitable dimension shall be used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of suitable thickness. The brackets shall be of “L" shape. Two holes shall be provided towards the end of each side for screwing /nailing.

1.5.6 MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM

Multi Layered Cross Laminated Polyethylene Film shall be used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

1.5.6 RUBBERISED COIR:

The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir.

1.5.7 FASTENERS

Bolts, double nuts, spring washers will have to be used to hold the job to the bottom plank of the box so that there shall be no jerk on the DISTRIBUTION BOARDS (LDB & LP) during transit.

1.5.8 PACKING SLIP:

Packing slip kept in the polyethylene bag shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder shall be nailed to front / rear of case.

1.5.9 MARKING PLATE:

Marking on the packing case shall be done as per the manufacturer standard.

SECTION – II

STANDARD TECHNICAL REQUIREMENTS

1.0 INTENT OF SPECIFICATION

1.1 The requirements given in specification shall be fully complied with.

1.2 The “design” shall broadly cover the selection of components, materials, sizes etc. for the equipment of supply in vendor’s scope. Complete responsibility of establishing the correctness of equipment design rests with the vendor.

1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship, and shall be capable of performing required function in a manner acceptable to Purchaser, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgement is not in full accordance herewith.

1.4 Make of all equipment and components shall be to the approval of Purchaser.

2.0 CODES & STANDARDS

2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.

2.2 The material, construction, manufacture, inspection and testing shall conform to the latest revisions of standards as specified in Data Sheet A.

2.3 In case of conflict between the applicable reference standard and this specification, stringent requirement shall govern.

3.0 DESIGN REQUIREMENTS

3.1 LIGHTING DISTRIBUTION BOARD (LDB) / WELDING DISTRIBUTION BOARD (WDB)

3.1.1 General Requirements of LDBs/ WDBs

a) LDB/WDB shall be totally enclosed, modular in construction, indoor type and suitable for electrical system data as specified in Data Sheet-A. The LDB/ WDB shall be free standing type suitable for installation on cable trenches / floor.

b) LDB/ WDB shall consist of dust and vermin proof cubicles without the use of louvers (except the transformer compartment, where applicable).

c) Good quality synthetic rubber / neoprene gaskets shall be put around the door, cover edges and cut-out edges for push button, lamps etc. for protection against dust. The door when closed, shall compress the gasket uniformly.

d) Cut-out edges for instruments, relays etc. shall have sufficient overlap surface to minimize the dust entry. The arrangement for the front mounting of switch

handles shall render the LDB/ WDB reasonably dust free such that the normal operations are not affected.

e) The LDB/ WDB shall be designed to prevent contact with live parts both within the modules and in the cable alley.

f) The bidder shall be responsible to check and coordinate the MCB characteristic with back up fuses etc. provided.

g) All equipment shall be constructed of non-hygroscopic and non-inflammable materials.

h) All components mounted in the LDB/ WDB shall be accessible and shall not impede access to wiring or terminals. All faults except busbar fault which may occur within any individual unit shall be confined within that unit only and shall not cause shutdown of any section of the board other than the affected unit itself. Maintenance and inspection shall be possible in any individual unit without affecting other units.

i) Incoming unit shall comprise of either switch-fuse/ composite switch-fuse unit or MCCB as per Data Sheet A. Outgoing units shall be either switch-fuse/ composite switch-fuse unit or MCCB as per data Sheet A.

j) Interlock between compartment door and modules shall be provided such that the door cannot be opened without switching off the power supply to the module.

k) Defeat interlock shall be provided for the units comprising of switch or moulded case circuit breaker as a means of isolation device, such that it is possible to open the door with device ON. It shall not be possible to close the door till the interlock has been reinstated.

l) Each LDB/ WDB shall be fitted with base frame made of angle or channel.

m) All fixing nuts and bolts together with grounding bolts shall be provided.

n) Lifting lugs shall be provided for each shipping section of LDB/ WDB. Removal of such lugs or hooks shall leave no opening in the LDB/ WDB.

3.1.2 LDB/ WDB with transformers (Additional Features)

a) The LDB/ WDB shall be arranged in two adjacent but separate compartments, one compartment for the lighting transformer and the other for the incoming & outgoing feeders etc.

b) The transformer shall be mounted on the base channel and it shall be possible to easily remove the transformer from the cubicle after opening the door. Necessary portable ramp made of mild steel shall be supplied along with each LDB/ WDB.

c) Independent gasket hinged door with operating handle shall be provided for access to transformer & its taps. Operating handle shall have built-in key locking arrangement.

d) Suitable ventilation arrangement for the transformer compartment to dissipate the heat of the transformer shall be provided. The arrangement shall be in the form of louvers and the same shall be provided with galvanised wire mesh with dust catchers on the inside.

e) Connections between transformer secondary terminals and the busbars shall be made by using PVC insulated flexible copper cables or busbars.

f) Warning plate shall be provided on transformer enclosure. The inscription of warning plate shall be as given below:

- DO NOT OPEN DOORS WHEN ENERGISED
- KEEP TAPS AT SAME POSITION FOR ALL PHASES

g) Transformer enclosure shall be provided with a danger plate.

3.1.3 Lighting Transformer/ Welding Transformer

a) Transformer, where specified, shall form an integral part of LDB/ WDB.

b) Lighting transformer shall be dry type, natural air cooled and suitable for mounting inside the lighting distribution board. Transformer particulars shall be as specified in Data Sheet A.

c) Rating of transformer shall be as per BOQ.

d) Winding shall be of copper material and maximum winding temperature at full load and under site conditions shall not exceed 120 ^{o}C.

e) Transformer shall be suitable for cable connections on the primary side and flexible cable or busbar connection on the secondary side.

f) The secondary neutral of the transformer shall be brought out for getting a grounded 4 wire supply system.

g) The transformer neutral shall be brought outside the LDB/ WDB for earthing. The neutral bus bar shall be insulated from the LDB/ WDB enclosure.

h) Transformers shall be provided with the rollers, pulling holes, lifting lugs, jacking positions etc.

3.1.4 Busbars, Connections and Joints

a) Busbars shall be supported on non-hygroscopic and non-inflammable insulators of material such as glass reinforced moulded plastic material, epoxy cast resin

etc. Separate supports shall be provided for each phase of the busbars. Insulation level of neutral busbar shall be same as that of phase busbars.

b) Busbars shall be contained in a separate vermin-proof compartment within the LDB/ WDB and shall have bolted sheet steel covers for providing suitable access.

c) Busbar clearances in the air shall be as per applicable standard for 415V, 3 phase system.

d) Temperature for busbars, droppers and connections shall not exceed 90 deg.C for an ambient of 50 deg.C while carrying maximum continuous current.

e) The busbar, busbar connections and supports shall have sufficient strength to withstand thermal and electromechanical stresses produced by the specified short circuit level of the system.

f) Busbars (including neutral busbar) shall be capable of carrying the short-time current specified in Data Sheet A. The duration of short-time current shall be 1 sec unless mentioned otherwise in Data Sheet A. For the specified current and duration, there shall be no damage to the equipment.

g) The neutral bus shall be rated same as phase bus.

h) Main busbars and connections shall be prominently marked and displaced for standard sequence counting from rear to front, top to bottom, or left to right as viewed from the switching device operating mechanism side.

i) Busbars and connections shall be provided with colour coded PVC sleeves. All live parts shall be properly shrouded with insulating material.

j) Earth busbar shall be provided separately.

k) Busbar Joints

- Busbar and tap off joints shall be bolted type.
- Busbars shall be thoroughly cleaned before jointing. Suitable contact grease shall be applied to remove oxide film just before jointing.
- For copper busbars, the connecting portion shall be tinned or silver plated.

3.1.5 Wiring and Terminals

a) All internal wiring for connections to remote equipment shall be brought to terminal boards. Spare contacts of devices shall also be wired upto terminal board as per schemes. Wires shall not be jointed or teed-off except at terminal points.

b) Wiring shall be made by 1100 volt grade three / seven strand PVC insulated copper wire having a cross-sectional area of not less that 1.5 sq.mm. All

connections from CT leads upto instruments, terminals shall be made by copper wires of minimum 2.5 sq.mm size.

c) All wiring shall be made with the Colour Codes specified below :

i) 3 phase AC Connections

Phase 1 (R)	Red
Phase 2 (Y)	Yellow
Phase 3 (B)	Blue
Neutral	Black

ii) 1 phase AC Connections

Phase	Red / Yellow / Blue (as per associated circuit)
Neutral	Black

iii) DC Connections

Positive	White
Negative	Grey

iv) Earth Connection Green

d) Where wiring passes from one compartment to another, the aperture shall be 'Bushed' to prevent damage to wires against sheet metal edges. Bushes may comprise of good quality rubber / PVC grommets.

e) Every wire end shall be fitted with numbered ferrules of white or yellow colour having glossy finish with identification number engraved in black. Ferrules shall be made of moisture and oil resisting insulating material. Ferrules shall be of interlocked type or tight fitting type. Ferrules shall be so fitted that they will not get detached, when the wire is removed from the terminal.

f) System of marking of wiring shall be as per applicable standard.

g) All wires used internally shall have crimped on tinned copper lugs for terminations.

h) Terminal boards shall be stud type with insulating barriers of adequate height.

i) Terminal boards shall have separate terminals for incoming and outgoing wires with not more than two wires connected to any one terminal.

j) Terminal boards shall be mounted vertically or in the horizontal rows and properly spaced to have clean wiring arrangement, adequate access for putting ferrules, making terminations etc. It shall be possible to read the ferrule numbers when the wiring is complete. Where terminals may be live when the equipment is isolated from the main supply, these shall be clearly marked near the terminal boards.

3.1.6 Cable Terminations

a) All cables, either incoming or outgoing to the LDB/ WDB, shall be terminated in a cable chamber. For each panel, there shall be a cable chamber on the side. The door of cable chamber should open or be locked with the help of a tool. Unless stated otherwise in Data Sheet A, all cables shall enter from the bottom.

b) Removable undrilled gland plates of sheet steel shall be provided in the cable chamber for entry of cables. Minimum thickness of gland plate shall be as per Data Sheet-A. The gland plate shall be of adequate size for connecting requisite number of cable glands for power and control cables.

c) Heavy duty bolt-on termination tinned copper lugs of compression type shall be used for power cable termination. The tinned copper cable lugs for all incoming and outgoing power cables shall be supplied by the vendor.

d) For supporting and clamping of cable cores at regular interval in cable alleys, suitable slotted angle upto the respective terminal blocks shall be provided.

3.1.7 Earthing

a) An earth busbar of adequate size of shall be provided at the bottom for the entire length of the LDB/ WDB. Material of earth busbar shall be GI unless mentioned otherwise in Data Sheet A.

b) Every metal part other than those forming parts of an electrical circuit shall be connected to the earth bus by means of high conductivity copper wire of size not less than 2.5 sq. mm. cross-sectional area.

c) Doors shall have a flexible copper wire for earth connection to fixed unit.

d) Each LDB/ WDB shall be fitted with two earthing studs located in accessible position on sides for connection of internal earth busbar to the external earthing connection.

e) Earth busbar shall be brought outside LDB/ WDB for making external connections.

3.1.8 Types of LDB/ WDB

a) The LDB/ WDB shall be of following type:

- LDB/ WDB-H (n) - AC LDB/ WDB with 100 kVA transformer
- LDB/ WDB-F (n) - AC LDB/ WDB with 50 kVA transformer
- LDB/ WDB-N (n) - AC LDB/ WDB with no transformer
- LDB-D (n) - DC LDB

NOTE: (n) indicates number of outgoing feeders.

b) AC LDB/ WDB (LDB/ WDB-H, LDB/ WDB-F, LDB/ WDB-N)

Each LDB/ WDB shall comprise of the following and comply with Data Sheet A :

i. One lighting/welding transformer (LDB/WDB-H & LDB/WDB-F).

ii. Incomer(s) of TP / TPN switch-fuse unit or MCCB / MCCB with neutral link as per Data Sheet A. It shall be provided on the primary side of transformer for LDB/WDB type LDB/WDB-H & LDB/WDB-F.

iii. Set of busbars with 3 phase and neutral.

iv. TPN switchfuse units or MCBs for each outgoing circuit.

v. Three indicating lamps with fuses for indicating bus supply ON.

vi. CT operated ammeter with selector switch.

vii. VT operated voltmeter with selector switch.

viii. Power & control terminals, earth-stud, earth busbar, designation labels, internal wiring, power cable lugs, glands etc. shall be provided to complete the LDB/ WDB in all respects.

c) DC LDB (LDB-D)

Each LDB shall comprise of following and comply with enclosed Data Sheet A :

i. Incomer & Outgoing feeders shall be as per Datasheet-A.

ii. Two pole DC contactor on the incoming circuit for changeover to DC in case of AC normal supply failure.

iii. One under voltage relay of suitable range, if required.

iv. One ON delay timer.

v. One test push button.

vi. Set of busbars for positive and negative.

vii. Two indicating lamps with fuses for indicating bus supply ON.

viii. Power & control terminals, earth-stud, earth busbar, designation labels, internal wiring, power cable lugs, glands etc. shall be provided to complete the LDB in all respects.

3.2 LIGHTING PANELS (LPs)

3.2.1 General Requirements of Lighting Panels

a) LPs shall be totally enclosed, suitable for electrical system data as specified in Data Sheet A. The LP shall be suitable for mounting on wall / column / structure.

b) Panels shall be suitable for indoor / outdoor application as per Data Sheet A.

c) All components of the LP shall be fully mounted inside the panel. LPs shall have only one operational front. Door shall be provided to give full access to all the components. Door shall have padlocking arrangement.

d) LPs shall consist of dust and vermin proof cubicles without the use of louvers.

e) Good quality synthetic rubber / neoprene gaskets shall be put around the door. The door when closed, shall compress the gasket uniformly.

f) The LPs shall be designed to prevent contact with live parts when the front door is open.

g) All busbars (phase, neutral, positive, negative as applicable) within a panel shall be of the same size.

h) All control wiring inside the panels shall be carried out with 1100 V grade, PVC insulated flexible copper wire of 2.5 sq. mm size.

i) The rated continuous current of the equipment and components shall be as given in Datasheet-A. These ratings shall be obtained with the components mounted in their housing as in service without exceeding the permissible temperature rise.

j) Each LP shall be fitted with M.S. mounting brackets.

k) Panel shall be suitable for top / bottom cable / conduit entries. However, outdoor LPs shall have bottom cable / conduit entry. Removable undrilled gland plate of sheet steel shall be provided for entry of cables. Minimum thickness of gland plate shall be as per Data Sheet-A. The gland plate shall be of adequate size having knock-outs for requisite number cable connections. Gland plate shall be provided with gasket.

l) The lighting panel shall be complete with copper busbars, and shall incorporate incomer and outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.

m) Each lighting panel shall be fitted with two GI earth studs located in accessible position on the outside of the panel on opposite sides.

n) All metal parts of the panel except current carrying parts shall be bonded together electrically to the earthing stud.

o) Each panel shall be fitted with phase barriers of fireproof insulating material in such a manner that it is not readily possible for personnel to touch the phase

busbars. Insulating sheet shall be fitted around the MCBs such that only the surface and toggle of the MCBs are available on the front.

p) The supply of cable lugs for power and control cable connections forms part of the supply of equipment.

q) Each panel shall be provided with a circuit directory plate with inscriptions neatly typed and laminated, fitted on the inside of door.

3.2.2 Type of Lighting Panels

a) LP-A (n) - AC Lighting Panel

b) LP-D (n) - DC Lighting Panel

c) LP-F (n) - Fancy Lighting Panel (Decorative)

d) LP-S (n) - Street Lighting Panel

NOTE: (n) indicates number of outgoing circuits.

3.2.3 AC Lighting Panel (LP-A)

a) LPs shall be provided with incomer and requisite number of outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.

b) Separate neutral shall be available at terminal block for each outgoing circuit.

c) Construction of AC Normal and AC Emergency panels shall be same.

3.2.4 DC Lighting Panels (LP-D)

~~a)~~ LPs shall be provided with incomer and requisite number of outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.

3.2.5 Decorative Type Lighting Panels (LP-A)

a) Decorative lighting panels shall be designed for use in areas like administrative building, service building, canteen, residential premises etc.

b) Thickness of sheet steel shall be as per manufacturer’s practice.

c) LPs shall be of tone colour with elegant finish.

d) LPs shall be provided with incomer and requisite number of outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.

e) LPs shall be suitable for either surface or flush mounting. Flush mounted panels shall have the collared door suitable for matching with the wall.

f) Lighting Panels may be provided with transparent acrylic cover for operation of MCBs.

g) LPs shall be provided with knockouts on the top, bottom and sides.

3.2.6 Street Lighting Panel (LP-S)

a) Street Lighting Panels shall be provided for feeding power supply to luminaires of street light poles, flood lighting poles, lighting masts, watch towers etc.

b) Each Street Lighting Panel shall comprise of the following :

i. One TPN door interlocked switch-fuse unit incomer. Interlock defeat feature shall also be provided.

ii. Three pole AC Contactor

iii. 0 - 24 hrs timer and/or photo-electric switch for automatic switching of contactor

iv. Three phase & neutral busbars

v. Single pole or three pole MCBs for each outgoing circuit as per Data Sheet A

vi. Two lamps for bus supply ON & OFF indications

vii. Complete wiring arrangement as per control scheme.

viii. Auto-Manual selector switch

ix. ON push button

x. OFF push button

c) Switching ON and switching OFF shall be through both 0 - 24 hrs timer and light sensor in automatic mode.

d) One number light sensor in weather proof enclosure having IP:55 degree of protection shall be supplied loose along with each SLP.

e) Internal power wiring shall be done with PVC insulated Cu wire of suitable size. All control wiring inside the panel shall be carried out with 1100 V grade, PVC insulated flexible copper wires.

f) Two nos. outgoing circuit in each panel shall be tapped before contactor for watch tower supply.

4.0 COMPONENTS OF LDB/WDB AND LIGHTING PANEL

4.1 MOULDED CASE CIRCUIT BREAKERS

a) Moulded case circuit breakers (MCCBs) shall be provided when called for in Data Sheet A for use in lieu of switch fuse. MCCB shall meet the requirements stipulated in Data Sheet A.

b) MCCBs in AC circuits shall be of triple pole construction arranged for simultaneous three pole manual closing and opening and for automatic tripping at short circuit and overload. Neutral link shall be provided for LDB/ WDB without transformers.

c) Operating mechanism shall be quick make, quick break and trip free type.

d) The ON, OFF & TRIP positions of the MCCB shall be clearly indicated so as to be visible to the operator when mounted as in service. Operating handle shall be provided on front of the LDB/ WDB.

e) MCCBs shall be capable of withstanding the thermal stresses caused by overloads and short circuits. The maximum tripping time under short circuit shall not exceed 20 milli-seconds.

f) MCCB terminals shall be shrouded and designed to receive cable lugs for cable sizes relevant to circuit ratings.

g) Under voltage releases and other releases shall be provided as specified in data Sheet-A.

4.2 SWITCH-FUSE UNITS

a) These units shall preferably comprise of switches having integral fuses, called composite units. Alternatively, combination units of separate switch and fuse may also be acceptable.

b) These units shall be provided for general purpose i.e. incoming or outgoing units.

c) The units shall be of the air break air insulated type and designed to ensure safety to operating personnel.

d) Composite units shall have integral fuses i.e. fuse carrier with fuse link (fuse link forming the moving contact). The design shall ensure that the moving contact is not live when switch is open i.e. in OFF position, so as to facilitate removal of fuse.

e) The switch shall be capable making and carrying the system prospective fault current, but limited in magnitude and duration by the cut off characteristics of the largest HRC fuse link that may be fitted to that unit.

f) The fixed contact shall be so shrouded that maintenance of the unit can be carried out in safety with the busbars live.

g) Where one isolating switch is used as the incoming device, the incoming side fixed contacts shall be shrouded to ensure that maintenance can be carried out with the remote fuse and switch closed.

h) Composite switch-fuse or the combination of switch and fuse shall meet the requirements of its components as follows:

Isolating Switch

i. Switches shall be air-break, quick make, and quick break heavy duty type conforming to applicable standard.

ii. All switches shall have visible ON / OFF position indication and shall be padlockable in any (ON / OFF) position.

iii. Switches shall be door interlocked such that it shall not be possible to gain access to inside the unit unless the isolating switch is in OFF position.

iv. The switches shall be suitable for independent manual operation.

v. The switch contacts shall be of silver alloy or silver plated copper and springs of non-corrosive material.

vi. Inter-phase barriers shall be provided to prevent possibilities of phase to phase fault in the switch. The switch shall also be shrouded from all sides to prevent access to live parts on the switch after opening the unit door. The barriers and shrouding shall extend upto the height of switch to fully enclose both side terminals of the device. The arrangement shall permit easy maintenance.

High Rupturing Capacity (HRC) Fuses

i. The fuse serving as the short-circuit protective device in isolating fuse-switch units shall be of HRC cartridge, current limiting and plug-in non-deteriorating type.

ii. The fuse carriers shall be easily withdrawable for replacement of fuse. Insulated fuse pullers shall be provided where fuses are not mounted in insulating carriers to remove and replace fuses in live conditions.

iii. Fuses shall preferably be fitted with a device to indicate operation (i.e. when the fuse has blown).

iv. Live terminals of fuse bases shall be shrouded to prevent contact with personnel where fuse links are not mounted in carriers and are directly plugged into the fuse base. Inter-phase barriers extending throughout the length of the fuse base shall be provided to prevent inter-phase short circuit. They shall be shrouded from all sides to prevent accidental contact.

v. Fuse carriers and bases shall be of good quality moulded insulating material. Porcelain fuse bases and carriers will not be accepted.

vi. The rating and characteristics of fuse links shall be chosen appropriately for short circuit protection of circuits downstream.

4.3 MINIATURE CIRCUIT BREAKERS

a) The use of miniature circuit breakers (MCBs) combining thermal overload and magnetic short circuit protection shall be application for the outgoing circuits of Lighting Panels.

b) MCBs shall have suitable rating as specified in Data Sheet A.

c) MCBs shall be suitable for housing in the lighting panel and for connection of copper link bus bar at the incoming and copper lugs at the outgoing ends.

d) The terminals of MCB and ON/OFF positions shall be clearly and indelibly marked.

4.4 CURRENT TRANSFORMERS

a) CTs shall be air insulated having insulation class E or better, cast resin type and shall be capable to withstand the thermal and mechanical stresses resulting from maximum short circuit.

b) The short time current duration for CTs shall be one second.

c) CT primary current shall not be less than the full load thermal rating of the associated circuit. CT secondary current shall be as specified in Data Sheet A. Polarity shall be marked in a suitable manner. The ratings shall be adequate to cater for the burden of connected instruments.

d) CTs shall be of bar primary / wound primary / ring type capable of carrying the rated primary current.

4.5 VOLTAGE TRANSFORMER

a) Voltage transformers (VT) shall be dry, cast resin type comprising of single phase or three phase units. They shall have their primary windings protected by current limiting fuses with interrupting capacity corresponding to that of the lighting board / panel.

b) VT secondary windings shall be earthed in LDB/ WDB / LP through link, which can be removed for insulation testing.

c) Three phase voltage transformers shall be as per Data Sheet A.

Single phase VTs shall have voltage rating of (Nominal System Voltage / √3) V / (110 / √3) V so that secondary voltage shall be 110 volts phase to phase when the secondary winding is star connected.

d) VTs shall have an output rating adequate to cater to the burden connected to them.

4.6 INDICATING METERS

a) Meters shall be panel mounted, flush type and suitable for rear terminal connection.

b) Meters and instruments shall be enclosed in dust proof, moisture resistant black finished cases and shall be suitable for tropical use. Instruments shall be suitable for operation from the secondary windings of CTs and VTs.

c) All instruments shall be calibrated to enable direct reading of primary quantities. Instruments shall be adjusted and calibrated at manufacturer's works and shall have means of calibration, checking and zero adjustment at site.

d) All the divisions and the quantity to be measured shall be clearly marked. Instruments shall conform to applicable standard having black numerals and lettering on white anti-parallax dial with knife edge pointer. Indicating instruments shall be of moving iron type for AC and moving coil type for DC circuits.

e) Instruments having metallic cases shall be fitted with earthing terminals.

4.7 CONTACTORS

a) Contactors shall be of the air break type fitted with arc shields.

b) The operating coil shall be suitable for satisfactory operation in the range of 85% - 110% of nominal voltage specified under the Data Sheet A. The coil shall be tropicalized having insulation not less than class 'E'.

c) Electrically independent auxiliary contacts not less than 2NO + 2NC for interlocking and indication shall be fitted to individual power contactor.

d) All springs shall be made out of a corrosion proof material.

4.8 RELAYS

a) Relays shall be provided on the various circuits as per schemes. Relays shall be flush mounted on front of the board. Relay case shall be painted with dull black or egg shell black enamel and with back connected terminals. Metal cases and frames of relay shall be earthed.

b) All relays shall be of withdrawable type with built-in testing facilities, with provision for inspection, maintenance and replacement. Where built-in test facility is not provided for a particular relay, separate suitable test block shall be provided on the board for this purpose.

c) Relay performance shall not alter due to mechanical shock or vibration or external magnetic field which may be present at the place of mounting.

d) Each relay shall not have less than two independent pairs of contacts.

4.9 TIMERS

4.9.1 Time Switch

a) Time switch shall be suitable for automatic switching ON and OFF of street lighting / flood lighting circuits.

b) Time switch have 00 - 24 hrs clock base.

c) Time switch shall indicate actual time and shall permit accurate time setting.

d) Time switch shall be rugged, independent of normal fluctuations of voltage / frequency and free from maintenance.

e) Contact rating, clock accuracy, rated voltage rating and frequency rating of timer shall be suitable to its application.

f) Time switch shall be provided with Ni-Cd battery.

g) Time switch shall be suitable for mounting inside the panel.

4.9.2 On/Off Delay Timer

a) On delay timer shall be required for continuation of DC supply for a limited duration when the AC Emergency supply has been restored and DG set is under stabilisation.

b) Timer shall be fully static and suitable for operation on normal frequency and system voltage.

c) Timer shall have high setting accuracy, high repeat accuracy, low reset time and low power consumption.

d) Timer shall have the time setting range as mentioned in Data Sheet A.

e) Timer shall be suitable for mounting inside the panel.

4.10 SELECTOR SWITCHES

a) The rating and other features of the switches shall be suitable for the application. The number of positions and the number of contacts required for each switch shall be as indicated in the schemes

b) Selector switches shall be stay put type, provided with properly designated escutcheon plates clearly marked to show operating position.

c) Terminals carrying potential above 120 Volts shall be shrouded to prevent accidental contact with personnel.

d) Ammeter selector switches shall have make before break contacts.

e) The switches shall be suitable for semi-flush mounting with the front plate and operating handle projecting out. All connection to the switches shall be from the back.

f) The arrangement for front mounting of these devices shall be such as to make them reasonably dust free so as not to interfere with normal operation.

4.11 PUSH BUTTONS

a) Push button shall be heavy duty, flush mounted suitable for the application.

b) Push button shall be provided with integral escutcheon plates marked with its function identified as per schemes.

c) Colour shall be appropriate to the function.

d) Minimum number of contacts shall be 2 NO + 2 NC or as per the requirements of control scheme.

4.12 INDICATION LAMPS

a) Indication lamps shall be complete with lens covers and holders.

b) Each lamp shall be fitted with a durable resistance integrally wired in series with the lamp. Alternatively, lamps with built in transformers are acceptable.

c) The lamp cover (lens) shall be translucent of appropriate colour.

d) Bulbs and covers shall be interchangeable, easily replaceable from the front without the need for any special means.

e) Terminals having potential above 120V shall be shrouded to prevent contact with personnel.

f) Terminals shall be suitable for ring type copper cable lugs of size depending upon the circuit rating.

4.13 CABLE GLANDS

a) Whether specifically mentioned or not, cable glands of suitable sizes shall be supplied along with each equipment for power and control cables.

b) Rubber components used in the gland shall be of neoprene.

c) Name / trade name of manufacturer, type no. and applicable range of outer diameter of cable shall be engraved / indelibly printed on the cable gland.

4.14 CABLE LUGS

a) All equipment shall be supplied with the power and control cable lugs of suitable size, whether specifically mentioned or not.

b) Name / trade name and size of lug shall be engraved/ indelibly printed on each cable lug.

4.15 TERMINALS

a) Terminals shall be stud type of copper material.

b) Terminals shall be provided with transparent cover(s).

c) Separate terminals shall be available for each termination of loop-in and loop-out power connections.

5.0 LABELING

5.1 Labels to identify all the Main assemblies, Sub-assemblies and components of the LDB/ WDB and LPs shall be provided.

5.2 Name and rating plate / marking shall be provided as required by relevant standard applicable to each component / assembly to be identified.

5.3 Labels shall be of two colour, three layer plastic material with matt or semi matt finish or of the anodised aluminium sheet.

5.4 All labels other than “Danger” or “Warning” labels shall have black lettering on a white background. Danger labels shall be as per applicable standard and shall not be affixed on to removable parts.

5.5 All labels shall be securely fixed on to the equipment by means of self tapping screws or other approved means.

5.6 Stick-on type labels of good quality and permanent mounting shall be acceptable for internally mounted components only.

5.7 A list of all such items to be labelled and text and type of labels to be provided is given below:

a) BOARD DESIGNATION (MAIN EQUIPMENT LABEL)

i. **Inscription** :
Designation & LDB/ WDB number for LDB/ WDB.
Designation and LP number for LPs.

ii. **Location** :
Top centre in the front of the LDB/ WDB.
Top centre in the front of the LP.

iii. **Material** :
3 Layer plastic material, fixation by self-tapping, non-rusting screws, black inscription on white back ground.

b) OUTGOING - FEEDER DESIGNATION

i. **Inscription**: Module number, LP number / purpose.

ii. **Material**:
Black engraving on white anodised aluminium plate of thickness 1.6 mm or more. Plate to be secured with screws.

c) COMPONENT DESIGNATION

i. **Inscription**: Letter symbol / Legend as assigned in schemes.

ii. **Location**: Near or on the component

iii. **Material:** Stick-on type

5.8 CIRCUIT DIAGRAM / DIRECTORY PLATE

a) A diagram is to be prepared for fixing to the inside cover of every lighting panel giving details of the points controlled by each circuit.

b) The circuit list shall be typed or printed stating the location of the equipment served, rating of the protective unit and the circuit loadings.

c) The list shall be mounted on the inside of the cover door and shall be protected by an acrylic sheet cover to be easily removable to permit circuit modifications.

6.0 SURFACE TREATMENT

6.1 All metal parts and the surfaces (exterior & interior) of equipment, unless stated otherwise in case of reflectors, shall be degreased by dipping in hot alkaline solution and rubbed with wire brush to remove oil & scale from them & then rinsed in water. Alternatively, they may be shot / sand blasted.

6.2 Parts shall be pickled by dipping in hydrochloric acid tank to remove the rust from the surfaces formed during storage of sheets & then rinsed to remove traces of the acid. The cleaning and pretreatment of all metal parts shall be as per applicable standard.

6.3 The surfaces to be painted shall then be prepared by phosphatizing to protect them from further rusting & to create a good bond with the paint. The pretreatment shall conform to the applicable standard.

6.4 All parts shall then be subjected to a coat of red oxide primer paint.

6.5 All inside and outside surfaces of panel shall be spray painted with synthetic enamel of the shade and minimum thickness as per Data Sheet A.

6.6 Electrostatic or powder painting shall be acceptable subject to purchaser’s approval.

6.7 Wherever possible, finished parts shall be coated with peelable compound by spraying method to protect the finished product from scratches, grease, dirty and oily spots during handling and transportation.

7.0 PACKING

7.1 Packing procedure shall conform to the following :

a) The equipment shall be properly packed before dispatch. The packing shall prevent damage to the contents while handling and lengthy period of outdoor storage.

b) The equipment shall be wrapped in weather proof packing using polythene sheets/ air bubble sheets/ thermocol sheets and then secured in wooden packing cases. Wood for wooden packing cases/ crates shall be chemically treated to prevent deterioration due to fungi and attack by termites, borers, and any other kind of infection.

c) The equipment shall be secured by fixing base plate/ frame with the help of bolt and nuts etc. to bottom frame of the wooden packing cases/ crates. Suitable cushioning material like rubberised coir (min. 50 mm thick & 100 mm wide) shall be provided on the bottom support. Gap between the panel and casing shall be filled with rubberised coir with distance between consecutive supports less than 500mm.

7.2 Specification for the sea worthy packing, if enclosed, for the export jobs shall form part of the specification.

8.0 INSPECTION & TESTING

8.1 Bidder shall confirm compliance with the BHEL Standard Quality Plan (PE-QP-999-558-E005) without any deviations. At contract stage, the successful bidder shall submit the same QP for BHEL/ ultimate customer's approval. In case bidder has reference QP agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of any changes in QP during contract stage.

8.2 All the components and completely assembled equipment shall be tested as per the latest edition of standards. Charges for these tests shall be deemed to be included in equipment price.

8.3 All the specified type and routine tests shall be carried out to verify the rating and performance of the equipment. Where valid type test certificates in evidence of equipment performance claimed are available & approved by purchaser, the requirements for conducting type tests may be waived. The general arrangement of object under test shall be to purchaser's approval.

8.4 Functional testing shall be carried out for Lighting/Welding Distribution Boards/ Lighting Panels.

8.5 All manufacturing processes viz. machining, sheet forming, electroplating, wire routing, cleating & crimping, assembly, surface preparation shall conform to good manufacturing practices.

8.6 Inspection for dimensional & visual checks especially of the following, with respect to contract drawings, documents & standards shall be conducted:

a) General sturdiness & rigidity of equipment.
b) Surface finishing.
c) Gasketting.
d) Inter-changeability.
e) Constructional features viz. location, accessibility & marking of components, segregation, accessibility to live parts (shrouding) etc.
f) Completeness of scope.

8.7 Safety interlocking verification shall be done.

8.8 Each lighting transformer shall be routine tested and one transformer of each rating shall be type tested in accordance with relevant standard in case type test certificates of similar transformers are not available / not acceptable to the purchaser.

8.9 Equipment shall be liable for rejection if tolerances on the values of dimensions, power consumption, impedances, temperature rise etc. exceed the specified values by purchaser and / or standards.

9.0 TOOLS AND TACKLE

9.1 Tools & tackle which are essential to facilitate assembly, adjustments, erection, maintenance & dismantling of equipment shall be provided as part of equipment supplied.

9.2 The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.

9.3 Vendor shall also submit a list of recommended tools and tackle. Acceptance of these tools and tackle shall not be a binding on the purchaser.

9.4 Schedule of tools & tackle shall be filled up by bidder.

10.0 SPARES

10.1 Mandatory spares (if applicable) are indicated in BOQ-cum-price schedule.

10.2 Erection & commissioning spares are included in the bidder's scope of supply. Bidder to furnish list of E&C spares in the relevant schedules of the Bid Form and Price Schedules.

561262/2021/PS-PEM-EL

	TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARDS	SPECIFICATION NO. PE-SS-999-558-E002
		VOLUME II
		SECTION II
		REVISION: 0 DATE:
		SHEET 22 OF 22

QUALITY ASSURANCE PLAN

PROJECT: Vyasi H.E.P. **CLIENT: UJVN Limited**
NAME OF **VENDOR: BHEL**
EQUIPMENT: Illumination Panels & Distribution Board **NIT/P.O. REFERENCE:**

SL. NO.	ITEM/COMPONENTS CHARACTERISTICS	NATURE OF CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENTS ACCEPTANCE NORMS	RECORD FORMAT	INSP. AGENCY			REMARKS
						Perform	Witness	Verify	
A	**Raw Material &Bought out items**								
1	**Steel Sheets**								
a)	Dimension (Size of sheet, Uniformity of thickness, surface finish)	Measurement	As per sampling plan	Tech. Spec./Appd. Drg./IS:513/IEC	TC	2/3	-	1	TC
b)	Hardness	Mechanical	-do-	-do-	TC	2/3	-	1	TC
c)	Bend test	-do-	-do-	-do-	TC	2/3	-	1	TC
2	**Copper/ Copper Alloy flats for Bus-bars & Links.**								
a)	Dimension	Measurement	-do-	Tech. Spec./Appd. Drg./IS:613/IEC	TC	2/3	-	1	TC
b)	Bend test	Mechanical	-do-	Tech. Spec./Appd. Drg./IS:191/IEC	TC	2/3	-	1	TC
c)	Hardness	-do-	-do-	Tech. Spec./Appd. Drg./IS:191/IEC	TC	2/3	-	1	TC
d)	Tensile Strength	-do-	-do-	Tech. Spec./Appd. Drg./IS:1897/IEC	TC	2/3	-	1	TC
e)	Chemical Composition	Chemical	-do-	Tech. Spec./Appd. Drg./IS:6160/IEC	TC	2/3	-	1	TC
f)	Conducitivity	Electrical	-do-	Tech. Spec./Appd. Drg./IEC	TC	2/3	-	1	TC
1	**Aluminium & Aluminium alloys Flats for Bus-bars. (if applicable)**								
a)	Dimension	Measurement	As per sampling plan	Tech. Spec./Appd. Drg./IS:5082/IEC	TC	2/3	-	1	TC
b)	Bend test	Mechanical	-do-	-do-	TC	2/3	-	1	TC
c)	Tensile Strength	-do-	-do-	-do-	TC	2/3	-	1	TC
d)	Chemical Composition	Chemical	-do-	-do-	TC	2/3	-	1	TC
e)	Conducitivity	Electrical	-do-	-do-	TC	2/3	-	1	TC

Note: a. In 'Inspection Agency' column figure 1, 2 or 3 to be filled, 1- will indicate 'UJVN Limited', 2- will indicate 'supplier' & 3- will indicate 'sub-supplier'.
a. In 'Remarks' column following abbreviations shall be used - RR- Review of Records, T.C.- Test Certificate Submission, CHP- Customer Hold Point & JIR- Joint Inspection Report.
c. Test certificates shall be submitted at the time of final insection.

QUALITY ASSURANCE PLAN

PROJECT: Vyasi H.E.P. **CLIENT: UJVN Limited**
NAME OF **VENDOR: BHEL**
EQUIPMENT: Illumination Panels & Distribution Board **NIT/P.O. REFERENCE:**

SL. NO.	ITEM/COMPONENTS CHARACTERISTICS	NATURE OF CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENTS ACCEPTANCE NORMS	RECORD FORMAT	INSP. AGENCY			REMARKS
						Perform	Witness	Verify	
2	**Tests for Switches & Control Switches, Power & Auxilliary Contactor, Current Transformer, Electrical Meters (Ammeter, Voltmeter, Freq. meter etc.), Miniature Circuit Breaker, Air Circuit Breaker, Power & Auxilliary Contactor, Timers (Electronic, Electro-pneumatic & Annunciaters), PVC Wire.**								
a)	Make & Rating	Visual	100%	Tech. Spec./Appd. Drg./IEC	TC	3/2	-	1	TC
b)	Routine Test	Test	-do-	Tech. Spec./Appd. Drg./IEC	TC	2/3	-	1	TC
B	**Final Inspection**								
1	**Mechnical checks**								
a)	BOM verification	Visual	100%	Tech. Spec./Appd. Drg./IS:8623/IEC	TC	3/2	-	1	TC
b)	Layout of components	Visual	100%	-do-	TC	3/2	-	1	TC
c)	Dimentional checks (Sheet thickness, Paint thickness, Paint shade & overall dimension)	Measurement	100%	-do-	TC	3/2	-	1	TC
d)	Name plate details	Visual	100%	-do-	TC	3/2	-	1	TC
e)	Mechnical operation of equipments.	Mechanical	100%	-do-	TC	3/2	-	1	TC
2	**Electrical**								
a)	Electrical operation of equipments.	Electrical	100%	-do-	TC	3/2	-	1	TC
b)	Scheme checking	Electrical	100%	-do-	TC	3/2	-	1	TC
c)	IR Test	Electrical	100%	-do-	TC	3/2	-	1	TC
d)	HV Test	Electrical	100%	-do-	TC	3/2	-	1	TC

Note: a. In 'Inspection Agency' column figure 1, 2 or 3 to be filled, 1- will indicate 'UJVN Limited', 2- will indicate 'supplier' & 3- will indicate 'sub-supplier'.
a. In 'Remarks' column following abbreviations shall be used - RR- Review of Records, T.C.- Test Certificate Submission, CHP- Customer Hold Point & JIR- Joint Inspection Report.
c. Test certificates shall be submitted at the time of final insection.

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-2	DATE:
		PROJECT:		PO NO.:	DATE:
		ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:II	SHEET 1 OF 4

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
1.0	**Raw Material**	(a)Material (b)Thickness (c) Surface Finish (d) Chemical Composition	MA	V/M	100%	Sample	Manuf. Std./ Approved Document	Manuf. Std./ Approved Document	Test Certificate	√	P	V		
2.0		Verification of make, type, Size & rating of component like indicating lamps, PB's, contactors, relays, switches etc.	MA	Visual	100%	Sample	Approved drg. & Datasheet	Approved drg. & Datasheet	Test Certificate	√	P	V		Component to be of approved make.
	LIGHTING DISTRIBUTION BOARDS & LIGHTING PANELS													
3.0	**Final Inspection**	1.Dimensions	MA	Measurement	100%	10%	Approved drg./ Datasheet	Approved drg./ Datasheet	Insp. Report	√	P	W		
		2. Paint shade/ Paint Finish & thickness	MA	Visual/ measurement	100%	10%	Approved drg./ Datasheet	Approved drg./ Datasheet	Insp. Report	√	P	W		
		3. Verification of GA	CR	Visual	100%	100%	Approved drg.	Approved drg.	Insp. report	√	P	W		
		4. Verification of BOM	CR	Visual	100%	100%	Approved drg.	Approved drg.	Insp. report	√	P	W		
		5. Functional tests (incl. wiring cont.)	MA	Elect	100%	100%	Approved drg	Approved drg.	Insp. report	√	P	W		
		6.HV/ IR/ HV	MA	Elect	100%	100%	HV -2.5KV AC for 1 minute IR - >50 MOHM	HV -2.5KV AC FOR 1 MINUTE IR - >50 M OHM	Insp. report	√	P	W		

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY					Doc No:			
	Sign & Date	Name		Sign & Date	Name	Sign & Date			Sign & Date	Name	Seal
Prepared by:	19-03-2020	Devendra Singh	Checked by:	19/3/20	Kusum Gautam	Seal		Reviewed by:			
Reviewed by:	19/3/2020	Praveen Dutta	Reviewed by:	19/3/2020	Ritesh Kumar Jaiswal			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-2	DATE:
		PROJECT:		PO NO.:	DATE:
		ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:II	SHEET 2 OF 4

SL.NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
		6. Degree of protection (including explosion proof if any)	MA	Scrutiny of type test certificates	1/rating	1/rating	IS 13947 or equivalent	IS 13947 or equivalent	Test certificate	√	P	V		
		7. Temperature rise test (for complete assembled LDB/ LP)	MA	Scrutiny of type test certificates	1/rating	1/rating	IS 8627 or equivalent	IS 8627 or equivalent	Test certificate	√	P	V		
4.0	**LIGHTING TRANSFORMER**													
		1.Routine test	CR	Visual	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		a.) Type/ Rating	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		b). Winding/ .Resistance	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		c). Voltage Ratio/ Vector	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	19.03.2020	Devendra Singh	Checked by:	19.3.2020	Kusum Gautam			Reviewed by:			
Reviewed by:	19/3/2020	Praveen Dutta	Reviewed by:	19/3/2020	Ritesh Kumar Jaiswal			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-2	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:II	SHEET 3 OF 4

		d) Z Volt/ Z Sckt	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		

SL.NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
		e).Load Loss/ Current	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		f.) No Load Loss & No Load Current	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		g.) Source Withstand	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		h) Induced O/ V	CR	Test	100%	100%	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Insp. report	√	P	V		
		2. Type Test	MA	Verification	------	1/Rating	IS 11171 & Approved Datasheet	IS 11171 & Approved Datasheet	Test Certificates	√	P	V		Type Test Certificate Clearance from BHEL/Customer
5.0	PACKING	As per BHEL Appd. Drg./Packing Procedure	MA	Visual	100%	100%	Appd. Packing Drg./ Packing procedure	Appd. Packing Drg./ Packing procedure	Insp. report	√	P	W	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	19.03.2020	Devendra Singh	Checked by:	19.3.20	Kusum Gautam
Reviewed by:	19/3/2020	Praveen Dutta	Reviewed by:	19/3/2020	Ritesh Kumar Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-2	DATE:
		PROJECT:		PO NO.:	DATE:
		ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:II	SHEET 4 OF 4

NOTES: -	
(A)	THE INSPECTION SHALL BE CARRIED OUT ONCE FOR THE MATERIAL OFFERED FOR INSPECTION IN ONE LOT. FOR SUBSEQUENT LOTS AGAINST THE SAME PROJECT, THE MATERIAL CAN BE ACCEPTED BASED ON CERTIFICATE OF COMPLIANCE FURNISHED BY THE VENDOR.
(B)	BHEL RESERVES THE RIGHT FOR CONDUCTING REPEAT TEST, IF REQUIRED.
(C)	AFTER PACKING AND PRIOR TO ISSUE OF MDCC, PHOTOGRAPHS OF COMPLETE MATERIAL (TO BE DISPATCHED) SHALL BE SENT TO BHEL-PURCHASE GROUP FOR REVIEW.
(D)	ENGG. TO ENSURE THAT ALL CUSTOMER REQUIREMENTS HAVE BEEN TAKEN CARE OF IN QP & TECH. SPECIFICATION DURING ISSUE OF PURCHASE INDENT.
(E)	IN CASE THERE ARE ANY CHANGES IN QP COMMENTED BY CUSTOMER AT CONTRACT STAGE, THE SAME SHALL BE CARRIED OUT BY THE BIDDER WITHOUT ANY IMPLICATION TO BHEL/ CUSTOMER.
(F)	PROJECT SPECIFIC QP TO BE DEVELOPED BASED ON CUSTOMER REQUIREMENT.
(G)	FOR EXPORT JOB, PACKING SHALL BE AS PER BHEL SEAWORTHY PACKING SPECIFICATION.

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: CUSTOMER,
P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	19-03-20	Devendra Singh	Checked by:	19.3.20	Kusum Gautam
Reviewed by:	19/3/2020	Praveen Dutta	Reviewed by:	19/3/2020	Ritesh Kumar Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			