

Annexure:-A
Special specifications in addition to SBD

(A) Specification for Modular Accessories in addition to CSR Item no. 34.01 to 34.08 & 34.15

Sr. No.	Description
1	<p>Standard:</p> <p>i) IS: 3854-1997 (amended up to date) applies to manually operated general purpose functional switches, for alternating current (AC) only with a rated voltage not exceeding 440 V with a rated current not exceeding 63 A, intended for household and similar fixed electrical installations, either indoors or outdoors.</p> <p>ii) IS 1293:1988 (amended up to date) applies to Plugs and socket-outlets of rated voltage up to and including 250 volts and rated current up to 16 amperes.</p> <p>iii) IS 11037:2019 (amended up to date) applies to Electronic type fan regulators</p>
2	<p>Certifications required from manufacturer/ OEM:-</p> <p>i) BIS Certification not old than 5year.</p> <p>ii) Authenticated type test reports from NABL not older than 5years.</p> <p>iii) In-house NABL accredited certifications in field of testing and calibration</p> <p>iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate</p> <p>v) Quality Management system certifications- ISO 9001 : 2008(amended up to date)</p> <p>vi) Environmental management system certifications- ISO 14001(amended up to date)</p> <p>vii) Occupational Health and safety management - ISO- 45001(amended up to date)</p>

(B) Specification for PVC Insulated FR Copper Conductor Cables in addition to CSR Item no.34.09 D

Sr. No.	Description
1	<p>Standard:-The materials covered under this specification shall comply with the requirements of the latest version of the following standards as amended up to date</p> <p>i) IS : 694:1990 (amended up to date)</p>
2	<p>Certifications required from manufacturer/ OEM:-</p> <p>i) BIS Certification not old than 5year.</p> <p>ii) Authenticated type test reports from NABL not older than 5years.</p> <p>iii) In-house NABL accredited certifications in field of testing and calibration</p> <p>iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate</p> <p>v) Quality Management system certifications- ISO 9001 : 2008(amended up to date)</p> <p>vi) Environmental management system certifications- ISO 14001(amended up to date)</p> <p>vii) Occupational Health and safety management - ISO- 45001(amended up to date)</p>

(C) Specification for 1100 V XLPE insulated Cables (Aluminum) in addition to CSR
Item no.34.10 D

Sr. No.	Description
1	<p>Standard:-The materials covered under this specification shall comply with the requirements of the latest version of the following standards as amended up to date</p> <p>i) IS : 7098 (Part-I) : 1988 (amended up to date) : Specification for Crosslinked Polyethylene Insulated PVC sheathed Cables for working Voltage up to & including 1100 Volt</p> <p>ii) IS:8130-1984 (amended up to date) : Specification for Conductors for insulated electric cables and flexible cords</p> <p>iii) IS:5831-1984 (amended up to date) : PVC insulation & sheath of electric cables</p> <p>iv) IS: 3975-1970 (amended up to date) : Specification for Low Carbon Galvanized steel wires, Formed Wires and tapes for armouring of Cables.</p> <p>v) IS:10810-1984 (amended up to date) : Methods of test for Cables.</p> <p>vi) IS:10418-1982 (amended up to date) : Cable Drums for Electric Cables.</p>
2	<p>Certifications required from manufacturer/ OEM:-</p> <p>i) BIS Certification not old than 5year.</p> <p>ii) Authenticated type test reports from NABL not older than 5years.</p> <p>iii) In-house NABL accredited certifications in field of testing and calibration</p> <p>iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate</p> <p>v) Quality Management system certifications- ISO 9001 : 2008(amended up to date)</p> <p>vi) Environmental management system certifications- ISO 14001(amended up to date)</p> <p>vii) Occupational Health and safety management - ISO- 45001(amended up to date)</p>

(D) Specification for Heavy gauge welded conduit pipe (ISI marked) as per IS:9537:Part-II in addition to CSR Item no. 34.11

Sr. No.	Description
1	<p>Standard:- This important features of this standard are:</p> <p>a) Substitution of tensile test by compression test,</p> <p>b) Modification of the test for protective coating, and</p> <p>c) Inclusion of details of a bending tool for performing bending test.</p>
2	<p>Certifications required from manufacturer/ OEM:-</p> <p>i) BIS Certification not old than 5year.</p> <p>ii) Authenticated type test reports from NABL not older than 5years.</p> <p>iii) In-house NABL accredited certifications in field of testing and calibration</p> <p>iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate</p> <p>v) Quality Management system certifications- ISO 9001 : 2008(amended up to date)</p> <p>vi) Environmental management system certifications- ISO 14001(amended up to date)</p> <p>vii) Occupational Health and safety management - ISO- 45001(amended up to date)</p>

(E) Specification for PVC Conduit Pipes (ISI marked) as per IS 9537: Part-III in addition to CSR Item no. 34.12

Sr. No.	Description
1	Standard:- This standard (Part 3) specifies requirements and method of tests for circular rigid non-flame propagating and non-threadables plain ended and socket ended conduits of insulating materials.
2	Certifications required from manufacturer/ OEM:- i) BIS Certification not old than 5 year. ii) Authenticated type test reports from NABL not older than 5 years. iii) In-house NABL accredited certifications in field of testing and calibration iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL (traceability with valid calibration certificate v) Quality Management system certifications- ISO 9001 : 2008(amended up to date) vi) Environmental management system certifications- ISO 14001(amended up to date) vii) Occupational Health and safety management - ISO- 45001(amended up to date).

(F) Specification for Miniature Circuit Breakers /RCCB's /RCBO's in addition to CSR Item no.34.16

Sr. No.	Description
1	<p>Standard:-The materials covered under this specification shall comply with the requirements of the latest version of the following standards as amended up to date</p> <p>i) IEC 60898-1: 1988 (amended up to date) : Specification for Electrical Accessories- Circuit Breakers for Overcurrent Protection for Household and similar installations- Part-1: CIRCUIT-BREAKERS FOR A.C. OPERATION</p> <p>NOTE: This part of IEC 60898 applies to a.c. air-break circuit-breakers for operation at 50 Hz, 60 Hz or 50/60 Hz, having a rated voltage not exceeding 440 V (between phases), a rated current not exceeding 125 A and a rated short-circuit capacity not exceeding 25000A.</p> <p>ii) IEC 61008-1:2010 (amended up to date) : Specification for Residual current operated circuit-breakers without integral over current protection for household and similar uses (RCCBs) - Part 1: General rules</p> <p>NOTE: IEC 61008-1:2010 applies to residual current operated circuit-breakers functionally independent of, or functionally dependent on, line voltage, for household and similar uses, not incorporating overcurrent protection (hereafter referred to as RCCBs), for rated voltages not exceeding 440 V a.c. with rated frequencies of 50 Hz, 60 Hz or 50/60 Hz and rated currents not exceeding 125 A, intended principally for protection against shock hazard.</p> <p>iii) IEC 61009-1:2010 (amended up to date): Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules</p> <p>NOTE: IEC 61009-1:2010 applies to residual current operated circuit breakers with integral overcurrent protection functionally independent of, or functionally dependent on, line voltage for household and similar uses (hereafter referred to as RCBOs), for rated voltages not exceeding 440 V a.c. with rated frequencies of 50 Hz, 60 Hz or 50/60 Hz and rated currents not exceeding 125 A and rated short circuit capacities not exceeding 25000A for operation at 50 Hz or 60 Hz.</p>

2	Certifications required from manufacturer/ OEM:- i) BIS Certification not old than 5 year. ii) Authenticated type test reports from NABL not older than 5 years. iii) In-house NABL accredited certifications in field of testing and calibration iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate v) Quality Management system certifications- ISO 9001 : 2008(amended up to date) vi) Environmental management system certifications- ISO 14001(amended up to date) vii) Occupational Health and safety management – ISO- 45001(amended up to date).
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(G) Specification for Sheet metal Double Door Distribution boards for MCB's in addition to CSR Item no. 34.17

Sr. No.	Description
1	Standard:- IEC 61439-1 Low-voltage switchgear and control gear assemblies – Part 1: General rules Applicable standards BS EN 61439-1 & 3, IS 8623-1 & 3 Scope: These standards deploy the constructional requirements, technical requirements for low voltage switchgear and control gear assemblies only when required by the relevant assembly standard as follows: (i) Assemblies for which the rated voltage does not exceed 1000V in case of a.c. or 1500V in case of d.c; (ii) Stationary or movable assemblies with or without enclosure; (iii) Assemblies intended for use in connection with generation, transmission, distribution and conversion of electric energy and for the control of electric energy consuming equipment; (iv) Assemblies designed for use under special service conditions, for example in ships and in rail vehicles provided that the other relevant specific requirements are complied with; (v) Assemblies designed for electrical equipment of machines provided that the other relevant specific requirements are complied with;
2	Certifications required from manufacturer/ OEM:- i) BIS Certification not old than 5 year. ii) Authenticated type test reports from NABL not older than 5 years. iii) In-house NABL accredited certifications in field of testing and calibration iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate v) Quality Management system certifications- ISO 9001 : 2008(amended up to date) vi) Environmental management system certifications- ISO 14001(amended up to date) vii) Occupational Health and safety management – ISO- 45001(amended up to date)

(H) Specification for Switch Disconnecter fuse units & Onload Changeover Switches (As per IEC 60947-3/IS 13947 (Part-III) in addition to CSR Item no. 34.21 & 34.22

Sr. No.	Description
1	Standard: The materials covered under this specification shall comply with the requirements of the latest version of the following standards as amended up to date i) IEC 60947-3:2020: Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units NOTE: IEC 60947-3:2020 applies to switches, disconnectors, switch-disconnectors and fuse-combination units and their dedicated accessories to be used in distribution circuits and motor circuits of which the rated voltage does not exceed 1000 V AC or 1500 V DC.
2	Certifications required from manufacturer/ OEM:- i) BIS Certification not old than 5 year.

- ii) Authenticated type test reports from NABL not older than 5 years;
- iii) In-house NABL accredited certifications in field of testing and calibration
- iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate
- v) Quality Management system certifications- ISO 9001 : 2008(amended up to date)
- vi) Environmental management system certifications- ISO 14001(amended up to date)
- vii) Occupational Health and safety management - ISO- 45001(amended up to date).

(I) Specification for MCCB's (Moulded Case Circuit Breakers) (As per IEC 60947-2 in addition to CSR Item no. 34.23B & C

Sr. No.	Description
1	<p>Standard: The materials covered under this specification shall comply with the requirements of the latest version of the following standards as amended up to date</p> <p>i) IS13947-2/IEC 60947-2: Low-Voltage Switchgear and Control gear, Part 2: Circuit Breakers</p> <p>NOTE: IEC 60947-2:2016+A1:2019 applies to circuit-breakers, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1000 V a.c. or 1500 V d.c.</p>
2	<p>Certifications required from manufacturer/ OEM:-</p> <ul style="list-style-type: none"> i) BIS Certification not old than 5 year. ii) Authenticated type test reports from NABL not older than 5 years. iii) In-house NABL accredited certifications in field of testing and calibration iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate v) Quality Management system certifications- ISO 9001 : 2008(amended up to date) vi) Environmental management system certifications- ISO 14001(amended up to date) vii) Occupational Health and safety management - ISO- 45001(amended up to date)

(J) Specification for ACB's (Air Circuit Breakers) (As per IEC 60947-2 in addition to CSR Item no. 34.25

Sr. No.	Description
1	<p>Standard: The materials covered under this specification shall comply with the requirements of the latest version of the following standards as amended up to date</p> <p>i) IS13947-2/IEC 60947-2: Low-Voltage Switchgear and Control gear, Part 2: Circuit Breakers</p> <p>NOTE: IEC 60947-2:2016+A1:2019 applies to circuit-breakers, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1000 V a.c. or 1500 V d.c.</p>

2	<p>Certifications required from manufacturer/ OEM:-</p> <ul style="list-style-type: none"> i) BIS Certification not old than 5year. ii) Authenticated type test reports from NABL not older than 5years. iii) In-house NABL accredited certifications in field of testing and calibration iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate v) Quality Management system certifications- ISO 9001 : 2008(amended up to date) vi) Environmental management system certifications- ISO 14001(amended up to date) vii) Occupational Health and safety management - ISO- 45001(amended up to date)
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(K) Specification for Double Walled Corrugated (DWC) HDPE Pipes in addition to CSR Item no.34.37

Sr. No.	Description
1	<p>Standard:-DWC HDPE Pipe (As per IS-16205 Part -24, 2018) shall have Good resistance to corrosion & abrasion resistance, Less weathering, Excellent Ring Stiffness, Chemically inert & environmentally safe, Good impact strength, Smooth inner wall (minimum friction loss), When bend the roundness of pipe is retained, bear heavy earth loads. Easy jointing using couplers. Anti Rodent & Non Flame Propagating properties</p>
2	<p>Certifications required from manufacturer/ OEM:-</p> <ul style="list-style-type: none"> i) BIS Certification not old than 5year. ii) Authenticated type test reports from NABL not older than 5years. iii) In-house NABL accredited certifications in field of testing and calibration iv) Full furnished laboratory for conducting acceptance testing as per BIS. All testing equipment shall have calibration certificate with NABL traceability with valid calibration certificate v) Quality Management system certifications- ISO 9001 : 2008(amended up to date) vi) Environmental management system certifications- ISO 14001(amended up to date) vii) Occupational Health and safety management - ISO- 45001(amended up to date)


(L) 3 Stepped tubular Poles & Foundation

Sr. No.	Description
1	Standard:-Pole conforming to IS: 1161-1979
2	Design:- Pole & Foundation as per design attached

LED Fittings	
Sr. No	Description
1.	LED Fitting as per Specifications approved by Hon. Tech. Advisor to CM Punjab vide Letter ION No: AT/2021/GL/1410-1422, Dated: 06.05.2021 and special additional conditions serial no 1 and 15.

(M) D:G Set

Sr. No	Description
1.	DG set should be as per the specification approved by C.E (Electrical) PWD B&R Chandigarh vide his letter no.842 dated 10.12.2018 and as per the guidelines/norms/notifications of CPCB, Government of India amended upto date.


ਕਰਮਕਾਰੀ ਡਿਜ਼ਾਈਨਿੰਗ ਡਿਵੀਜ਼ਨ
ਪੰਜਾਬ ਮੰਡੀ ਡਿਵੀਜ਼ਨ
ਸ਼੍ਰੀਮ. ਏ. ਐਮ. ਸਤਗੁਰ

To

1. Engineer-in-Chief
PUDA
2. Chief Engineer/Electrical
PWD (B&R), Chandigarh
3. Chief Engineer (O&M)
Department of Local Govt.
4. Chief Engineer/North/South
Punjab Mandl Board
5. Chief Engineer
GMADA
6. Chief Engineer
Panchayat Raj Department
7. Chief General Manager (P)
Punjab Heritage and Tourism Promotion
Board, Chandigarh
8. Superintending Engineer
PPHC
9. Superintending Engineer
PSIEC
10. Superintending Engineer
PHSC
11. Superintending Engineer
Housefed
12. Superintending Engineer
Markfed
13. Executive Engineer (S)
Punjab State Sports Council
Chandigarh

ION No: AT/2021/GL/1410-1422

Dated: 06-05-2021

Sub: Technical Specifications for Outdoor and Indoor Lighting Fixtures-LED

1. Refer the following ION and Memo Nos:
 - (i) This office ION No. ATPB/20/GL dated 30 Nov 17.
 - (ii) This office ION No. ATPB/24/GL dated 13 Feb 15.
 - (iii) This office ION No. AT/2021/PWD/1147 dated 19-02-2021.
 - (iv) CE/Electrical office Memo No. 1154 dated 22-03-2021.
2. It may please be recalled that with a view to ensure uniformity in technical specifications for Outdoor and Indoor type luminaries by all departments, a detailed exercise was conducted again to rationalize the technical specifications which was first done in 2015 {Refer to Para-1(ii)} and later on in 2017 {refer to Para-1(i)}.
3. A committee under the Chairmanship of Chief Engineer (Electrical) PWD with the Electrical Engineers from various Departments, Boards and Corporations as its members had finalized the updated technical specifications for outdoor and Indoor lighting fixtures-LED to ensure uniformity in specifications by all Departments.

O/o Advisor (Technical), Govt of Punjab, SCO No 61-62, Phase-2, SAS Nagar, Ph No 0172-5134606

4. Since then, as a number of improvements in the LED fixtures has taken place. Accordingly, the technical specifications for LED Outdoor and Indoor Lighting fixtures have been upgraded to get better performance, durability etc. This was done after detailed deliberations by the CE/Electrical PWD (B&R) with the other concerned same committee of Electrical Engineers from the concerned Departments, Boards and Corporations and representatives of and with LED lighting manufacturers (viz. Wipro, Crompton Greaves, Surya, Eajaj, Panasonic, Havells, Jaquar, Halonix, Trilux etc).

5. Based on the above, the technical specifications for Outdoor and Indoor lighting are attached as Appendix-A, B & C respectively stands approved by this office after the approval of Advisor (Tech).

6. In case, there is any observations or issues regarding the technical specifications finalized by the Committee of Electrical Engineers of all Departments, Boards, Corporations etc., the same should be conveyed to CE/Electrical PWD (B&R) for any further revision/rectification that may be required.

7. The above should be implemented forthwith in letter and spirit.

Dharminder Singh 6/5/21
(Dharminder Singh)
Technical Officer/EE (E) (PMB)
O/o Advisor (Tech)

APPENDIX - A
TECHNICAL SPECIFICATIONS FOR
LED OUTDOOR LUMINAIRES

LED OUTDOOR LUMINAIRES		
A	ELECTRICAL PARAMETERS:	DESCRIPTIONS
1 (a)	Input Operating Voltage	140 to 270 Volts AC
1(b)	Testing Voltage range at Site/manufacturing premises	70 to 330 Volts AC cut off/withstand $\pm 10\%$ AC
2	Input AC Frequency	AC 50 Hz $\pm 3\%$
3	Efficiency of driver	More than 85%, the control gear should be complying with IEC 61347 -2-13, IEC 62384 & IEC62031 as per requirement. The driver should comply with CISPR-15 for limit and methods of measurement of ratio disturbance characteristic. Current waveform should meet 61000-3-2. The driver should be constant current driver.
4 (a)	Driver Type	BIS certified potted single driver with screen or laser printed logo upto 150 W Street light, Flood light and high/medium/low bay luminaires
4 (b)	Driver Type	BIS certified potted double driver with screen or laser printed logo above 150 W Street light, Flood light and high bay luminaires
5	THD (Total Harmonic Distortion)	<10%
6	LED Drive current (for each driver with tolerance value)	Max 750 $\pm 5\%$ mA
7	Efficacy of LED fixture	Minimum 120 Lumens per watt
8	Efficacy of LED chip/source	Minimum 140 lumens per watt.
9	Working humidity	10% to 90% RH
10	Surge Protection	4 KV SPD within driver and 10 KV external SPD within driver compartment of fixture for luminaires > 45 Watt
		4 KV SPD within driver and 10 KV external SPD outside driver compartment of fixture for luminaires ≤ 45 Watt
B	OPTICAL PARAMETERS:	
1	LED chip /source Make	NICHIA/ Philips Lumiled/ Cree/ Osram/ Seoul
2	LED chip /source Life (TM-21 report)	Above 50000 operating hours at 70% lumens
3	CRI (Color Rendering Index)	Minimum 70
4	Wattage of LED chip/source	Each LED shall be of High power LED with wattage 1 watt to 5 watt
5	Lenses	Mandatory Secondary Lenses
C	THERMAL PARAMETERS:	
1	Working Temperature	0 degree C to 50 degree C
2	Color Temperature	Nominal CCT (ANSI C78.377A) CCT (a). 5700 K CCT Range 5665 \pm 355
3	Heat Sink	Pressure Diecast or Extruded Aluminium
4	Junction Temperature	100 degree C
D	GENERAL PARAMETERS:	
1	Body of fitting	ADC 12 or LM-6 Grade Single Piece Pressure diecast Aluminium housing with separate driver compartment (with IP 66 Protection) with company logo engraved/ embossed on the housing
2	Ingress Protection	IP66 as per IEC 60529:2001 or IS 10322 with test certificate
3	Impact code	Min IK07

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LED OUTDOOR LUMINAIRES

4	Optical Cover	(i) Toughened Glass/ Polycarbonate cover with prescribed thickness according to type of usage for fitting with rating \leq 30W (ii) Only toughened Glass with prescribed thickness according to type of usage for fitting with rating $>$ 30W
5	LM-79 Report(Wattage, Lumen output, Efficacy, CRI,CCT)	Duly supported with relevant LM79 reports not more than two years old from NABL/ UL accredited laboratory.
6	LM-80/ TM-21 Report	Depreciation life of LED chip /source should be verified by LED Chip/Source Manufacturer as mentioned in Para-B(1)
7	Electrical Protection	The fitting should have a low/ high voltage, reverse polarity, overload and short circuit protection inbuilt in the fixture itself and it should sustain at 440V upto four hours as per IS standards.
8	Authenticity of Fixture	The Contractor should submit the certificate from the OEM's of Luminaire regarding the authenticity, specifications and five years warranty of fittings duly signed by the rank of Branch Manager (minimum) as per Annexure -A attached.
E	MARKING:	
	a. Manufacturers name/ Year of manufacture.	Marking Sticker on the fitting
	b. Rated voltage (marked "V" or volts)	Marking Sticker on the fitting
	c. Rated Wattage (marked "W" or watt)	Marking Sticker on the fitting
	d. Batch No/ Serial No.	Marking Sticker on the fitting
	e. BIS Marking (R. No.)	Marking Sticker on the fitting

Note:

1. Above Specifications will not be applicable on Architectural/Facade Lighting
2. Make of LED chip/source used in luminaire should be mentioned in Technical Data Sheets (TDS)
3. Dimensions of heat sink and luminaires should be according to the wattage of luminaires
4. All the luminaires should be top/bottom opening type as per latest IP standards and requirement by User Department and type of usage.
5. There should be proper spacing between drivers, SPD, connectors, wiring etc. within driver compartment for ease maintenance point of view in future

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K. S. S. S.

APPENDIX - B

TECHNICAL SPECIFICATIONS FOR
LED INDOOR LUMINAIRES

LED INDOOR LUMINAIRES		
A	ELECTRICAL PARAMETERS:	DESCRIPTIONS
1(a)	Input Operating Voltage	140 to 270 Volts AC
1(b)	Testing Voltage range at Site/manufacturing premises	100 to 320 Volts AC cut off/withstand < 100 V AC
2	Input AC Frequency	AC 50 Hz ± 3 %
3	Efficiency of driver	More than 85%, the control gear should be complying with IEC 61347-2-13, IEC 62384 & IEC 62031 as per requirement. The driver should be constant current driver.
4	THD (Total Harmonic Distortion)	<10%
5	LED Drive current (for each driver with tolerance value)	Max 500 ± 5% mA
6	Efficacy of LED fixture	Nominal CCT (ANSI C78.377A) CCT CCT Range (a). 5700 K 5665 ± 355 = Minimum 100 Lumens per watt (b). 4000 K 3985 ± 275 = Minimum 100 Lumens per watt (c). 3000 K 3045 ± 175 = Minimum 100 Lumens per watt
7	Efficacy of LED chip/source	Minimum 100 Lumens per watt for luminaires (> 12 watt). Minimum 85 Lumens per watt for luminaires (< 12 watt).
8	Working humidity	10% to 90% RH
9	Surge Protection	2.5 KV and above as per IS/ IEC standards
B	OPTICAL PARAMETERS:	
1	LED chip /source Make	NICHIA/ Philips Lurniled/ Osram/ Epistar/ Samsung/ LG/ Seoul/ Everlite
2	LED chip /source Life (TM-21 report)	Above 50000 operating hours at 70% lumens
3	CRI (Color Rendering Index)	Minimum 70
4	Wattage of LED chip /source	Each LED shall be of Low power LED Less than 1 Watt
C	THERMAL PARAMETERS:	
1.	Working Temperature	0 degree C to 50 degree C
2	Color Temperature	2870 to 6020 degree kelvin
3	Heat Sink	CRCA/ Aluminium Alloy
4	Junction Temperature	100 degree C
D	GENERAL PARAMETERS:	
1	Body of fitting	(a). Pressure diecast aluminium housing with backlit technology (excluding chip on Board (COB)); (b). Extruded Aluminium for Retrofit LED tube rods/integrated batten (c). CRCA Sheet for Panels of all sizes .
2	Color Finish	Epoxy Powder coated - White/ Off White.
3	Ingress Protection	IP20 or as per latest BIS standards
4	Optical Cover	Industrial grade Polycarbonate/Poly Methamethyl Acrylic/Poly styrene cover
5	LM-79 Report (Wattage, Lumen output, Efficacy, CRI,CCT)	Duly supported with relevent LM79 reports not more than two years old from NABL /UL accredited laboratory.

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LED INDOOR LUMINAIRE

6	LM-80/ TM-21 Report	Depreciation life of LED chip /source should be verified by LED Chip/Source Manufacturer as mentioned in Para-B(1)
7	Identifications	Logo and Brand Name shall be screen printed or Embossed on Luminaire & driver separately
8	Electrical Protection	The fitting should have a low/ high voltage, reverse polarity, overload and short circuit protection inbuilt in the fixture itself as per IS standards.
9	Authenticity of Fixture	The Contractor should submit the certificate from the OEM's of Luminaire regarding the authenticity, specifications and five years warranty of fittings duly signed by the rank of Branch Manager (minimum) as per Annexure -A attached.
E	MARKING:	
	a. Manufacturers name/ Year of manufacture.	Marking Sticker on the fitting
	b. Rated voltage (marked "V" or volts)	Marking Sticker on the fitting
	c. Rated Wattage (marked "W" or watt)	Marking Sticker on the fitting
	d. Batch No/ Serial No.	Marking Sticker on the fitting
	e. BIS Marking (R. No.)	Marking Sticker on the fitting

Note:

1. Efficacy of LED Luminaire hanging fixtures specially for Architectural lighting or for special effects or COB type luminaires are excluded.
2. Make of LED chip/source used in luminaire should be mentioned in Technical Data Sheets (TDS).
3. Dimensions of heat sink and luminaires should be according to the wattage of luminaires.

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APPENDIX-C

ANNEXURE-A

Authenticity /Warranty Certificate
(From OEM's)

Name of Work:

Agency (Contractor):

OEM's Name:

Supplied Luminaires Bill No. & Date:

Model No. & Cat. No. of Luminaires:

This is to certified that material supplied at above said work is genuine and as per PWD specifications approved by Punjab Government. Further, We provided five year warranty on material supplied by our company from date of installation.

Signature with stamp
Branch Manager

[Handwritten Signature] 6/5/21
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