TENDER SPECIFICATION DOCUMENT

Decorative Street Light Poles

For Government & Municipal Procurement

Document Reference	DSL-TENDER-SPEC-2026
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Applicable Products	Decorative Street Light Poles (GI / MS / Solar)
Scope	Government, Municipal, Gram Panchayat, AMRUT & Smart City Projects
Prepared By	Xeratech, Satpur MIDC, Nashik, Maharashtra 422007
Standards Applicable	IS:1239, IS:2062, IS:875 Part-3, IS:456, IS:1944, IS:4759
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This document provides standard technical specifications for the procurement of decorative street light poles by government bodies, municipal corporations, gram panchayats, and contractors. Specifications are based on applicable Bureau of Indian Standards (BIS) codes and are suitable for inclusion in tender documents and purchase orders.

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1 SCOPE & PURPOSE

This specification document governs the supply of decorative street light poles for government, municipal, and public sector procurement in India. It covers:

- Galvanized Iron (GI) decorative poles — heritage, standard, and garden series
- Mild Steel (MS) decorative poles — modern and smart city series
- Solar-integrated decorative poles with off-grid power systems
- Applicable Indian Standards, testing requirements, and quality assurance conditions
- Procurement conditions for AMRUT 2.0, Smart Cities Mission, HRIDAY, and gram panchayat projects

Applicable project types: NMC / PMC / municipal corporation tenders, PWD contracts, gram panchayat scheme purchases, AMRUT 2.0 ULB projects, Smart Cities Mission SPV orders, HRIDAY heritage zone projects, RWA / housing developer procurement, and MIDC / industrial area infrastructure.

2 APPLICABLE INDIAN STANDARDS

IS Code	Title	Applicability
IS:1239 (Part 1)	Mild Steel Tubes, Tubulars and Other Wrought Steel Fittings — Specification	GI pole shaft material
IS:2062 (Grade A)	Hot Rolled Medium and High Tensile Structural Steel	MS pole shaft material
IS:210	Grey Iron Castings — Specification	Cast iron decorative elements
IS:4759	Hot-Dip Zinc Coatings on Structural Steel and Other Allied Products	Galvanizing specification (85 microns min.)
IS:875 (Part 3)	Code of Practice for Design Loads for Buildings and Structures — Wind Loads	Wind zone structural design
IS:456 (2000)	Plain and Reinforced Concrete — Code of Practice	Foundation design
IS:1944	Code of Practice for Lighting of Public Thoroughfares	Lux levels by road class
IS:10322	Specification for Luminaires (LED street lights)	Luminaire requirements
IS:12063	Classification of Degrees of Protection Provided by Enclosures	IP rating verification (= IEC 60529)
IS:3043	Code of Practice for Earthing	Earthing of pole and fixtures
IS:2911	Design and Construction of Pile Foundations	Soft soil foundation
BIS/IEC 62560	Self-Ballasted LED Lamps for General Lighting Services	LED lamp certification

Note: Where IS codes have been superseded, the latest revision in force at the time of tender shall apply. Bidders must confirm current revision compliance in their technical bid.

3 GENERAL TECHNICAL REQUIREMENTS

3.1 Material Quality

- All poles shall be manufactured from new, unused material conforming to applicable IS standards. Use of reclaimed, recycled, or sub-standard material is grounds for rejection.

• Mill test certificates (MTCs) for all raw material (pipe/structural steel) shall be submitted with the technical bid.
• Any deviation from specified material must be pre-approved in writing by the procuring authority.

3.2 Dimensional Tolerance

Parameter	Tolerance	Reference
Pole height (overall)	±50mm on specified height	IS:1239
Outer diameter (OD) at base	±2mm	IS:1239
Wall thickness	–5% (not below minimum)	IS:1239
Straightness (max bow)	1mm per 1000mm of pole length	IS:1239
Base plate flatness	±1mm across plate diagonal	IS:2062
Anchor bolt hole spacing	±2mm from specified PCD	Fabrication std.
Arm projection length	±20mm on specified projection	Fabrication std.

3.3 Wind Zone Compliance

Poles shall be structurally designed for the wind zone applicable to the project district per IS:875 Part-3. The bidder shall confirm the wind zone in the technical compliance statement.

Wind Zone	Basic Wind Speed	Typical Districts (Maharashtra)	Design Requirement
Zone I	33 m/s (119 km/h)	Parts of Vidarbha (interior)	Standard design
Zone II	39 m/s (140 km/h)	Nashik, Pune, Aurangabad, Nagpur	Standard — medium
Zone III	44 m/s (158 km/h)	Coastal Maharashtra (Ratnagiri)	Medium — heavy duty
Zone IV	47 m/s (169 km/h)	Konkan (Sindhudurg)	Heavy duty
Zone V	50 m/s (180 km/h)	Coastal AP / Odisha adjacent	Special engineering

4 STRUCTURAL SPECIFICATIONS — GI POLES

Applicable to: Heritage series, Standard series, Garden/Park series, and Solar-GI series.

Parameter	Specification	IS Reference	Requirement
Shaft material	Galvanized Iron (GI) tubular pipe	IS:1239 Part 1	MANDATORY
Steel grade	IS:1239 Grade B (medium class)	IS:1239	MANDATORY
Minimum wall thickness	3.15mm for poles up to 7.5m	IS:1239	MANDATORY
Wall thickness (HD)	4.00mm for poles above 7.5m or Zone III+	IS:1239	MANDATORY
Galvanizing process	Hot-dip galvanizing (not electroplating)	IS:4759	MANDATORY
Galvanizing thickness	Minimum 85 microns (average)	IS:4759	MANDATORY
Base plate material	MS IS:2062 Grade A	IS:2062	MANDATORY
Base plate size (6m)	300mm x 300mm x 10mm	Standard	MANDATORY
Anchor bolts (6m)	4 x M20 x 600mm, Grade 4.6 HDG	IS:1367	MANDATORY

Parameter	Specification	IS Reference	Requirement
Crown / motif material	Aluminium die-cast or GI fabricated	Manufacturer std	MANDATORY
Shaft profile	Circular tubular (single-piece up to 6m; coupler-jointed above)	IS:1239	MANDATORY
Coupler joint (if used)	Threaded machined coupler, flush with shaft OD	Mfr. std.	MANDATORY

4.1 Standard Height Availability — GI Poles

Height	Wall Thickness	Base Plate	Anchor Bolt	Foundation Depth (Normal Soil)
3.0m	3.15mm	250x250x8mm	4xM16x450mm	0.9m
4.0m	3.15mm	250x250x8mm	4xM16x450mm	0.9m
4.5m	3.15mm	300x300x10mm	4xM20x600mm	1.0m
5.0m	3.15mm	300x300x10mm	4xM20x600mm	1.1m
6.0m	3.15mm	300x300x10mm	4xM20x600mm	1.2m
7.5m	3.15mm	300x300x10mm	4xM20x600mm	1.4m
9.0m	4.00mm	350x350x12mm	4xM24x700mm	1.6m
10.5m	4.00mm	350x350x12mm	4xM24x700mm	1.8m
12.0m	4.00mm	400x400x14mm	6xM24x800mm	2.0m

Foundation depth values are for normal soil (SBC 100-150 kN/m2), Wind Zone II. For black cotton soil, coastal soil, or Wind Zone III+, increase depth by 300-500mm and obtain structural engineer certification.

5 STRUCTURAL SPECIFICATIONS — MS POLES

Applicable to: Modern series, Galaxy series, Square section series, Smart City poles. MS poles are specified for heights above 8m, highway median installation, and smart city projects.

Parameter	Specification	IS Reference	Requirement
Shaft material	Mild Steel (MS) structural steel	IS:2062 Gr.A	MANDATORY
Minimum wall thickness	4.0mm standard; 5.0mm heavy duty	IS:2062	MANDATORY
Shaft profile	Tapered circular or square section	Mfr. standard	MANDATORY
Taper ratio (circular)	Min. 1:100 (6mm per 600mm height)	Mfr. standard	MANDATORY
Hot-dip galvanizing	Full HDG treatment after fabrication	IS:4759	MANDATORY
Galvanizing thickness	Min. 85 microns external, 55 internal	IS:4759	MANDATORY
Powder coat	Electrostatic powder coat, 80 microns	Mfr. standard	MANDATORY
Base plate (8m pole)	350mm x 350mm x 12mm, MS IS:2062	IS:2062	MANDATORY
Anchor bolts (8m)	4 x M24 x 700mm, Grade 8.8, HDG	IS:1367	MANDATORY
CCTV bracket provision	Factory-integrated bracket at 5m+	Smart city req.	RECOMMENDED

Parameter	Specification	IS Reference	Requirement
SCADA conduit	4-core conduit path, separate from power cable	AMRUT 2.0	MANDATORY (AMRUT projects)
Weld quality	Full penetration butt welds, Visual + DP test	IS:9595	MANDATORY

6 SOLAR DECORATIVE POLE SPECIFICATIONS

Component	Minimum Specification	Preferred / Recommended	Requirement
Solar Panel	Monocrystalline, 30W minimum	Mono PERC, 60-80W, 21%+ efficiency	MANDATORY
Panel mounting	Rear-bracket, angle-adjustable (10-20deg)	Hidden rear-mount, tiltable	MANDATORY
Battery	Lithium-ion, 30Ah minimum	LiFePO4, 50Ah, 3000+ cycles	MANDATORY
Battery chemistry	LiFePO4 strongly preferred	No lead-acid in new installations	MANDATORY
Backup (maharashtra)	3 days minimum (monsoon season)	5-day backup at 50Ah+	MANDATORY
Charge controller	PWM 10A minimum	MPPT 20A with overcharge protection	MANDATORY
LED wattage	15W minimum for 5m pole	20-40W per pole depending on height	MANDATORY
Dusk-to-dawn sensor	Required — auto on/off	Photocell + timer hybrid	MANDATORY
Battery compartment	Tamper-resistant lock, IP65 minimum	IP65, anti-theft bolt seal	MANDATORY
Operating temp. range	0 degree C to 60 degree C	LiFePO4: -20 to +60 degree C	MANDATORY
Panel IP rating	IP65	IP65	MANDATORY
MNRE approval	Required for government/GP projects	MNRE certification number on label	MANDATORY (govt)

6.1 Solar Performance Verification

- Manufacturer to provide LiFePO4 battery cycle-life test certificate (minimum 2000 cycles at 80% DoD)
- Panel efficiency certificate from NABL-accredited laboratory
- Backup duration test results at standard operating conditions (10 hours/night, 0% sun input)
- For gram panchayat and government projects: MNRE ALMM (Approved List of Models and Manufacturers) registration

7 SURFACE FINISH & COATING REQUIREMENTS

Process	Specification	Measurement Method	Minimum Standard
Shot blasting (MS poles)	Sa 2.5 cleanliness before galvanizing	Visual inspection per ISO 8501-1	MANDATORY
Hot-dip galvanizing	IS:4759, immersion in molten zinc bath	Coating thickness gauge	85 microns (external)

Process	Specification	Measurement Method	Minimum Standard
Zinc primer (if HDG not used on MS)	Epoxy zinc primer, 40 microns DFT	DFT meter	Not acceptable for external poles
Powder coat — base	Polyester powder coat, electrostatic application	Cross-cut adhesion test	60 microns DFT minimum
Powder coat — MS poles	Polyester powder coat over HDG	Cross-cut + salt spray 500hr	80 microns DFT minimum
Standard colour	Graphite Grey (RAL 7024) — recommended	Pantone/RAL comparison	Any RAL acceptable
Coastal poles (IP66+)	Marine-grade powder coat + topcoat lacquer	Salt spray 1000hr	MANDATORY within 5km of coast
Anti-graffiti coating	Optional — polyurethane topcoat	Manufacturer data sheet	Available on request
Cure temperature	180-200 degree C, 15-20 minutes	Cure log	Per powder coat manufacturer

8 ELECTRICAL & LUMINAIRE SPECIFICATIONS

Parameter	Specification	Standard	Requirement
IP rating — junction box	IP65 minimum (inland); IP66 coastal	IEC 60529 / IS:12063	MANDATORY
IP rating — luminaire	IP65 minimum; IP66 for coastal/riverfront	IEC 60529	MANDATORY
IP rating test certificate	NABL-accredited laboratory certificate	IS:12063	MANDATORY (govt bids)
Luminaire type	LED only — HPS, MH, CFL not accepted	IS:10322	MANDATORY
LED luminous efficacy	Minimum 100 lm/W (AMRUT projects)	AMRUT 2.0 circular	MANDATORY (AMRUT)
Colour rendering index (CRI)	Minimum CRI 70 (Ra); CRI 80 preferred	IEC 62471	MANDATORY
Colour temperature (CCT)	3000K / 4000K / 6500K — confirm at order	IEC 60081	MANDATORY
Power factor	Minimum 0.9 (leading)	IS:14697	MANDATORY
Total harmonic distortion	THD less than 15%	IEC 61000-3-2	MANDATORY
Surge protection	4kV minimum surge protection device	IEC 61643-11	RECOMMENDED
Cable routing	4-core (2.5 sq mm minimum) through shaft conduit	IS:694	MANDATORY
Earthing provision	Earth lug at base plate, IS:3043 compliant	IS:3043	MANDATORY
Smart dimming (AMRUT/SCM)	DALI-2 / LoRaWAN / NB-IoT compatible	AMRUT 2.0	MANDATORY (1000+ poles)

Parameter	Specification	Standard	Requirement
Luminaire warranty	Minimum 3 years comprehensive (AMRUT)	AMRUT 2.0	MANDATORY (AMRUT)

9 DESIGN & AESTHETIC REQUIREMENTS

9.1 General Design Principles

- Pole design shall be appropriate to the project context — heritage motifs for heritage zones; modern profiles for smart city corridors.
- For HRIDAY-designated heritage zones, pole design shall be submitted to the local heritage committee for approval before procurement. Approval documentation must accompany the technical bid.
- Decorative crown motifs shall be fabricated from aluminium die-cast or precision GI fabrication — plastic crowns are not acceptable.
- Arm brackets shall be welded or bolted at the correct ergonomic angle (typically 10-15 degrees upward tilt) to maintain luminaire position.
- Post-top luminaires shall be centred on the pole axis within ±5mm.

9.2 Standard Motif Series Available

Series / Theme	Description	Typical Application	Arm Config
Ashok Chakra	National wheel symbol crown	Government buildings, civic squares	Single / Double
Chhatrapati	Maratha heritage heraldic crown	Maharashtra municipal projects	Single / Double / Post-top
Dhal Talwar	Maratha shield and sword motif	Maharashtra cultural corridors	Double
Trishul	Shiva trident — devotional symbol	Temple roads, ghats, religious sites	Single / Double
Vitthal	Vithoba standing figure	Pandharpur route, Varkari corridor	Double
Om	Pan-tradition sacred symbol	Temples, ashrams, spiritual sites	Double
Rajmudra	Royal seal — Maratha tradition	Heritage zones, government corridors	Single / Double
Sun / Surya	Radiant sun crown	Township roads, cultural corridors	Double
Dhanush	Rama's bow motif	Ram-circuit, temple approaches	Double
Horse	Equestrian crown	Township entries, heritage parks	Single
Handi / Lantern	Traditional pot / lantern housing	Parks, gardens, pedestrian zones	Single / Double
Modern Tapered	Clean geometric contemporary	Smart city, highways, townships	Single / Double
Square Section	Angular contemporary profile	Smart city corridors, commercial	Single / Double
Curved Arm	Swan-neck outreach arm	Premium township boulevards	Single

10 QUALITY ASSURANCE & TESTING

10.1 Factory Tests (mandatory before dispatch)

Test	Method	Acceptance Criteria	Status
Visual inspection	100% of poles	No cracks, weld defects, surface irregularities	MANDATORY
Dimensional check	Per tolerance table (Section 3.2)	Within specified tolerances	MANDATORY
Coating thickness (HDG)	Magnetic thickness gauge per IS:4759	Min. 85 microns average	MANDATORY
Coating thickness (PC)	DFT meter per ASTM D7091	Min. 60 microns (GI) / 80 microns (MS)	MANDATORY
Cross-cut adhesion test	ISO 2409, 6x6 grid, 1mm spacing	Grade 0 or Grade 1 only	MANDATORY
Load test (sample)	10% of order qty or 5 poles (whichever less)	No permanent deformation at 1.5x design load	MANDATORY
Weld inspection (MS)	Visual + DPT on butt welds	No cracks, porosity, undercut	MANDATORY
IP rating verification	NABL cert or factory test to IEC 60529	IP65 minimum	MANDATORY
Salt spray test (coastal)	ASTM B117, 500 hours minimum	No red rust, coating intact	MANDATORY (coastal)
Photometric test (LED)	LM-79 test report from NABL lab	Declared lm/W ±5%	MANDATORY

10.2 Third-Party Inspection

For orders above 100 poles, the procuring authority reserves the right to appoint a third-party inspection agency at manufacturer's facility. All test records shall be made available. Cost of third-party inspection is to the account of the procuring authority unless otherwise specified in the tender.

11 PROCUREMENT CONDITIONS

11.1 Minimum Order Quantities

Pole Type	MOQ (Standard Catalogue)	MOQ (Custom Motif)	Note
GI Standard / Heritage series	1 pole (no minimum)	10 poles	Custom motifs below 10 poles at higher per-unit cost
MS Modern / Smart City series	1 pole (no minimum)	5 poles	
Solar GI series	1 pole (no minimum)	5 poles	
Garden / Park series	1 pole (no minimum)	10 poles	
Heritage Cast Iron elements	10 poles	20 poles	Lead time 6-8 weeks

11.2 GST & Taxation

Item	HSN Code	GST Rate	Notes
Decorative poles (GI / MS / CI)	9405	18%	Lamps, lighting fittings and illuminated signs
LED luminaires / fixtures	9405	18%	As above
Solar panels (monocrystalline)	8541	5%	Photovoltaic cells / panels

Item	HSN Code	GST Rate	Notes
LiFePO4 / lithium battery	8507	18%	Electric accumulators
MPPT charge controller	8504	18%	Electrical transformers / static converters
Foundation civil work	9954	18%	Construction services (sub-contractor scope)

11.3 Documentation to be Provided by Supplier

- GST invoice with supplier GSTIN, HSN code, and item description
- Material Test Certificates (MTCs) for GI pipe / structural steel (mill certificate)
- Coating thickness test reports for galvanizing and powder coat
- IP rating certificate from NABL-accredited laboratory
- LED photometric test report (LM-79) from NABL laboratory
- BIS registration certificate for LED luminaires (where applicable)
- MNRE ALMM registration for solar panels (for government-funded solar projects)
- Manufacturer ISO 9001 certification (if applicable)
- Foundation drawing and anchor bolt specification per pole model and height
- Warranty certificate issued in name of procuring authority

12 STANDARD HEIGHT & CONFIGURATION MATRIX

Application / Road Type	Road Width	Recommended Height	Arm Config	Typical Wattage	IS:1944 Lux Target
Pedestrian pathway / garden	Up to 3m	3.0-4.0m	Single / Post-top	9-18W	10-15 lux
Colony / residential road	4-6m	4.5-5.0m	Single arm	18-30W	20-25 lux
Township internal road	6-8m	5.0-6.0m	Single / Double	30-40W	25-30 lux
Township main road	8-10m	6.0-7.5m	Double arm	40-60W	25-35 lux
Commercial street / market	8-10m	6.0-8.0m	Double arm	50-80W	30-40 lux
District road / MDR	10-12m	7.5-9.0m	Double arm	60-100W	35-40 lux
Urban arterial / NH	12-18m	9.0-12.0m	Double arm / median	80-150W	30-50 lux
Highway median (4-lane)	22-30m	10.0-14.0m	Double arm median	100-200W	30-50 lux
Large open space / plaza	Any	12-20m	High mast crown	200-400W	50-100 lux
Heritage zone / old city	Up to 6m	3.0-5.0m	Multi-arm / post-top	18-30W	10-20 lux
Park / riverfront promenade	Up to 5m	3.0-5.0m	Single / post-top	9-20W	10-20 lux

Lux values are at road surface, measured 0.85m above ground. Actual lux levels depend on luminaire beam angle, pole spacing, and mounting height. Lighting design calculation to IS:1944 should be provided for all government tenders above 50 poles.

13 INSPECTION, DELIVERY & WARRANTY

Parameter	Standard Conditions	AMRUT / Govt Projects
Pre-dispatch inspection	Factory inspection by procuring authority or nominee	Third-party inspection mandatory above 100 poles
Delivery timeline	2-4 weeks (catalogue), 4-8 weeks (custom)	As per LOI / purchase order terms
Delivery terms	Ex-Works, Nashik (unloaded at factory gate)	FOR delivery to site on govt projects
Packing	Bundle-wrapped in HDPE, banded. Luminaires in cartons	Marking: PO number, pole model, height on each pole
Erection	Not included (civil contractor scope)	Erection drawings and supervision available
Pole structural warranty	3 years against manufacturing defects	5 years for government contracts
Coating warranty	3 years (no chalking, peeling, or corrosion)	5 years for government contracts
LED luminaire warranty	3 years comprehensive (replacement on site)	3 years MANDATORY per AMRUT 2.0
LiFePO4 battery warranty	3 years / 1500 cycles (whichever first)	3 years minimum
Solar panel warranty	10 years product, 25 years power output	Per MNRE requirements
Warranty service	Within 48 hours for Nashik district; 7 days others	As per contract SLA

14 APPROVED PRODUCTS REFERENCE

The following product series from Xeratech, Nashik meet the specifications defined in this document and are pre-approved for use in government and municipal tenders:

Series	Category	Height Range	Material	Price Range (ex-GST)
Ashok Chakra Series	Heritage — GI	3-9m	GI IS:1239	Rs.16,000-65,000
Chhatrapati Series	Heritage — GI	3-9m	GI IS:1239	Rs.22,000-72,000
Dhal Talwar Series	Heritage — GI	3-9m	GI IS:1239	Rs.20,000-65,000
Trishul Series	Heritage — GI	3-9m	GI IS:1239	Rs.20,000-65,000
Vitthal / Om Series	Heritage — GI	3-9m	GI IS:1239	Rs.20,000-65,000
Rajmudra / Sun Series	Heritage — GI	3-9m	GI IS:1239	Rs.20,000-65,000
Standard Double Arm	Standard — GI	3-9m	GI IS:1239	Rs.18,000-60,000
Standard Single Arm	Standard — GI	3-9m	GI IS:1239	Rs.14,000-48,000
Eco Series	Economy — GI	3-7.5m	GI IS:1239	Rs.10,000-35,000
Galaxy / Modern Series	Modern — MS	6-12m	MS IS:2062	Rs.22,000-1,05,000
Smart City Pole X1	Smart City — MS	8-12m	MS IS:2062	Rs.85,000-3,50,000

Series	Category	Height Range	Material	Price Range (ex-GST)
Solar SA Series (5m/6m)	Solar — GI	5-6m	GI IS:1239	Rs.28,000-75,000
Solar Heritage Series	Solar Heritage	4-7.5m	GI IS:1239	Rs.32,000-82,000
Lotus Series	Designer — GI+Al	4-10m	GI+Aluminium	Rs.28,000-1,50,000
Garden Handi/Lantern	Garden — GI	3-5m	GI IS:1239	Rs.10,000-40,000

For bulk orders, current pricing, and tender documentation support: **connect@xeratech.in** | +91 9607908432 | decorativestreetlight.in/bulk-quote

15 DISQUALIFICATION CRITERIA

Bids or supplies shall be rejected if any of the following conditions are found:

- **Material non-compliance**: Use of non-IS material, reclaimed pipe, or specification below minimums
- **Galvanizing failure**: Coating thickness below 85 microns average, electroplating instead of hot-dip
- **IP rating non-compliance**: IP rating below IP65 on any outdoor junction box or luminaire
- **LED non-compliance**: Non-LED luminaire supplied; luminous efficacy below 100 lm/W on AMRUT projects
- **Lead-acid battery (solar)**: Lead-acid battery supplied in place of specified lithium/LiFePO4 battery
- **Certificate non-submission**: Missing NABL IP certificate, MTC, LM-79 test report, or other mandatory docs
- **False declarations**: Incorrect specification claims in technical bid — grounds for blacklisting
- **Coating adhesion failure**: Powder coat adhesion below Grade 2 on cross-cut test
- **Heritage non-compliance**: Modern utility pole supplied for HRIDAY heritage zone without written approval

16 GLOSSARY OF TERMS

Term / Abbreviation	Full Form / Definition
GI	Galvanized Iron — iron/steel pipe hot-dip coated in zinc per IS:4759
MS	Mild Steel — structural steel per IS:2062 Grade A
HDG	Hot-Dip Galvanizing — immersion of fabricated steel in molten zinc bath
PC / DFT	Powder Coat / Dry Film Thickness — electrostatic paint applied after galvanizing
IP65	Ingress Protection 65 — fully dust-tight, protected against water jets (IEC 60529)
IP66	Ingress Protection 66 — fully dust-tight, protected against powerful water jets
CCT	Correlated Colour Temperature — 3000K warm / 4000K natural / 6500K cool white
CRI	Colour Rendering Index — measure of colour fidelity (80+ recommended)
LiFePO4	Lithium Iron Phosphate battery — preferred battery chemistry, 3000+ cycles
MPPT	Maximum Power Point Tracking — solar charge controller type
MNRE	Ministry of New and Renewable Energy (India)
ALMM	Approved List of Models and Manufacturers — MNRE solar product registry

Term / Abbreviation	Full Form / Definition
AMRUT	Atal Mission for Rejuvenation and Urban Transformation (2.0 = 2021-2026)
HRIDAY	Heritage City Development and Augmentation Yojana — heritage zone scheme
SCM	Smart Cities Mission — GoI urban infrastructure programme
SCADA	Supervisory Control and Data Acquisition — remote monitoring system
DALI-2	Digital Addressable Lighting Interface — smart dimming protocol
LoRaWAN	Long Range Wide Area Network — IoT communication protocol for smart poles
NB-IoT	Narrowband Internet of Things — cellular IoT protocol
SBC	Safe Bearing Capacity — soil strength parameter for foundation design (kN/m2)
ULB	Urban Local Body — municipal corporation or town panchayat
BOQ	Bill of Quantities — itemised procurement schedule with specifications and rates
LOI	Letter of Intent — formal procurement commitment before purchase order
MTCs	Mill Test Certificates — material quality certificates from steel manufacturer
NABL	National Accreditation Board for Testing and Calibration Laboratories
INTACH	Indian National Trust for Art and Cultural Heritage
BIS	Bureau of Indian Standards

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