

I/48128/2024

दक्षिण पूर्व रेलवे / South Eastern Railway

(प्रधान मुख्य विद्युत अभियंता का कार्यालय, गार्डन रीच, कोलकाता -700043)
(Office of the Principal Chief Electrical Engineer, Garden Reach, Kolkata-700043)

संख्या /No: eFile Computer No: 254349

दिनांक:/Date: As Signed

Sr.DEE/G/KGP,CKP,RNC,SRC,ADA, Dy.CEE/WS/KGP,ADEE/G/GRC

विषय/ Sub: Description for LED Flood Lights

The Description for LED Flood Lights as approved by CECE is being issued herewith under Description no. SER/ELEC/GS/DESCRIPTION/LED Flood Light/REV-0/OCT 2024.

It is requested to follow the approved Description, while procuring through Stores/ Works Tenders.

Encl.: Description no. SER/ELEC/GS/DESCRIPTION/LED Flood Light/REV-0/OCT 2024.

Digitally Signed by Praveen
Meena
Date: 28-10-2024 17:43:49
Reason: Approved

Dy. Chief Elect. Services Engineer
For Principal Chief Electrical Engineer

Copy to Secy. to PCEE for kind information to PCEE please.

Description No.: SER/ELEC/GS/DESCRIPTION/LED Flood Light/REV-0/OCT 2024**LED FLOOD LIGHT AS PER FOLLOWING TECHNICAL REQUIREMENTS**

SN	Item	Technical Requirement
1	LED FLOOD LIGHT Wattage	100W, 150W, 200W, 80W
2	Rated Input voltage	230 Volt AC 50 Hz
3	Input operating Voltage range and frequency	140 to 270 Volts AC at 50 Hz±2
4	Operating Temperature	0 to 55 deg. C
5	Power Factor at full load	≥0.95
6	LED chip efficacy	≥150 lumens/watt
7	LED life expectancy	≥50,000 burning hours (to be supported by LM80 report and TM21 report of manufacturer of LED chip)
8	Beam Angle	≥120 Degree
9	Colour Temperature	5500-6500 K
10	Lumen efficacy of the complete Luminary	≥135 lm/Watt (As per BEE 5 star standard)
11	Colour Rendering Index	≥70
12	Driver type	Constant current driver with short circuit & open circuit protection. Note: The LED driver shall be required compulsory registration as per IS: 15885 (part 2/sec.-13)-2012 from 'BIS' in favour of tenderer or other authorized manufacturer.
13	THD	<10%
14	Driver Efficiency	≥85% for 100 W. ≥95 for 150 W and 200 W
15	PCB	FR4 grade to be fixed with high thermal conductive paste or tape on the extruded aluminium heat sink.
16	Junction Temperature	Shall not exceed 85 deg. C
17	Internal voltage surge protection	To protect the luminaire from switching surges the driver of all luminaires should have internal surge protection of MOV of ≥4 KV (on board)
18	External Surge Protection Device	External surge protection of minimum 10KV to be separately installed with the each fixture (As per ANSI C 136.2- 2014).
19	Finishing	Anodised/Powder coated
20	Lamp Cover	Toughened transparent glass cover of thickness 4 mm
21	Ingress Protection	IP-66 or higher
22	Construction of Housing	Single Housing, High Pressure aluminium die cast/extruded aluminium, grey colour corrosion-resistant with separate optical and control gear compartments. The housing shall be of high conductivity (LM6/ADC12/LM24) with integral heat sink and heat proof silicon rubber.
23	Mounting	Aluminium or Stainless steel mounting Bracket of adjustable type along with 2 sets of fasteners of SS.
24	Impact Resistance	IK-08 or higher
25	Over Voltage Protection	Driver should be designed at cut in voltage 120 volt AC and cut off voltage at 300 volt AC. Unit shall withstand 300 volt AC for 1 minute and cut off. It will automatically "ON" when voltage comes in operating voltage range.
26	External supply cable	1 meter ISI marked, 3 core PVC Copper cable of FRLSH type, 1.5 sq. mm (minimum) as per IS:694 latest along with PVC Sleeves shall be provided with LED Flood Light.
27	Earth Terminal	Eearth terminal shall be made of brass or Stainless Steel Screw.
28	Marking:	Firm name, month and year of manufacture, guarantee-period, serial number, rated input voltage and wattage shall be embossed/engraved on Aluminium/SS plate in each unit.
29	Guarantee period for free replacement	03 years if Procured through GeM 05 Years for non-GeM procurement
Reports and certification		
30	Test Report from Central Government Lab/NABL/ILAC accredited lab to Indian Standard IS:10322/part5/sec-5/2013 and IS 16107 (Part 2/Sec 1): 2012 are to be submitted along with supply.	
31	LM 79 (Photometry) report from Central Government Lab/NABL/ILAC accredited lab. Reports shall be submitted along with supply.	
32	LED street Lighting shall comply with Compulsory Registration (CRS) of BIS for safety as per IS 10322 (Part 5/Section 5): 2013 as applicable on date.	
33	LM 80 & TM 21 Report and Photo biological report for LED Chip shall be provided along with supply of material from Central Government Lab /NABL/ILAC accredited Lab.	



South Eastern Railway

Office of the
Pr. Chief Electrical Engineer
Garden Reach, Kolkata-43,

No: CEE/S/185/519/Genl.

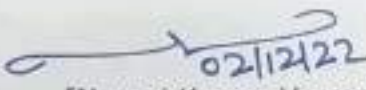
Date: 02.12.2022

To
Sr.DEE/G/KGP,CKP,RNC,SRC, Dy.CEE/WS/KGP,DEE/G/ADA,ADEE/G/GRC,
Dy.CESE/GRC

**Sub: High Mast Lighting Tower Description no.-
SER/ELEC/DESCRIPTION/HIGH MAST/1/REV-0/DEC 2022**

The Description for "High Mast Lighting Tower" of 20 /16/ 12 Meters with "LED Flood Lighting System as per South Eastern Railway's Specification no. CEE/S/185/LED/12/21/Rev-0, Dec 2021" is enclosed herewith for adopting while procuring through Stores/ Works Tenders.

Encl: As above.


[Neeraj Kumar Verma]
Chief Electrical General Engineer

Copy for information please:-

PCEE/SER	ED/Electrical/RVNL KOLKATA	PCEE/CON/GRC
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HIGH MAST LIGHTING TOWER 20 /16/ 12 METERS WITH LED FLOOD LIGHTING SYSTEM

A	Height of Mast (meter)	20	16	12
	Basic wind speed of Mast	50m/Second as per IS 875:2015 part 3 latest		
	Design life of the Mast (in years)	25		
	No. of section of Mast	2	2	1
	No of longitudinal welds per section	1		
	Type of joints	Stress fit		
	Material of Mast construction	Steel plates of Grade 355 as per BS-EN 10025		
	Plate thickness (minimum) (mm)	Top-4, Bottom-5	Top -3, Bottom-4	Top to bottom-4
	Design of fabricated mast section	Continuously-tapered Polygonal cross section		
	Mast Diameter (minimum) at Base(mm)	540	360	360
Base plate Diameter(minimum) (mm)	840	520	520	
Base plate thickness (minimum) (mm)	30	25	25	
	Hot dipped galvanization of Mast, Base plate	Minimum 86 Microns thickness galvanization both internally & externally with single dipping process as per BIS.		
	Size of opening and door at base for clear access and removal of winch, cable, etc.	1200x250mm or higher as per design	1050x225 mm or higher as per design	As per design.
	Type of locking arrangement for the door	Pad lock		
B	Junction box on Carriage Assembly	IP 65 as per IS/IEC: 60529: latest. Lab Test report required.		
	Junction box material	Galvanized Iron		
	Foundation, Foundation bolt-Type/Size/ Nos	As per manufacturer design.		
C	Lantern Carriage (hot dip galvanized) For fixing Luminaries, Control gears, Junction box etc			
	Construction	In 2 or 3 halves with SS bolted flanges		
	Inner lining of Carriage with PVC	To avoid damage to Mast during raising/ lowering of Carriage		
	Construction of galvanized Lantern Carriage	Steel tube (also acting as conduits for wire, with holes closed)		
	Number of Arms (welded)	12	8	6
D	LED Lights Luminary Conforming to South Eastern Railway's Specification no. CEE/S/185/LED/12/21/Rev-0, Dec 2021 with System Lumen efficiency of 120Lm/Watt or higher. Other parameters shall be as per mentioned specification.			
	Rating for each luminary	200W, single phase, 3 wires system, (Phase, Neutral and Earth)		
	Quantity of LED Lights	12	8	6
E	Lighting Finial at Centre of Head frame shall be	Min. 1.2 m length, solidly bolted to Head frame for earthing		
F	WINCH/POWER TOOL to lower and raise the lantern carriage assembly			
	Winch arrangement at Mast Base Shall be with	Integral Motor & manual operation with copper cable		
	Minimum SWL of Winch including Motor	750 Kg. Winch type test Certificate required		
G	Head Frame designed as Capping unit of Mast			
	Head frame of Welded steel construction shall be	Galvanized internally & externally after assembly		
	Top pulley Diameter shall be enough	to accommodate Steel wire ropes& electric cable		
	Pulley block shall be	Die-cast Aluminium Alloy (LM-6) with Self-lubricating bearing and steel shaft for long life maintenance free work		
	The pulley assembly shall be fully protected by	Canopy galvanized internally and externally.		
	The head frame shall be provided with	Guides & Stops with PVC buffer for docking Lantern Carriage		
	Suspension system with SS Wire Rope of more than 6 mm diameter with SS central core	Shall essentially be without any intermediate joint and made out of AISI 316, 7/19 construction.		
	Numbers of ropes	Two		

Prepared by SSE Stores:

02/12/2022

Checked by Dy. CESE:

02-12-2022

	Torque-limiting device with load adjustment	Shall be provided to protect the wire ropes.
	Braking load capacity	2350Kg x 2 minimum of each rope
II	Electrical System, Cable and Cable Connections	
	Terminal box to terminate the incoming cable	Shall be provided at the base compartment of the Mast
	Junction box (IP66) to terminate trailing cable.	Shall be provided at top of the Mast
	Testing the Luminaries while in lowered position	System shall have in-built facilities.
	Trailing cable from Base Compartment to top of the mast Junction box conforming to	IS:7098(Part 1): 1988 latest, Cable category-C1, 4sqmm, Un armoured, copper conductor
I	FEEDER PANEL	
	Feeder panel shall be suitable for	415V, 3 phase, 4 wire, 50 Hz AC, Stand mounting
	Construction	2mm thick Stainless-steel or Galvanized steel sheet
	IP Class	IP 65 as per IS/IEC: 60529. Test Report required.
	Circuit diagram	Plate shall be fixed inside of the door
	Feeder Panel shall have	Top Sloping cover and bottom cable entry
	Incoming & outgoing MCCBs	In quantity as per total no. of circuits in use.
	Timer Shall be provided	For automatic ON & OFF of lights with pilot lamps
	Toggle switch for AUTO/OFF/MANUAL mode	Yes
	Bus bars material	Copper
	Power cable upto Base Compartment of mast	IS:7098(Part-1):1988 Latest
J	Earth Electrode, Earthing leads, Connections	Shall be provided on Base of Mast, Feeder panel
K	All Products shall have marking	As per relevant BIS standard.
L	Onsite warranty other than Luminary	3 Years Test report
M	Onsite warranty of Luminary	5 Years as per Referred specification.
N	All the Lab test reports mentioned above	Shall be from NABL/ILAC accredited Lab to latest issue of Referred Standard.

02/12/22
Approved by: CEGE/SER

Prepared by SSE Stores:

02/12/2022

Checked by Dy. CESE:

02-12-2022

I/51043/2025

दक्षिण पूर्व रेलवे / South Eastern Railway

(प्रधान मुख्य विद्युत अभियंता का कार्यालय, गार्डन रीच, कोलकाता -700043)

(Office of the Principal Chief Electrical Engineer, Garden Reach, Kolkata-700043)

संख्या /No: eFile Computer No: 255925

दिनांक:/Date: As signed.

Sr.DEE/G/KGP, CKP, RNC, SRC, ADA, Dy.CEE/WS/KGP, ADEE/G/GRC
CEE/Con/GRC, ED/Electrical/RVNL, GM/Electrical/IRCONविषय/ **Sub:** Descriptions for Insulating Mats for Electrical purposes

The Description for Insulating Mats as approved by CECE is being issued herewith as follows under Description no. SER/ELEC/GS/DESCRIPTION/INSULATING MATS/REV-0/JAN 2025.

SN	Uses Voltage	Unit	Description
1	Up to 11 KV	Length in Meter	<p>Insulating Mat for Electrical purpose of Width 1 Meter., thickness 2.5 mm $\pm 10\%$, Class B type, Mechanical Properties of Mats suitable for ambient temperature of -10 to 55 degree C, Category III (Mats resistant to acids, alkali and oil and low temperature), Minimum Die-electric Strength of 45 KV ac (rms), should Conform to IS 15652: 2006 with Amendment No. 1 & 2 or latest and ISI marked. The Insulating Mat shall be packed in rolls as per clause 10 of IS.</p> <p>Insulating Mat should be got type tested from NABL accredited laboratory. Type Test certificate, Routine Test Certificate shall be attached with the supply.</p> <p>To be supplied by manufacturer or authorized dealer of the manufacturer.</p>
2	33 KV	Length in Meter	<p>Insulating Mat for Electrical purpose of Width 1 Meter., thickness 3.0 mm $\pm 10\%$, Class C type, Mechanical Properties of Mats suitable for ambient temperature of -10 to 55 degree C, Category III (Mats resistant to acids, alkali and oil and low temperature), Minimum Die-electric Strength of 65 KV ac (rms), should Conform to IS 15652: 2006 with Amendment No. 1 & 2 or latest and ISI marked. The Insulating Mat shall be packed in rolls as per clause 10 of IS.</p> <p>Insulating Mat should be got type tested from NABL accredited laboratory. Type Test certificate, Routine Test Certificate shall be attached with the supply.</p> <p>To be supplied by manufacturer or authorized dealer of the manufacturer.</p>

Note:

1. Consignee to specify length of individual rolls in a multiple of 5 meter, up to 50 meters. However, for specific needs, lengths of 1 meter, 2 meters, or 3 meters may also be specified.
2. The roll can be cut to sizes as per the individual requirements in substation etc

Any changes/improvement in the above description in the wisdom of the Divisions shall be advised to this Office for changes in the description in future.

Encl. As above.

Dy. Chief Elect. Services Engineer
For Principal Chief Electrical Engineer

Copy to Secy. to PCEE for kind information to PCEE please.

South Eastern Railway

Office of the
Pr. Chief Electrical Engineer
Garden Reach: Kolkata-43.

No: CEE/S/185/519/Genl.

Date: 29.12.2021

Sr.DEE/G/RNC/KGP/CKP/SRC
Dy.CEE/WS/KGP,DEE/G/ADA
ADEE/G/GRC

Sub: Issue of Technical Specification for LED based Luminaries for General Service application.

Ref: Specification no. CEE/S/185/LED/12/21/Rev-0, Dec 2021

The revised specification for LED based Luminaries for General Service application duly approved by PCEE is sent herewith for information and necessary action at your end.

This supersedes all earlier specifications issued by PCEE/Office in this subject. It is advised to follow the revised specification at the time of procurement.

Encl: As above.

Dy.CESE/GRC

South Eastern Railway




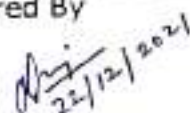
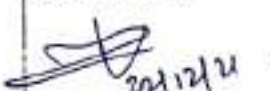
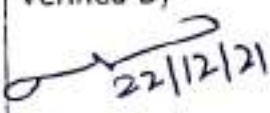
Technical Specification for LED based Luminaries for General Service applications

Specification No. CEE/S/185/ LED/12/21/Rev-0, Dec 2021

(This supersedes all earlier specifications issued by PCEE's Office on this subject)

Approved By:-


PCEE/SER 22/12/21

Prepared By  SSE/Stores/TL&P	Checked By  Dy. CESE	Verified By  CESE
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 Prepared By SSE/S/TL&P	 Checked By Dy. CESE	 Verified By CESE
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1.0 SCOPE: This specification defines the requirement of Design, Manufacture, Supply Testing and Inspection of LED based luminaries/ fixtures for various applications such as Street Lights, Office Buildings Lights, Platform Lights, Signages and Pit Lights etc.

2.0 REFERENCE STANDARDS: The following documents given below are for reference to the Manufacturer for design, manufacture, performance, safety, environmental, biological and tests requirements. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall prevail.

S.N.	Referenced specification/Document	Description
1	IEC 60598-2-1/ 60598-1	Fixed general purpose luminaries/ Luminaries general requirement and tests.
2	IEC:62384/IS:16104:2012 (Reaffirmed: 2017)	LED Driver Performance requirements- DC or AC supplied electronic control gear for LED modules Performance requirements.
3	IEC 62031/IS: 16103 (part-1 &2)-2012 (Reaffirmed:2017)	LED modules for general lighting- safety requirements and performance requirements.
4	IEC:62471/EN 62471/ IS: 16108-2012(Reaffirmed 2017)	LED Photo biological safety requirements
5	IEC:60571/IS:9000	Luminaries environmental requirements
6	IEC 60068-2-38	Environmental testing/ Humidity Cycle Test
7	IEC 60332-1/IS:11000	Luminaries Fire retardant test
8	IEC. 50529	Luminaries Ingress Protection test
9	IEC 61000-3-2	EMC (Electromagnetic compatibility)- Limits for harmonic current emission
10	IEC 61373	Electric Shock testing
11	IEC:61347-2-13/EN:61347-2-13/IS:15885 (part-2/Sec-13)- 2012 (Reaffirmed 2017)	LED Driver safety requirements- Lamp control gear, particular requirements for DC or AC supplied electronic control gear for LED modules.
12	IEC 60081-1997 (Annexure B, C & D)/ ANSI_NEMA_ ANSLGC78.377-2008	Colour rendering index measurement test
13	IS-16101-2012 (Reaffirmed 2017)	General Lighting- LED/LED module- terms and definitions
14	IS:16102 (part-I & II)-2012 (Reaffirmed 2017)& IEC/PAS 62612	Self ballasted LED lamps for general lighting services (Safety Requirements and Performance Requirements)
15	IS:16104-2012 (Reaffirmed 2017)	Electronic control gear for LED modules performance requirements.
16	IS 10322 (PART-5/SEC-3) 2012 (Reaffirmed 2017)	Requirements of Luminaires for Road and Street Lighting
17	IS:14700 (part 4 section-2)	Standard testing of LED driver
18	IS:513	Specification of cold rolled low carbon steel strips
19	IS:4905	Method of random sampling
20	CISPR-15/IS:6573 IEC:61547	EMI/EMC tests for LED driver
21	LM-70 (IEC-60081-1997)/ IS:16107-part-2	LED life expectancy
22	LM-80/IS:16105-2012 (Reaffirmed 2017)	Approved method for measuring Lumen Maintenance of LED light source.
23	LM-79/IS:16106-2012 (Reaffirmed 2017)	Approved method for electrical and photometric measurements of solid state LED lighting products.

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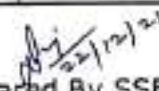
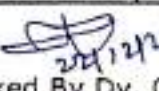
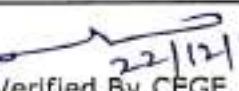
3.0 COMMON TECHNICAL PARAMETERS FOR ALL TYPES OF LED LUMINARIES:**3.1 GENERAL TECHNICAL REQUIREMENTS**

- 3.1.1 The suitable connector fire retardant of UL94V0 or better type shall be provided for LED connection between driver output and LED for high power LED luminaries and for low power LED fittings connection with conformer coating.
- 3.1.2 The material of grommet shall be of silicon rubber and PG gland should be provided.
- 3.1.3 Nil
- 3.1.4 Nil
- 3.1.5 The illumination of luminaries will be uniform without dark bands or abrupt variations and smoothing to the eyes.
- 3.1.6 The luminaries works on single phase 3 wires system (Phase, Neutral and Earth). Length of 0.5 Mtr. ISI marked 3 core wire shall be provided with LED luminaries and LED tube light fittings.
- 3.1.7 LM 79 test report in respect of LED luminaries of manufacturer shall be provided along with supply of material.
- 3.1.8 LM80 test report of the LED chip of LED manufacturer shall be provided along with supply of material.
- 3.1.9 Power factor of luminary shall be ≥ 0.90 at full load.
- 3.1.10 The normal voltage of luminary shall be 230 Volt AC $\pm 5\%$, 50 Hz.
- 3.1.11 The input operating voltage of luminary shall be 140V-270 V AC.
- 3.1.12 The working temperature of luminary shall be as follows:-

Luminary type	Value
LED Tube Light, LED Bulb	-10 deg. C to 50 deg. C
LED Street Light/High Mast Light & Signage Board	-10 deg. C to 55 deg. C

- 3.1.13 The insulation resistance between earth and current carrying part shorted together shall not be less than 100 M ohm at 60% RH with 500 V megger and after HV test.
- 3.1.14 The complete unit cubicle together with its mounting arrangement shall be subjected to shock testing as per latest IEC 61373.
- 3.1.15 The firm shall provide the technical details as per Annexure- 'A' attached.
- 3.1.16 The tolerance limit of technical parameters wherever not given shall be applicable as per relevant IS/IEC.

3.2 LED/ LED LIGHT SOURCE

S.N.	Description	Specification
3.2.1	LED make	NICHIA/OSRAM/SAMSUNG/LUMILEDS/CREE/SEOUL/TOYODA GOSEI/ LG INNOTEK
3.2.2	LED type	(a) For Street Lights and High Mast Lights Low bay/ Medium Bay/ High Bay- High Power LED (Ceramic/EMC package) (≥ 1 watt) (b) For LED bulbs, LED tube light fittings and LED Signages- Low Power LED (< 1 watt)
3.2.3	Lumen Output	≥ 140 lumens/watt- For high power LED ≥ 110 lumens/watt- For low power LED
3.2.4	LED life expectancy	$\geq 50,000$ burning hours (to be supported by LM80 report and TM21 report of manufacturer of LED chip)
3.2.5	Beam Angle	120 deg
3.2.6	Colour Temperature	5500 - 6500 K
3.2.7	Colour Rendering Index	≥ 70 - For street light and high mast light fittings ≥ 80 - For LED bulbs and LED tube light fittings
3.2.8	LED wattage	LED should not be operated more than 90% of rated capacity in luminary.
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3.3 LED DRIVER

S.N.	Description	Specification
3.3.1	Driver type	Constant current driver with short circuit & open circuit protection. Note: The LED driver shall be required compulsory registration as per IS: 15885 (part 2/sec.-13)-2012 from 'BIS' in favour of tenderer or other authorized manufacturer.
3.3.2	THD	<10%
3.3.3	Driver Efficiency	Up to 100 W: >85% (Minimum) Above 100W: >90% (Minimum)
3.3.4	Driver Components	Industrial grade or above. Driver current should be less than rated current of component used to meet the rated life.
3.3.5	PCB	FR4 grade minimum 0.8-1.0 mm thick to be fixed with high thermal conductive paste or tape on the extruded aluminium heat sink for Street Light and High Mast Light. For LED Bulbs and LED tube light the same may be provided, if required.
3.3.6	Driver cut in and cut off voltage	The driver should be designed at cut in voltage 120 volt AC and cut off voltage at 300 volt AC.
3.3.7	Junction Temperature	Switching Device such as a Transistor and MOSFETs etc. shall not exceed 85 deg. C (allowing thermal margin of 25 deg. C)
3.3.8	Surge Protection	(1) <u>Internal voltage surge protection</u> : to protect the luminaire from switching surges the driver of all luminaires should have internal surge protection of MOV of ≥2.5 KV (on board) (2) <u>External Surge Protection Device (SPD) for Street Light Fittings And High Mast Light Fittings</u> External surge protection of minimum 10KV to be separately installed with the each fixture (As per ANSI C 136.2- 2014).

4.0 TECHNICAL PARAMETERS FOR LED STREET LIGHT/ HIGH MAST LIGHT:

General Technical Requirements of Luminaries under Para 3.0 to 3.3 will remain applicable.

S.N.	Description	Specification
4.1	System Lumen efficiency of the complete Luminary	≥110 lm/Watt (±5%)
4.2	Finishing	Anodised/Powder coated
4.3	Lamp Cover	Distortion free, clear, heat resistance toughened glass of thickness 4.0 mm
4.4	Secondary optics	Polycarbonate Lens Fire retardant FR grade.
4.5	Mounting	Suitable for existing pole/universal with dedicated mounting Kits/ Bracket mounting of adjustable type.
4.6	Ingress Protection	IP-66
4.7	Construction of Housing	Single Housing, Side entry High Pressure aluminium die cast/extruded aluminium, grey colour corrosion-resistant polyester powder coating with separate optical and control gear compartments. The housing shall be high conductivity (LM6/ADC12/LM24) with integral heat sink and heat proof silicon rubber.
4.8	Gasket between housing and cover	Silicon Gasket
4.9	Impact Resistance	IK-07

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4.10	Type of power supply	SMPS
4.11	Over Voltage Protection	Unit shall withstand 300 volt AC for 1 minute and cut off. It will automatically "ON" when voltage comes in operating voltage range.
4.12	Reverse Polarity	Shall be operated with Reverse Voltage for 3 minutes at maximum value of voltage range.
4.13	High voltage test	Shall be tested at 1500 volt AC for 1 minute between supply terminals and body of the unit.
4.14	Fixing Of Cover Frame	The cover to be fixed to the housing by means of stainless steel screws.

5.0 TECHNICAL PARAMETERS FOR LED TUBE LIGHT (LAMP) & TUBE LIGHT FITTING: General technical requirements of luminaries under Para 3.0 to 3.3 will remain applicable.

(a) LED TUBE LIGHT (Lamp)

S.N.	Description	Specification
5.1	Type of Tube Light	T8, Indoor Type
5.2	Length	1200mm/600mm ($\pm 2\%$)
5.3	System lumen efficiency of the complete luminary	100 lm/W ($\pm 5\%$)
5.4	LED tube light lamp construction	The LED tube light (lamp) shall be with inbuilt control driver and designed in such a way that driver should be fitted in the LED tube light (lamp) or LED driver shall be fixed to the lamp in such a way that the driver end cap shall be detachable/ replaceable and they provide access to the driver which may be replaced if defective.
5.5	Ingress protection	IP 20
5.6	Lamp cover/diffuser	The diffuser of polycarbonate sheet shall be milky to ensure uniformity of light and Polycarbonate material shall be fire retardant UL94-VO grade (not less than 0.8-1.0 mm thick)
5.7	Wattage of LED used in package	≤ 1 W
5.8	High Surge Protection	As per Para 3.3.8 item no. (1)
5.9	LED Tube Light Heat Sink	Fabricated Aluminum for heat sink shall be with proper thermal management.
5.10	End Cap (Both ends)	Fixed to the tube rod on both ends in such a way that these shall be detachable/ replaceable.

(b) BATTEN/FITTING WITH LED TUBE LIGHT (LAMP)

S.N.	Description	Specification
5.11	Type of Fitting	Suitable for T8 light
5.12	Details of Fixture	Suitable for Single/Double Tube Light (lamp)
5.13	Type of Diffuser	Milky
5.15	Mounting Arrangement	The fixture shall be provided with suitable mounting arrangement for wall mounting as well as for platform mounting on steel structure complete with SS mounting clamps.
5.15	Tube Holder	The fixture shall be fitted with Bi-Pin G13 holder suitable for T8 tube light (lamp)
5.16	Batten (Box Type)	The batten should be high pressure Die-Cast/ extruded aluminium with ADC12 alloy or CRCA sheet (0.6mm thick) power coated to white colour.
5.17	Tube light (lamp)	Specification of Tube light (lamp) will remain applicable as per Para 5.0 (a).

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22/12/21

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22/12/21

6.0 TECHNICAL PARAMETERS FOR LED BULBS: General technical requirements of luminaries under Para 3.0 to 3.3 will remain applicable.

S.N.	Description	Specification
6.1	Rating of LED bulbs	Up to 23 W
6.2	Type of base	B22
6.3	System Lumen Efficiency of The Bulb	100 lm/W ($\pm 5\%$)
6.4	High Surge Protection	As per Para 3.3.8(1)
6.5	Beam Angle of Luminary	270 deg
6.6	Construction Of Housing	Injection molded plastic housing with Aluminium insert minimum thickness 1.0 mm
6.7	Lamp Cover/ Diffuser	Polycarbonate milky diffuser shall be fire retardant confirming to UL94 VO grade (not less than 0.8- 1.0 mm thick)
6.8	LED life	≥ 25000 burning hours
6.9	Ingress protection	IP 20
6.10	Wattage of LED used in package	≤ 1 Watt

7.0 TECHNICAL PARAMETERS FOR LED SIGNAGE BOARDS: General Technical Requirements of Luminaries under Para 3.0 to 3.3 will remain applicable.

S.N.	Description	Specification
7.1	Type of Signage	(a) Backlit Signage (b) 3D character Backlit Signage
7.2	Backlit Signage for utility services (a)	SMD (Surface mounted device) LED Glow Sign Boards etc.
7.3	3D character Backlit Signage (b)	SMD LED Glow Sign Railway Station Name Boards etc.
7.4	Colour Scheme (a)	Size and colour scheme will be decided by the Consignee/Purchaser as per site requirement
7.5	Colour scheme (b)	Size and colour scheme will be decided by the Consignee/Purchaser as per site requirement
7.6	Luminous intensity	(a) Backlit Signage: minimum 990 mcd (milli candela). (b) 3D character Backlit Signage: Minimum 3000 mcd.
7.7	Signage Board	Backlit Signage: Sleek type energy efficient SMD LED based glow sign boards made of MS Steel square tube of size 25mm x 25mm X 14 gauge for frame and with 24mm aluminum extrusion male-female clip on fixture to catch and release the sheet. 3D character backlit signage: The background of board shall be made of 3mm thick ACP (Aluminum composite panel) of prescribed colour by consignee. The enclosure shall be fabricated from MS Steel square tube of size 25 x 25 mm of 14 gauge.
7.8	Language	All matter shall be written in Hindi, English or other regional language in 3D shape as per purchaser/consignee requirement.

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7.9 Technical details for Signages for A1 & A category Railway Station

Technical details for Type- A, B, C, D & other accessories are as per following details:-

Type 'A'

Entry gate and Exit gate, Line Marking Gantry, Parking Entry, Parking Exit Freight Entry, Freight Exit, Way Finding Sign External (6panelsx6 directories) Panels, Way Finding Sign External Building Titles, On staircase East gate sign, double sided sign shall be of size 30'x5', 60'x2.5', 50'x5', 72'x10', 16'x1.5' etc. Dimension may vary as per site requirement conforming to the following technical details:-

Made of laser cut Aluminium panel of 1mm thick aluminium sheet with painted face having 3 mm letter fascia to be laser cut out from opel perplex sheet of 4 mm thickness to use as per signage size: 20W, 40W, 60W, 100W, 150W constant current mode power supply, Universal AC input/ full range.

(a) **Signage Support Gantry Structure:** Made up of 50mm x 50mm x 2mm pipes sections for fixing sign board both front and back.

(b) **Anchor Plates:** To use plates from existing gantry structure RCC base (M40/50 concrete) of size 900X1800X1800 mm each pole.

Type 'B'

Way finding signage external shall be of size 36"x8" (4X2 panels, 1X1 Panels, 2X1 panels) way finding signage internal (4x1) panel shall be of size - 36"x8", dimension may vary as per site requirement conforming to following specifications:-

Signage Panel Sides front and back illuminated, 1mm aluminium sheet with laser cut graphics painted to required colour to use as per Sgnage size 20w, 40w, 60w, 100w, 150w constant current mode power supply universal AC input/ full range.

Type 'C'

Establishment Titles, Amenities Signs, Platform Number, Gate Entry/Exit shall be of size 3'x1', 2'x1.5', 5'x1.5' etc. dimension may vary as per site requirement conforming to following specifications:-

Signage panel, sides -front and back illuminated, 1 mm aluminium sheet with laser cut graphics, painted to required colour to use as per signage size 20w, 40w, 60w, 100w, 150w constant current mode power supply universal AC input/ full range.

Type 'D'

Layouts sign shall be of size 8'x4' feet, dimension may vary as per site requirement conforming to following specification:-

Signage Panel, Sides- front and back illuminated, 1 mm aluminium sheet with laser cut graphics, painted to required colour to use as per sign size 20w, 40w, 60w, 100w, 150w constant current mode power supply universal AC input/ full range.

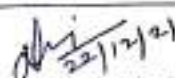


OTHER ACCESSORIES

(i) **Fixing:** To wall with anchor bolts of 50mm x 6mm size, fixed HILTI HS V M-12 expansion fastener.

(ii) **Fixing Hanging Type:** Telescopic pipes of size 25mm x 25mm x 10'/4' fixed to sign with size bolt of 25mm x 6mm size and SS 304 plate of size 75mm x 150mm x 3mm with a stiffening bar support and fixed to roof with fastener of size 75mm x 8mm through a 150 mm x 150 mm, SS 304 plate of 4 mm thickness.

(iii) **Fixing projecting type:** Two pipes of thickness 50mm X 50mm X 300mm with SS 304 plate of size 4" x 8" x 3mm for anchoring to wall with fastener of size 75mm X 8mm

(iv) **support structure:** Support structure of stainless steel grade 304, two square pipe of size- 75mm x 75mm x 1mm of length 10' fixed with use of SS:304 anchor plates of size- 200 mm x 2mm x 4mm fixed to RCC base with anchor fastener RCC base size 24" x 18" x 18".

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(v) Pole Mounting Type-I: Single MS pole mounting with 200mm dia X 5mm X 6m with MS plate base of size 720 mm x 720 mm x 20mm with 3m x 25mm dia anchor rods (8 each plate) grouter in ground with 1mx1mx1.5m. RCC-M40/50 Conforming to IS 1239 2004 or latest HFW pipe of class A.

(vi) Pole Mounting Type-II: Single MS pole mounting with 300mm dia X 5mm X 6m with MS plate base of size 920 mm x 920 mm x 20mm with 3m x 25mm dia anchor rods (8 each plate) grouter in ground with 1.5mx1.5mx2m. RCC-M40/50 Conforming to IS 1239 2004 or latest HFW pipe of class A.

(vii) Fixtures: Signage structure made of 40 mm round pipes in scissor pattern conforming to IS: 1239 2004 or latest HFW pipe of class A.

Note:- RDSO document regarding functional requirement Specification for LED based luminaries for Pit lighting shall be followed.

8.0 TECHNICAL PARAMETERS FOR PIT LIGHT:

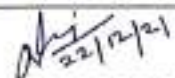
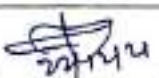
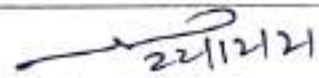
S.N.	Description	Specification for 18W	Specification for 22W (Bulkhead)
8.1	Rated Voltage	110V AC	
8.2	Front Cover	Toughened glass diffuser as per Para 4.3	
8.3	LED Test	LM79 & LM80 certified LED as per Para 3.1.7 & 3.1.8	
8.4	Control Gear/LED Driver	External constant current driver as per Para 3.3. (max. placement distance 1 mtr.)	External constant current driver as per Para 3.3
8.5	Internal Wiring	Teflon insulated Copper conductor	
8.6	Hardware	MS zinc plated & passivated	
8.7	Ingress Protection	IP66	
8.8	Impact Test	IK10	
8.9	Lumen Maintenance	50,000 hrs. & L70	
8.10	Operating Temperature	-10 to 50 deg. C	
8.11	Main Housing & Frame	Aluminum casting with powder coating as per Para 4.7	
8.12	Wattage	18W \pm 10%	22W \pm 10%
8.13	Power Factor	≥ 0.90	
8.14	Lumen Output	2340 lm	1760 lm (if bulkhead type)
8.15	CCT	5500-6500 K	
8.16	CRI	> 70	
8.17	Protection	System covers the open & short circuit protection, reverse polarity protection & surge protection as per Para 3.3.8	

9.0 Identification: The firm shall embossed/engraved firm name, month and year of manufacture, guarantee-period, serial number rated input voltage and wattage inside and outside the fitting and also screen print on LED panel and LED driver the firm name and year of manufacturing.

10.0 Inspection: The inspection shall be done by M/s. RITES or Railway authorized representative at manufacturers works, full facility for carrying out acceptance tests as per IS/IEC specification shall be made available by the manufacturer to inspecting authority at manufacturers cost.

11.0 TESTS: The LED, LED driver and luminaries shall be tested with the applicable IS/IEC reference standards given in Para 2.0 of this specification.

11.1 TYPES OF TESTS

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11.1.1 Type Tests: Inspecting Agency will verify the documents available with the firm for type tests mentioned in Para 11.1.4 carried out from Govt. Laboratory/National/International Accredited Laboratory to ensure the conformation with the requirement of specification for the luminaries. For signages, type Tests mentioned in Para 11.1.4 are not applicable. However, for signages following checks are applicable to Para 7.4, 7.5, 7.6 & 7.7.

11.1.2 Acceptance tests: These tests shall be carried out by an inspecting Agency at the manufacturer works on sample taken from a lot for the purpose of acceptance of material.

11.1.3 Routine Tests: These tests shall be performed by the manufacturer on each item and the records shall be shown to the inspecting Agency during the inspection of lot offered for acceptance tests.

11.1.4 TESTS SCHEME:

S.N.	Description of test	Reference Para of the specification	Type Test	Acceptance Test	Routine Test
1	Visual and dimension Check	As per requirements	-	Y	Y
2	Checking of documents i.e bills/ invoice for purchase of LED	3.2.1	-	Y	Y
3	Checking of documents of purchase of-				
	a) Connector	3.1.1	-	Y	Y
	b) Grommet & PG Gland	3.1.2	-	Y	Y
	d) LED Driver Components	3.3.4	-	Y	Y
	e) MOV	3.3.8	-	Y	Y
4	Checking of documents of:-				
	a) Lamp Cover	4.3	-	Y	Y
	b) Secondary Optics	4.4	-	Y	Y
	c) Diffuser	5.6 & 6.7	-	Y	Y
5	Operating Voltage	3.1.10	-	Y	Y
6	Input Voltage Range of Luminary	3.1.11	-	Y	-
7	Over voltage protection	4.11	Y	Y	-
8	HV Test	4.13	-	Y	-
9	Power factor	3.1.9 As per IS 16102 (Part. 2)-2012 Para 15 or latest	Y	Y	-
10	Harmonics (THD)	3.3.2 As per IS: 16102 (Part. 2)-2012 Para 15 or latest	Y	-	-
11	Types of power Supply (SMPS)	4.10	-	Y	Y
12	High Power LED ≥ 1 Watt	3.2.2(a)	Y*	-	Y
13	Low Power LED < 1 Watt	3.2.2(b), 5.7 & 6.10	Y*	-	Y
14	Beam Angle -LED	3.2.5(Covered under LM 80)	Y*	-	-
15	LED Life Test (L-70& TM-21)	3.2.4 & 6.8	Y*	-	-
16	All Tests as per LM-79	3.1.7	Y	-	-
17	All Tests as per LM-80	3.1.8	Y*	-	-
18	LED Driver Cut in & Cut off voltage	3.3.6	Y	-	-
19	LED Driver Efficiency	3.3.3	Y	-	-

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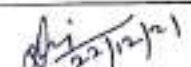
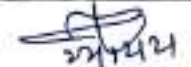
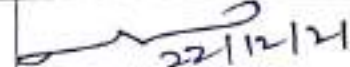
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S.N.	Description of test	Reference Para of the specification	Type Test	Acceptance Test	Routine Test
20	LED driver Certificate from BIS	3.3.1	Y*	—	—
21	High surge Protection (Street Lights)	3.3.8 (1 & 2)	Y	—	—
22	Surge Protection (LED Bulbs & LED Tube Lights)	3.3.8 (1), 5.8 and 6.4	Y	—	—
23	System Lumen Efficacy	4.1, 5.3 & 6.3	Y	Y	—
24	3 Core wire of one meter length	3.1.6 (IS:694)	—	Y	Y
25	Beam Angle of Luminaries	6.5	Y	—	—
26	Checking of tube Light Length & Batten	5.2 & 5.17	—	Y	—
27	Type of Base for LED Bulb	6.2 (As per IS: 16102(Part.1-2012) para6.1)	—	Y	—
28	Finishing of Luminaries	4.2	—	Y	Y
29	Mounting of Luminary	4.5 & 4.14	Y	Y	—
30	Construction of Housing of Luminary	4.7 & 6.6	Y	Y	—
31	Gasket of Luminary	4.8	—	Y	Y
32	Impact Resistance of Luminary	4.9	Y	—	—
33	Checking of PCB	3.3.5	Y	—	—
34	Lux measurement	IS: 16106 2012 Para 11.0	—	Y	Y
35	Fire retardant test	UL 94-VO	Y	—	—
36	Reverse Polarity	4.12	—	Y	Y
37	Protection Against Electric Shock	3.1.14, IEC: 61373	—	Y	—
38	Junction Temperature	3.3.7	Y	—	—
39	Working Temperature	3.1.12 IS 16105-2012, Para 4	Y	—	—
40	Wattage Measurement Test	3.2.8 & 6.1	—	Y	—
41	Insulation Resistance Test	3.1.13	—	Y	—
42	Ra (Color Rendering index) measurement test	3.2.7 (Cover under LM 80)	Y*	—	—
43	CCT(Correlated Colour Temperature)	3.2.6 (Covered under LM 80)	Y*	—	—
44	Test for IP Protection	4.6, 5.5 & 6.9	Y	—	—
45	Identification	9.0	—	Y	Y
46	Luminous Intensity Test for Signages	7.6	—	Y	—
47	Signages Board	7.4, 7.5 & 7.7	—	Y	—

Y- Lab Test Report Documents

Y*- Documents to be submitted from OEM

12.0 Guarantee: The complete luminaire/LED bulb shall have replacement guarantee for satisfactory performance and manufacturing defects for a period of 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier.

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Annexure - 'A'

S.N.	Description Para as per specification	Technical Requirement as per specification no. CEE/S/185/LED/12/21/Rev-0, Dec 2021	Technical parameter offered by Firm
Common Technical Parameters for All Types of LED Luminaries			
1	LED Make	NICHIA/OSRAM/SAMSUNG/LUMILEDS/CREE/SEOU L/ TOYODA GOSEI/ LG INNOTEK	
2	Lumen Output	≥140 Lumens/Watt- For High Power LED ≥110 Lumens/Watt- For Low Power LED	
3	Range of Colour Temperature	5500-6500K	
4	Colour Rendering Index	≥70- For street light and high mast fittings ≥80- For LED bulbs and LED tube light fittings	
5	Driver Type	Constant current driver with short circuit & open circuit protection. The LED driver shall be required compulsory registration as per IS:15885 (part 2/sec.-13)-2012	
6	THD (Current)	<10%	
7	Working Temperature	-10 to 50/55 deg C as per Para 3.1.12	
(A) For Street Light/High Mast Light			
(i)	System Lumen efficiency of the complete Luminary	≥110 lm/Watt (±5%)	
(ii)	Ingress Protection	IP-65	
(iii)	Surge Protection	(1) <u>Internal voltage surge protection</u> : MOV of ≥2.5 KV (on board) (2) <u>External Surge Protection Device (SPD)</u> : External surge protection of minimum 10KV to be separately installed with the each fixture (As per ANSI C 136.2- 2014).	
(iv)	Over Voltage Protection	Unit shall withstand 300 volt AC for 1 minute and cut off. It will automatically "ON" when voltage comes in operating voltage range.	
(v)	Wattage of LED Used	≥1 Watt	
(B) For Tube Light Fitting/Lamp			
(i)	System Lumen efficiency of the complete Luminary	≥100 lm/Watt (±5%)	
(ii)	Ingress Protection	IP-20	
(iii)	Surge Protection	MOV of ≥2.5 KV(on board)	
(iv)	Wattage of LED Used	<1 Watt	
(v)	LED Tube Light lamp construction	The LED tube light (lamp) shall be with inbuilt control driver and designed in such a way that driver should fitted in the LED tube light (lamp) or LED driver shall be fixed to the lamp in such a way that the driver end cap shall be detachable/ replaceable and they provide access to the driver which may be replaced if defective.	
(C) For LED Bulb (Lamp)			
(i)	Wattage of Bulb	Wattage as per Description	
(ii)	Type of Base	B22	
(iii)	System Lumen Efficacy of the Bulb	100 lm/W (±5%)	
(iv)	High Surge Protection	MOV of ≥2.5 KV(on board)	
(v)	Beam Angle of Luminary	270 deg.	
(vi)	Ingress Protection	IP-20	
(vii)	Wattage of LED Used	<1 Watt	

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Description No. SER/ELEC/GS/DESCRIPTION/LT PANEL/1/REV-1/JAN 2025

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South Eastern Railway

[Office of the Pr. Chief Electrical Engineer, Garden Reach: Kolkata-43]

e-file Computer No. 255925

Date: As Signed

**Sr. DEE/G/KGP, CKP, RNC, SRC, ADA, Dy.CEE/WS/KGP, ADEE/G/GRC
CEE/Con/GRC, ED/Electrical/RVNL, GM/Electrical/IRCON****Sub:** - Revised Description for 3 Phase LT Distribution Panel**Ref.:** - Earlier Description no. SER/ELEC/GS/DESCRIPTION/LT PANEL/1/REV-0/MAR 2024
issued vide letter no. SER-HQ0ELEC(POWR)/18/2021-O/o DY. CESE/GRC/SER, Dated-
24.04.2024

Description for 3 Phase LT Distribution Panel under ref. above has been revised with the approval of competent authority (CEGE/SER) under Description No. SER/ELEC/GS/DESCRIPTION/LT PANEL/1/REV-1/JAN 2025, which is attached as Annexure A.

It is requested to follow the revised description for procurement through Store/Works Tender.

Any changes/improvement to the description in the wisdom of the Divisions/Workshop shall be advised to this Office for changes in the description in future.

Dy. Chief Electrical Service Engineer
For Pr. Chief Electrical Engineer

Copy to: Secy. To PCEE for kind information of PCEE please.

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Description No. SER/ELEC/GS/DESCRIPTION/LT PANEL/1/REV-1/JAN 2025

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Annexure A

Supply, Installation, Testing & Commissioning of 415V, 3 Phase, 50Hz LT Distribution Panel Consisting of ACBs, MCCBs, RCCBs, Multifunction Meters, Indicator Lamps, Current Transformers etc. as per following details:

Following details are to be specified by Consignee in Non-stock requisition/Tender as per specific requirement:															
Type of LT Panel	Indoor or Outdoor														
Switchgear→	ACB			MCCB				MCB				RCCB			
Capacity→	1250A	1000A	800A	630A	400A	250A	100A	63A	32A	16A	6A	63A	32A	16A	10A
Incoming (in nos.)															
Outgoing (in nos.)															
Bus Coupler (in nos.)				X	X	X	X	X	X	X	X	X	X	X	X

Technical details:		
1. LT Distribution Panel 415V, 3phase, 50Hz, 4 Wires System		
	Indoor Type	Outdoor Type
Degree of protection	IP 53 or higher	IP 65 or higher
Shape of Panel	Cubical type with flat-top	Cubical type with a canopy at the top made of minimum 2.0 mm thick CRCA Sheet Steel to protect panel from rainwater.
Doors & Operation	Front side openable & operatable compartmental doors.	Front side openable & operatable compartmental doors. Front side outer door is to be provided to meet the desired IP requirements.
Box Dimension (HxWxD)	(Tentative dimension to be specified by Consignee. Layout drawing will be submitted by supplier for Railway approval)	
Sheet	Minimum 2.0 mm thick CRCA Sheet Steel/GI	
Painting	Powder Coated for CRCA Sheet Steel	
Base	GI/SS Channel for floor Mounting. (Minimum 75mm height)	
Internal Wiring	Copper Strips & Flexible Copper Cables of suitable rating as per IS. Cables should be terminated through suitable lugs manufactured from tough pitched electrolytic copper of 99.9% purity and fire retardant ferrules to grade UL-94 V0. Cable ties used shall be of fire retardant to grade UL-94 V0	
Busbar	Copper Busbar made of Electrolytic Copper with 99.9% purity, (R.Y.B.N).	
Busbar Supporter	Epoxy type Insulator.	
Earthing	Aluminum Earth bus of minimum cross section 50x6mm, shall run throughout the length at the bottom of the panel and shall have 02 earthing terminals.	
Stainless Steel materials	All Hinges, Locks, Cable Glands and Fasteners used in the Panel.	
Other details	Floor mounted, 'Detachable gland plate with glands at bottom for Cable Entry'. Panel bottom will have suitable clearance from floor level for cable entry through glands. All visible parts of Panel (meters, indication lamp, switches, MCCB etc.) shall have aluminum Name Plate.	
Automatic Fire Ball	Inside panel 1 no Automatic Fire Balls of spherical shape will be provided. Fire ball will have weight of extinguishing agent Dry Chemical Powder for Fighting A,B,C Class fires duly ISI marked UL listed not less than 0.5 kg but less than 1kg. Fire ball will be Thermally activated with activation temperature of 95 deg C. Location of installation shall be such that it should cover whole volume of the panel.	
Insulating Mat	Insulating Mat is to be provided as per PCEE Office's Description no. SER/ELEC/GS/	

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Description No. SER/ELEC/GS/DESCRIPTION/LT PANEL/1/REV-1/JAN 2025

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	DESCRIPTION/INSULATING MATS/REV-0/JAN 2025 or latest to cover the whole length of panel.			
2. Air Circuit Breaker (ACB): 4 pole, Conforming to IS/IEC 60947-1&2 or latest.				
Capacity	1250A	1000A	800A	
Icu	50 KA Rated Ultimate Short Circuit Breaking Capacity			
Protections required	Overload, Short-circuit, Instantaneous over current & earth fault.			
Rated Service breaking capacity (Ics)	Ics =100% Icu			
Icw	Rated short term withstand current for 1 sec Icw = 100% Icu			
Release and Tripping Mechanism	Microprocessor based release with true RMS based sensing.			
Rated Operational Voltage (Ue)	690V or higher			
Rated Insulation Voltage (Ui)	1000 V or higher			
Rated Impulse Voltage	12 KV or higher			
3. Moulded Case Circuit Breaker [MCCB] 4 pole, Conforming to IS/IEC 60947-1&2 or latest.				
Capacity	630A	400A	250A	100A
Breaking capacity	50KA	36KA		
Rated Operational Voltage	550V or higher, 50Hz, 3 Phase AC			
Rated insulation voltage	800V AC or higher, capable to withstand 50 deg.C ambient temperature			
Impulse withstanding voltage capacity	8KV or higher			
Additional feature	Adjustable thermal magnetic overload release & Fixed/Adjustable magnetic short circuit release. Indication of ON/OFF/Tripped with locking arrangement in OFF position to avoid accidental ON position			
4. Digital Multifunction Meter (DFM): 01 No. per Incoming & Outgoing ACB/MCCB. Three phase DFM shall have 4 or more Rows or Column LED/LCD display for display of Voltage, Current, Frequency, Power factor, kW, kVAR, kWh, kVAh, kVARh, ON-Hours, Phase Angle, and THD with Modbus RS 485 port having accuracy class of 0.5S, site adjustable CT secondary, Flush mounting, 128 samples/cycle, power supply 110V-230V AC/DC. Each line will display a group of different parameters.				
5. Miniature Circuit Breaker (MCB): Rated Voltage 240V, 50Hz, 3 Phase AC, IS/IEC 60898-1:2015 or latest				
Rated Current	63A	32A	16A	6A
No. of Poles	02	02	02	01
Breaking capacity	10KA	10KA	10KA	10KA
Instantaneous tripping current type	B- Type			
6. Residual Current Circuit Breaker (RCCB)	As per Description no. SER/ELEC/GS/DESCRIPTION/RCCB/REV-0/DEC 2024 or latest 63 A is of 4 pole. 32A, 20A, 16A is of double pole.			
7. LED Indicator Lamp: 1 set (R.Y.B) & 1 set (ON, OFF, TRIP) per ACB & MCCB.				
8. Current Transformer (CT): Cast-resin type, Class-E insulation of Suitable Ratio: 3 nos. per Multifunction meter.				

I/50308/2024

दक्षिण पूर्व रेलवे / South Eastern Railway

(प्रधान मुख्य विद्युत अभियंता का कार्यालय, गार्डन रीच, कोलकाता -700043)

(Office of the Principal Chief Electrical Engineer, Garden Reach, Kolkata-700043)

संख्या /No: eFile Computer No: 255925

दिनांक:/Date: As Signed

Sr.DEE/G/KGP, CKP, RNC, SRC, ADA, Dy.CEE/WS/KGP, ADEE/G/GRC**CEE/Con/GRC, ED/Electrical/RVNL, GM/Electrical/IRCON****विषय/ Sub:** Description for Residual Current Circuit Breaker (RCCB)

The Description for Residual Current Circuit Breaker (RCCB) as approved by CEGE is being issued herewith under Description no. SER/ELEC/GS/DESCRIPTION/RCCB/REV-0/DEC 2024.

Table 1: Double pole RCCB**Table 2:** Four pole RCCBDescription no. SER/ELEC/GS/DESCRIPTION/RCCB/REV-0/DEC 2024

Table 1	
Rated Current in Amps	RCCB of double pole, 240V
10, 16, 20, 25, 32, 40	Residual Current Circuit Breaker (RCCB) of rated current __ Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 2, Rated voltage: 240 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated Making and Breaking Capacity-500 A, Rated residual making and breaking capacity- 500 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.
63	Residual Current Circuit Breaker (RCCB) of rated current 63 Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 2, Rated voltage: 240 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated Making and Breaking Capacity- 630 A, Rated residual making and breaking capacity- 630 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.
80	Residual Current Circuit Breaker (RCCB) of rated current 80 Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 2, Rated voltage: 240 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated Making and Breaking Capacity (Im)-800 A, Rated residual making and breaking capacity- 800 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.
100	Residual Current Circuit Breaker (RCCB) of rated current 100 Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 2, Rated voltage: 240 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated Making and Breaking Capacity-1000A, Rated residual making and breaking capacity- 1000 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.

I/50308/2024

Table 2	
Rated Current in Amps	RCCB of Four Pole, 415V
10, 16, 20, 25, 32, 40	Residual Current Circuit Breaker (RCCB) of rated current __ Amps, AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 4, Rated voltage: 415 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated residual making and breaking capacity- 500 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.
63	Residual Current Circuit Breaker (RCCB) of rated current 63 Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 4, Rated voltage: 415 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated residual making and breaking capacity- 630 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.
80	Residual Current Circuit Breaker (RCCB) of rated current 80 Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 4, Rated voltage: 415 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated residual making and breaking capacity- 800 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.
100	Residual Current Circuit Breaker (RCCB) of rated current 100 Amps , AC type Conforming to IS 12640 (Part 1): 2008 or latest, No. of Poles 4, Rated voltage: 415 V AC, Rated frequency: 50 Hz, Without time delay, Rated Residual Operating Current- 30 mA or lower, Rated conditional short circuit current and Rated conditional residual short circuit current- 10KA, Rated residual making and breaking capacity- 1000 A, RCCB shall have fixing arrangement for mounting on steel rails of Top Hat section Rail TH:35-7.5 conforming to IS/IEC 60715:2017 (Reaffirmed Year: 2024) or latest.

Divisions, GRC unit and Construction department are advised to ensure the provision of RCCBs in all residential, service buildings in each MCB controlled circuit. DB, Panel etc. should be provided of appropriate size to suit the space required for MCBs and RCCBs.

Dy. Chief Elect. Services Engineer
For Principal Chief Electrical Engineer

Copy to Secy. to PCEE for kind information to PCEE please.

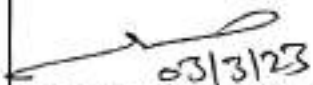
LED STREET LIGHT 20W AS PER FOLLOWING TECHNICAL REQUIREMENTS

S.N.	Item	Requirement
1	System Wattage	20W
2	Rated voltage	230 Volt AC 50 Hz
3	Input operating Voltage range and frequency	140 to 270 Volts AC at 50 Hz \pm 2
4	Length of ISI marked three core wire (shall be provided along with supply of material)	0.5 mtr.
5	Operating Temperature	0 to 55 deg. C
6	Power Factor of luminary	≥ 0.90
7	LED chip efficacy	≥ 150 lumens/watt
8	LED life expectancy	$\geq 50,000$ burning hours (to be supported by LM80 report and TM21 report of manufacturer of LED chip)
9	Beam Angle	120 deg
10	Colour Temperature	5500 - 6500 K
11	System Lumen efficacy of the complete Luminary	≥ 135 lm/Watt (As per BEE 5 star standard)
12	Colour Rendering Index	≥ 70
13	Driver type	Constant current driver with short circuit & open circuit protection. Note: The LED driver shall be required compulsory registration as per IS: 15885 (part 2/sec.-13)-2012 from 'BIS' in favour of tenderer or other authorized manufacturer.
14	THD	$< 10\%$
15	Driver Efficiency	$> 85\%$ (Minimum)
16	PCB	FR4 grade minimum 0.8-1.0 mm thick to be fixed with high thermal conductive paste or tape on the extruded aluminium heat sink.
17	Junction Temperature	Shall not exceed 85 deg. C (allowing thermal margin of 25 deg. C)
18	Surge Protection	(1) <u>Internal voltage surge protection</u> : to protect the luminaire from switching surges the driver of all luminaires should have internal surge protection of MOV of ≥ 2.5 KV(on board) (2) <u>External Surge Protection Device (SPD)</u> : External surge protection of minimum 10KV to be separately installed with the each fixture (As per ANSI C 136.2- 2014).
19	Finishing	Anodised/Powder coated
20	Lamp Cover	Polycarbonate Cover Fire retardant FR grade
21	Secondary optics	Polycarbonate Lens Fire retardant FR grade
22	Mounting	Suitable for existing pole/universal with dedicated mounting Kits/ Bracket mounting of adjustable type.
23	Ingress Protection	IP-66 or higher

03/02/23
Prepared By SSE/S/TL&P

Checked By Dy. CESE

24	Construction of Housing	Single Housing, Side entry High Pressure aluminium die cast/extruded aluminium, grey colour corrosion-resistant polyester powder coating with separate optical and control gear compartments. The housing shall be high conductivity (LM6/ADC12/LM24) with integral heat sink and heat proof silicon rubber.
25	Impact Resistance	IK-07
26	Over Voltage Protection	Driver should be designed at cut in voltage 120 volt AC and cut off voltage at 300 volt AC. Unit shall withstand 300 volt AC for 1 minute and cut off. It will automatically "ON" when voltage comes in operating voltage range.
27	Identification:	Firm name, month and year of manufacture, guarantee-period, serial number, rated input voltage and wattage shall be embossed/engraved in each unit.
28	Guarantee period for free replacement:	05 Years
Reports and certification		
29	Test Report from Central Government Lab/NABL/ILAC accredited lab to Indian Standard IS:10322/part5/sec-3/2012 and IS 16107 (Part 2/Sec 1) : 2012 are to be submitted along with supply.	
30	LM 79 (Photometry) report from Central Government Lab/NABL/ILAC accredited lab. Reports shall be submitted along with supply.	
31	LED street Lighting shall comply with Compulsory Registration (CRS) of BIS for safety as per IS 10322 (Part 5/Section 3): 2012 as applicable on date.	
32	LM 80 & TM 21 Report and Photo biological report for LED Chip shall be provided along with supply of material from Central Government Lab /NABL/ILAC accredited Lab.	


 03/3/23
 Approved By CEGE/SER

 Prepared By SSE/S/TL&P	 Checked By Dy. CESE
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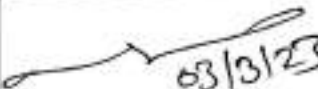
LED STREET LIGHT 90W AS PER FOLLOWING TECHNICAL REQUIREMENTS

S.N.	Item	Requirement
1	System Wattage	90W, 60W, 45W
2	Rated voltage	230 Volt AC 50 Hz
3	Input operating Voltage range and frequency	140 to 270 Volts AC at 50 Hz \pm 2
4	Length of ISI marked three core wire (shall be provided along with supply of material)	0.5 mtr.
5	Operating Temperature	0 to 55 deg. C
6	Power Factor of luminary	≥ 0.90
7	LED chip efficacy	≥ 150 lumens/watt
8	LED life expectancy	$\geq 50,000$ burning hours (to be supported by LM80 report and TM21 report of manufacturer of LED chip)
9	Beam Angle	120 deg
10	Colour Temperature	5500 - 6500 K
11	System Lumen efficacy of the complete Luminary	≥ 135 lm/Watt (As per BEE 5 star standard)
12	Colour Rendering Index	≥ 70
13	Driver type	Constant current driver with short circuit & open circuit protection. Note: The LED driver shall be required compulsory registration as per IS: 15885 (part 2/sec.-13)-2012 from 'BIS' in favour of tenderer or other authorized manufacturer.
14	THD	$< 10\%$
15	Driver Efficiency	$> 85\%$ (Minimum)
16	PCB	FR4 grade minimum 0.8-1.0 mm thick to be fixed with high thermal conductive paste or tape on the extruded aluminium heat sink.
17	Junction Temperature	Shall not exceed 85 deg. C (allowing thermal margin of 25 deg. C)
18	Surge Protection	(1) <u>Internal voltage surge protection</u> : to protect the luminaire from switching surges the driver of all luminaires should have internal surge protection of MOV of ≥ 2.5 KV(on board) (2) <u>External Surge Protection Device (SPD)</u> : External surge protection of minimum 10KV to be separately installed with the each fixture (As per ANSI C 136.2- 2014).
19	Finishing	Anodised/Powder coated
20	Lamp Cover	Polycarbonate Cover Fire retardant FR grade
21	Secondary optics	Polycarbonate Lens Fire retardant FR grade
22	Mounting	Suitable for existing pole/universal with dedicated mounting Kits/ Bracket mounting of adjustable type.
23	Ingress Protection	IP-66 or higher
24	Construction of Housing	Single Housing, Side entry High Pressure aluminium die cast/extruded aluminium, grey colour corrosion-resistant polyester powder coating with separate optical and control gear compartments. The housing shall be high conductivity (LM6/ADC12/LM24) with integral heat sink and heat proof silicon rubber.
25	Impact Resistance	IK-07

Prepared By SSE/S/TL&P

Checked By Dy. CESE

26	Over Voltage Protection	Driver should be designed at cut in voltage 120 volt AC and cut off voltage at 300 volt AC. Unit shall withstand 300 volt AC for 1 minute and cut off. It will automatically "ON" when voltage comes in operating voltage range.
27	Identification:	Firm name, month and year of manufacture, guarantee-period, serial number, rated input voltage and wattage shall be embossed/engraved in each unit.
28	Guarantee period for free replacement:	05 Years
Reports and certification		
29	Test Report from Central Government Lab/NABL/ILAC accredited lab to Indian Standard IS:10322/part5/sec-3/2012 and IS 16107 (Part 2/Sec 1) : 2012 are to be submitted along with supply.	
30	LM 79 (Photometry) report from Central Government Lab/NABL/ILAC accredited lab. Reports shall be submitted along with supply.	
31	LED street Lighting shall comply with Compulsory Registration (CRS) of BIS for safety as per IS 10322 (Part 5/Section 3): 2012 as applicable on date.	
32	LM 80 & TM 21 Report and Photo biological report for LED Chip shall be provided along with supply of material from Central Government Lab /NABL/ILAC accredited Lab.	

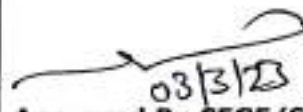

 03/3/23
 Approved By CEGE/SER

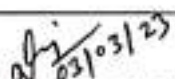
 Prepared By SSE/S/TL&P	 Checked By Dy. CESE
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LED STREET LIGHT 150W AS PER FOLLOWING TECHNICAL REQUIREMENTS

S.N.	Item	Requirement
1	System Wattage	150W
2	Rated voltage	230 Volt AC 50 Hz
3	Input operating Voltage range and frequency	140 to 270 Volts AC at 50 Hz \pm 2
4	Length of ISI marked three core wire (shall be provided along with supply of material)	0.5 mtr.
5	Operating Temperature	0 to 55 deg. C
6	Power Factor of luminary	≥ 0.90
7	LED chip efficacy	≥ 150 lumens/watt
8	LED life expectancy	$\geq 50,000$ burning hours (to be supported by LM80 report and TM21 report of manufacturer of LED chip)
9	Beam Angle	120 deg
10	Colour Temperature	5500 - 6500 K
11	System Lumen efficacy of the complete Luminary	≥ 135 lm/Watt (As per BEE 5 star standard)
12	Colour Rendering Index	≥ 70
13	Driver type	Constant current driver with short circuit & open circuit protection. Note: The LED driver shall be required compulsory registration as per IS: 15885 (part 2/sec.-13)-2012 from 'BIS' in favour of tenderer or other authorized manufacturer.
14	THD	$< 10\%$
15	Driver Efficiency	$> 85\%$ (Minimum)
16	PCB	FR4 grade minimum 0.8-1.0 mm thick to be fixed with high thermal conductive paste or tape on the extruded aluminium heat sink.
17	Junction Temperature	Shall not exceed 85 deg. C (allowing thermal margin of 25 deg. C)
18	Surge Protection	(1) <u>Internal voltage surge protection</u> : to protect the luminaire from switching surges the driver of all luminaires should have internal surge protection of MOV of ≥ 2.5 KV(on board) (2) <u>External Surge Protection Device (SPD)</u> : External surge protection of minimum 10KV to be separately installed with the each fixture (As per ANSI C 136.2- 2014).
19	Finishing	Anodised/Powder coated
20	Lamp Cover	Polycarbonate Cover Fire retardant FR grade
21	Secondary optics	Polycarbonate Lens Fire retardant FR grade
22	Mounting	Suitable for existing pole/universal with dedicated mounting Kits/ Bracket mounting of adjustable type.
23	Ingress Protection	IP-66 or higher
24	Construction of Housing	Single Housing, Side entry High Pressure aluminium die cast/extruded aluminium, grey colour corrosion-resistant polyester powder coating with separate optical and control gear compartments. The housing shall be high conductivity (LM6/ADC12/LM24) with integral heat sink and heat proof silicon rubber.
25	Impact Resistance	IK-07
Prepared By SSE/S/TL&P		Checked By Dy. CESE

	Over Voltage Protection	Driver should be designed at cut in voltage 120 volt AC and cut off voltage at 300 volt AC. Unit shall withstand 300 volt AC for 1 minute and cut off. It will automatically "ON" when voltage comes in operating voltage range.
27	Identification:	Firm name, month and year of manufacture, guarantee-period, serial number, rated input voltage and wattage shall be embossed/engraved in each unit.
28	Guarantee period for free replacement:	05 Years
Reports and certification		
29	Test Report from Central Government Lab/NABL/ILAC accredited lab to Indian Standard IS:10322/part5/sec-3/2012 and IS 16107 (Part 2/Sec 1) : 2012 are to be submitted along with supply.	
30	LM 79 (Photometry) report from Central Government Lab/NABL/ILAC accredited lab. Reports shall be submitted along with supply.	
31	LED street Lighting shall comply with Compulsory Registration (CRS) of BIS for safety as per IS 10322 (Part 5/Section 3): 2012 as applicable on date.	
32	LM 80 & TM 21 Report and Photo biological report for LED Chip shall be provided along with supply of material from Central Government Lab /NABL/ILAC accredited Lab.	


 03/3/23
 Approved By CEGE/SER

 Prepared By SSE/S/TL&P	 Checked By Dy. CESE
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South Eastern Railway

(Office of the Pr. Chief Electrical Engineer Garden Reach, Kolkata-700043)

No: CEE/P/56/301/ MAINTENANCE

Date: 13.07.2022

**SR. DEE(G)/CKP, KGP, RNC, SRC, SR.DEE/TRD/ADA, Dy. CESE/GRC,
DEE/G/ADRA, ADEE/G/GRC**

Sub: Mandatory Accessories for House Wiring.

It has been noted during the inspections that suitable Accessories for Electrical wiring are not being used during the electrical wiring and short-cuts are being adopted.

Lists of electrical accessories as attached with this letter are mandatory for using at all applicable places during the wiring.

The attached document will be made part of the tender documents and it's implementations shall be the responsibility of the concern supervisors.

Encl: As above

Neeraj Kumar Verma
Chief Electrical General Engineer/SER

Copy to:
PCEE/SER: For kind information please.

Mandatory Accessories for House Wiring

Following electrical accessories as attached with this letter are mandatory for using at all applicable places during the wiring

Page-1

Electrical PVC Conduit Pipe Joint



1 Way Box



Through box



2 Way Box (Angle)



3 Way Box



Female Adaptor



4 Way Box /
Cross Box



Long Bend



Short Bend /
Elbow



Inspection Tee



Spring Saddle



Lid Cover



Female Adaptor



Socket Joiner



Reducer
(25mm to 20mm)



Saddle Bar Clip

CLAMPS / CLIPS/ CLEATS FOR ELECTRICAL WIREING



Glass Filled Polymer



Strap Cleat



Stainless Steel Cleat



Wood



Aluminium



Self Locking Nylon Wire Ties



Easy access and Pulling of Wires through Conduit run



Open Slot Wiring Raceway Duct

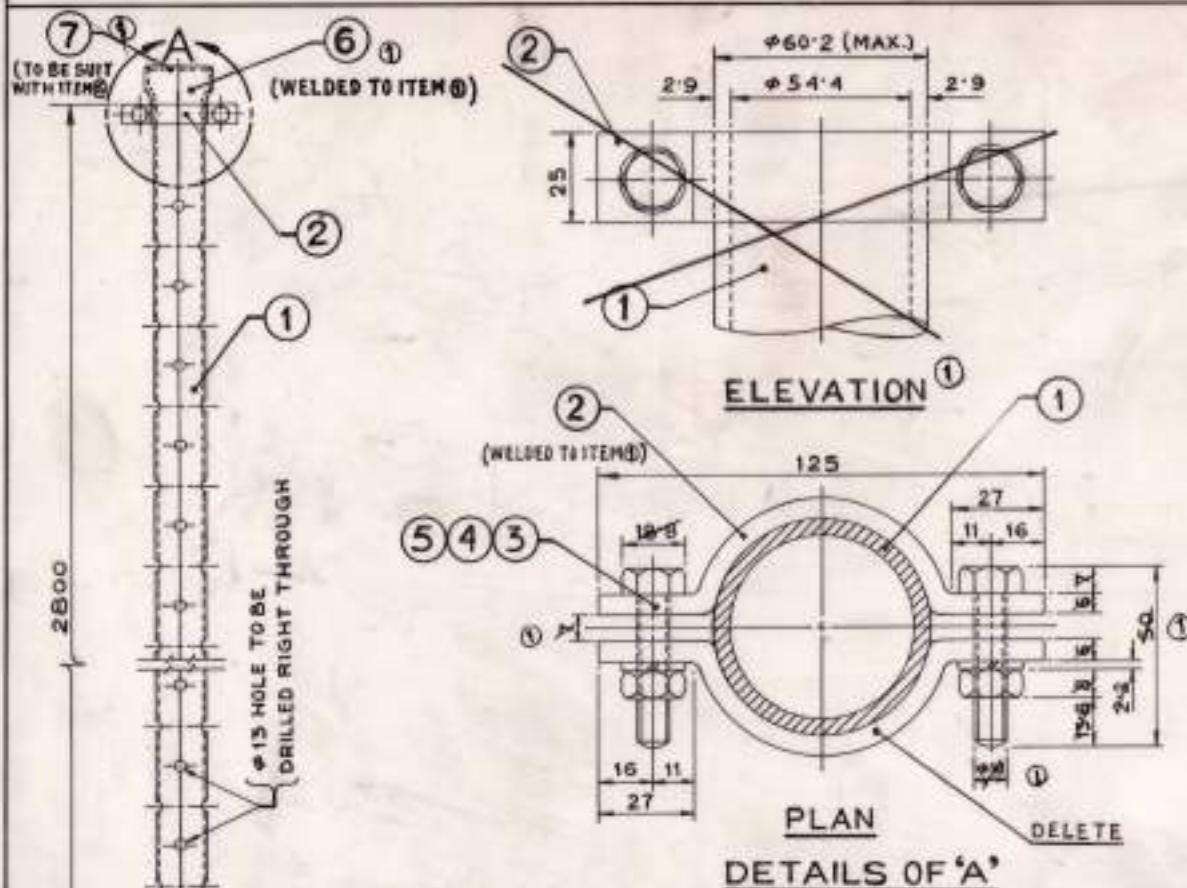


CABLE COVERING KIT



SLEEVES





NOTE :-

1. ALL DIMENSIONS ARE IN mm.
2. EARTH ELECTRODE PIPE AS PER IS:1239-Pt.1 (LATEST), TABLE-5
 - i) NOMINAL BORE : 50 mm.
 - ii) OUTER DIA. : 60.2 mm. (MAX.); 59.6 mm. (MIN.)
 - iii) THICKNESS : 2.9 mm.
 - iv) MASS : 4.08 Kg/m. (PLAIN END)
3. THE PIPE SHOULD BE MADE OF SINGLE PIECE WITHOUT ANY JOINT AND SHOULD BE KEPT FROM PAINT, ENAMEL AND GREASE.
4. THE ELECTRODE SHOULD NOT BE INSTALLED IN PROXIMITY TO A METAL FENCE TO AVOID THE POSSIBILITY OF BECOMING LIVE.
5. THE ELECTRODE SHOULD NOT BE LOCATED CLOSER THAN 15 m. FROM ANY BUILDING.
6. ELECTRODE SHOULD BE EMBEDDED BELOW PERMANENT MOISTURE LEVEL AS FAR AS POSSIBLE.
7. THE RESISTANCE OF THE ELECTRODE SHOULD NOT BE MORE THAN 5 OHMS.
8. ELECTRODE PIPE AND ALL HARDWARES SHOULD BE GALVANIZED AS PER IS:4736.
9. THE PERMISSIBLE TOLERANCE IN THE LENGTH OF THE FINISHED PRODUCT SHOULD BE LIMITED WITHIN $\pm 1\%$.
10. ITEM ② & ③ TO BE WELDED WITH ITEM ①
11. REDUCING SOCKET AS PER IS:1239-Pt.2 (LATEST), TABLE-18

ALT.No	DATE	AUTHO.	ALTERATIONS	INITIAL
1	26.11.2024		1. NOTE ON 2 (10), (10), (10), 4, 5, 6 & ELEVATION OF DETAILS 'A' DELETED. 2. NOTE ON 10, 11, 12 & ITEM No. 6 & 7 ADDED 3. QTY. OF ITEM No. 2 CHANGED. 4. MATL. OF ITEM No. 1 TO 6 CHANGED. 5. REMARKS OF ITEM No. 2 TO 5 CHANGED. 6. SOME DIMENSIONS OF DETAILS 'A' DELETED.	CEE S.K. PAUL DRN

12. COMPLETE EARTH CONE ASSEMBLY SHALL BE HOT-DIP GALVANIZED AFTER WELDING/FABRICATION AS PER IS:4736 (LATEST).

THIS DRG. SUPERSEDES DRG. No.: CEE/G/A4/P-105, ALT.1

7	WIRE MESH	1	STEEL	SS304	
6	REDUCING SOCKET-80x65	1	STEEL	IS:1239(Pt.2)	GLVD.
5	SPRING WASHER M10	2	M.S.	IS:3063	GLVD. S.S.
4	NUT HEX. M10	2	-D0-	IS:1363	-D0-
3	BOLT HEX.HD. M10x50	2	-D0-	IS:1363	-D0-
2	CLAMP:W-25, THICK-6	12	STEEL	IS:2062	GLVD.
1	PIPE (LIGHT & SEAMLESS)	1	-D0-	IS:1239(Pt.1)	GALVD.

ITEM	DESCRIPTION	QTY.	MATL.	SPEC.No.	REMARKS
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EARTH CONE			CEE	S.K. PAUL	27/5/06
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REF.	SOUTH EASTERN RAILWAY				
DATE	NAME	ELECTRICAL DEPARTMENT			
DR	17-04-06	S.K. PAUL	DRG.No. CEE/G/A3/P-150		
TC			SCALE : 1:2 & 1:14		
CK	17.05.06	S.K. PAUL	ALT.	1	

