

**TAMIL NADU GENERATION & DISTRIBUTION
CORPORATION LTD.**

1X800 MW NORTH CHENNAI STAGE-III BTG

VOLUME – II

TECHNICAL SPECIFICATION FOR
POLES & HIGH MAST

SPECIFICATION NO: PE-TS-423-558-E004
REV-0



BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UTTAR PRADESH, INDIA – 201301



**TECHNICAL SPECIFICATION FOR
POLES & HIGH MAST**

SPECIFICATION NO. PE-TS-423-558-E004

VOLUME II

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**1 X 800 MW NORTH CHENNAI STAGE-III
BTG**

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COMPLIANCE CERTIFICATE

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

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in BOQ-Cum-Price schedule of the specification shall not be considered (i.e., technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE



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SECTION – 'I'

SPECIFIC TECHNICAL REQUIREMENTS



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1.0 SCOPE OF ENQUIRY

- 1.1 Design, manufacture, assembly, inspection & testing at manufacturer's works, proper packing and delivery to site of POLES & HIGH MAST as mentioned in different sections of this specification, complete with all accessories for efficient and trouble-free operation.
- 1.2 Standard technical requirements of the POLES & HIGH MAST are indicated in Section-II. Project specific requirements/changes are listed in Section-I.
- 1.3 **The requirements of Section-I shall prevail and govern in case of conflict between the corresponding requirements of Section-I and Section-II.**
- 1.4 Review of sub vendor's documents by the vendor shall not relieve the vendor from the responsibility of design and supply.
- 1.5 The documents shall be in English language and MKS system of units.

2.0 BILL OF QUANTITIES:

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

3.0 SPECIFIC TECHNICAL REQUIREMENTS

3.1 Street Light Poles

Street light poles shall be FRP based of height 9M / 11M above ground complete with fixing brackets, weather-proof junction box and all other accessories.

Poles shall be round with classic entasis taper. The surface shall be free from crack or bubbles, damage, any exposed fiber & smooth surface shall be uniformly coloured. The FRP pole shall be finished uniform coating equal to the performance of the aliphatic polyurethane.

- Pole length shall have a tolerance of not exceeding 0.3m per 10m.
- Deflection of the pole as per the AASHTO LTS-4 shall not exceed a 15%, depends upon requirement of the length of the pole above the ground line. When subject to maximum wind loading & shall not have more than 1% permanent deflection.
- Bending test, Torsion test, Fatigue test- The provisions for the performance evaluation of FRP poles are based on ASTM D4923

3.2 Lighting High Masts (Winch Operated)

- i. Applicable standards-

1. IS-875 (Part-III) - Code and practice for design loads for Structures.
2. BSEN 10025/DIN 17100 - Grade of M.S. Plates.
3. BS-5135/AWS - Welding



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4. BS.ISO 1461 - Galvanizing
5. TR. No. 7200 of ILE - UK Specification for Mast and foundation.

ii. Structure

1. Lighting High Mast shall be of continuously tapered polygonal cross section, at least 20 sided, hot dip galvanized and presenting a good and pleasing appearance and shall be based on proven In-Tension design confirming to the standards referred to above, to give an assured performance, and reliable service. The structure shall be suitable for wind loading as per IS-875 Part-III. The masts dimensions shall be as per standards.
2. The Mast shall be of 30M height with lantern carriage to enable raising/lowering for ease of maintenance, including the Head Frame, Double Drum Winch, continuous stainless steel wire rope, in built power tool, luminaries, suitable aviation warning light, lightning along with necessary power cables within the mast. The mast shall be delivered only in three sections & shall be joined together by slip stressed fit method at site. No site welding or bolted joints shall be done on the mast.

<u>S.No.</u>	<u>Reference Clause No. of Section- II</u>	<u>Specific Requirement/ Change</u>
1	3.2.4 JB-S	Provided with four (4) way stud type terminals, each terminal suitable for terminating upto two nos. of 3.5Cx25 mm ² /3.5Cx50 mm ² /3.5Cx95 mm ² stranded aluminium conductors & with one no.6A HRC fuse and link.
2	7.0 (TOOLS & TACKLES)	Bidder to supply necessary accessories required for installation of its supplied equipment's without any cost implication to BHEL.
3	GENERAL	Junction boxes shall have following indelible markings: 1. Circuit nos. on top 2. Circuit nos. with ferrules(inside) as per drawing 3. Danger sign in case of 415V circuit

3.3 Inspection & Testing

Bidder to comply with the requirements specified at clause no 6.0 in Section-II. Further manufacturing quality plan for FRP type lighting poles & panel to be submitted by successful bidder for BHEL/ ultimate customer's approval to also include physical, chemical & mechanical properties as per relevant standards. There shall be no commercial implication to BHEL on account of any changes in QP during contract



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4.0 DOCUMENTATION

4.1 Documents required after award of LOI shall be as per attachment-I (to be submitted by successful bidder).

ATTACHMENT – I

DOCUMENTS REQUIRED AFTER AWARD OF LOI **(To be submitted by successful bidder)**

SL. No.	DOCUMENT TITLE	DWG. / DOCUMENT No.	CATEGORY
1	TECHNICAL DATASHEET FOR POLES/ HIGH MAST	PE-V0-423-558-E404	APPROVAL
2	GA DRAWING OF POLE-PS1 (Including foundation details)	PE-V0-423-558-E075	APPROVAL
3	GA DRAWING OF POLE-PS2 (Including foundation details)	PE-V0-423-558-E076	APPROVAL
4	GA DRAWING OF POLE-PF1 (Including foundation details)	PE-V0-423-558-E077	APPROVAL
5	GA DRAWING OF POLE-PF2 (Including foundation details)	PE-V0-423-558-E078	APPROVAL
6	GA DRAWING OF HIGH MAST (including feeder panel, structural calculation & foundation calculation)	PE-V0-423-558-E086	APPROVAL
7	GA DRAWING FOR JB(S)	PE-V0-423-558-E061	APPROVAL
8	MANUFACTURING QUALITY PLAN FOR POLES	PE-V0-423-558-E907	APPROVAL
9	MANUFACTURING QUALITY PLAN FOR HIGH MAST	PE-V0-423-558-E909	APPROVAL
10	FIELD QUALITY PLAN FOR POLES/ HIGH MAST	PE-V0-423-558-E911	INFORMATION
11	BILL OF MATERIAL FOR POLES & HIGH MAST	PE-V0-423-558-E407	APPROVAL
12	INSTRUCTION FOR ERECTION OF POLES & HIGH MAST	PE-V0-423-558-E408	INFORMATION

Note: The above list of drawings and documents is indicative.



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1.0 APPLICABLE STANDARDS & CODES

[A] POLES AND HIGH MAST

- | | | |
|-----|---|--------------------|
| 1. | Tubular steel poles for over head power lines | IS 2713 |
| 2. | Code and practice for design loads for structures | IS 875 Part III |
| 3. | Code of practice for general construction in steel | IS 800 |
| 4. | European structural steel standard | BS-EN 10025 |
| 5. | Code of practice for phosphating of iron and steel | IS 6005 |
| 6. | Colour for ready mixed paints & enamels | IS 5 |
| 7. | Recommended practice for hot dip galvanising of iron & steel | IS 2629 |
| 8. | Method of testing uniformity of coating on zinc coated articles | IS 2603 |
| 9. | Method of sampling for steel pipes, tubes & fittings | IS 4711 |
| 10. | Method of chemical analysis of pig iron, cast iron and plain carbon & low alloy steel | IS 228 |
| 11. | Steel tubes for structural purposes | IS 1161 |
| 12. | Mechanical testing of metals-Tensile Testing | IS 1608 |
| 13. | Specification for hot dip zinc coatings on structural steel and allied products | IS 4759 |
| 14. | Method for testing uniformity of coating on zinc coated articles | IS 2633 |
| 15. | Specification for structural support for Highway signs, luminaries & traffic signals | AASHTO LTS-6 |
| 16. | Fibreglass Reinforced Plastic Lighting Pole | ANSI C 136.20-1990 |
| 17. | Performance evaluation of FRP poles i.e | ASTM D4923 |



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Bending test, Torsion test, Fatigue test

18. Deflection of the pole

AASHTO LTS-4

[B] ADDITIONAL STANDARDS FOR MAST

1. Welding

BS 5135/AWS

2. Galvanizing

BS.ISO 1461

3. UK Specification for Mast & Foundation

TR No. 7200 of ILE

[C] ASSEMBLED EQUIPMENT AND COMPONENTS

1. Low voltage switchgear and control gear

IEC 60947

2. General requirements for enclosures for accessories for household and similar fixed electrical installations

IS 14772

3. Electrical accessories- Circuit breaker for overcurrent protection for household and similar installations

IEC 60898

4. Low voltage Fuses for voltages not exceeding 1100V AC or 1500V DC

IS 13703

5. Visual indicator lamps

IS 1901

2.0 TECHNICAL DETAILS

S. No.	Description	Unit	Value
1.0	System Design Data		
a	Rated voltage	V	415
b	Rated frequency	Hz	50
c	Voltage and frequency variation (permissible)	%	Voltage: $\pm 10\%$ Frequency: $\pm 5\%$
d	Combined voltage & frequency variation (permissible)	%	10% absolute
e	System fault level & duration	kA, sec	50kA for 1 sec
2.0	Lighting Poles (FRP)		



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2.1	Type of Pole		FRP
a	PS-1 (9m), Refer 3.1.9 Section-II		
b	PS-2 (11 m), Refer 3.1.9 Section-II		
c	PF-1 (9m), Refer 3.1.9 Section-II		
d	PF-2 (9m), Refer 3.1.9 Section-II		
2.2	Material		FRP
2.3	Tensile Strength	MPa	DIN 53455/ASTMD 638
2.4	Mounting arrangement		[] PCC foundation [√] Base plate
2.5	Grade of concrete		[] M20 [√] M25 [] M30
2.6	Surface Treatment		[] Painted [] Galvanized
2.7	Colour shade		Siemens grey RAL-7032 (Shall be finalised during detail engg. without any price implication to BHEL)
2.8	PAINTING details for poles (if applicable)		
a	Paint shade as per IS:5		Two coats of red oxide primer followed by two coats of battleship Siemens grey RAL-7032.
b	Paint Thickness	Microns	50
2.9	GALVANISATION details for poles		(NOT APPLICABLE)
a	Process		
b	Min weight of zinc coating	gm/m2	
c	Avg. thickness of zinc coating	Microns	
Note:	Exterior Aluminium paint specified at 2.8 above is not in vendor's scope and is to be carried out at site after installation. It is specified only for completeness of datasheet. However, black bituminous paint & red oxide primer to be applied by vendor as per clause 3.12 of section II.		
3.0	Lighting Masts		
a	Number of luminaires on each mast	nos.	[√] 12 [] 16
b	Type of design		Continuously tapered at least 20 sided, Polygonal shape
c	Material		GI



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d	Height	meter	☐ 20 ☐ 25 ☒ 30
e	Grade of concrete		☐ M20 ☒ M25 ☐ M30
f	Galvanisation details		
i)	Process		Hot dip
ii)	Min weight of zinc coating	gm/m2	610
iii)	Avg. thickness of zinc coating	Microns	86
4.0	Street Light Junction Box		
a	Enclosure material		☒ FRP ☐ CRCA Sheet.
b	Enclosure thickness (Min.)	mm	2
c	Galvanisation details		(NOT APPLICABLE)
i)	Process		
ii)	Min weight of zinc coating	gm/m2	
iii)	Avg. thickness of zinc coating	Microns	
d	Degree of protection		IPW-66
e	Colour shade		Shall be finalised during detail engg. Without any price implications to BHEL.
5.0	Feeder Panel (High Mast)		
a	Enclosure material		☒ FRP ☐ CRCA Sheet.
b	Enclosure thickness (Min.)	mm	3
c	Degree of protection		IPW-55, Weatherproof with canopy.
d	Colour shade		Siemens grey RAL-7032 (Shall be finalised during detail engg. without any price implication to BHEL)
e	Paint type		(NOT APPLICABLE)
f	Paint Thickness	Microns	(NOT APPLICABLE)
5.1	Switch-Fuse Unit		
a	Utilisation category for main		AC23



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	contacts		
5.2	Miniature Circuit Breaker		
a	SPN MCB rating (min)	A	20
b	DP MCB rating (min)	A	20
c	TPN MCB rating (min)	A	63
d	Short time rating	kA	10
e	Magnetic short circuit protection required		☒ Yes ☐ No
f	Thermal overload protection required		☒ Yes ☐ No
5.3	Power Contactors		
a	AC contactors voltage coil rating	V	240
b	DC contactors voltage coil rating	V	220
5.4	Selector switch		
a	Type of selector switch		☒ Stay put ☐ Wing knob
b	Lockable		☒ Yes ☐ No
5.5	Push Button		
a	Voltage grade	V	500
b	Potential free contacts		2NO+2NC
5.6	Time switch		
a	Type		Digital synchronous
b	Range	Hr	00-24
c	Coil voltage rating	V	240
5.7	Timer		
a	Type		
b	ON delay timer range	Sec	0-5
c	OFF delay timer range	Sec	0-180
d	AC Coil voltage rating	V	240
e	DC Coil voltage rating	V	220
6.0	Cable Glands		By vendor for all incoming and outgoing cables at Pole JB and feeder panel
a	Type		☒ Double compression ☐ Single compression
b	Material		Brass



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c	Nickel Plating provided		☒ Yes ☐ No			
d	Size		Cable Gland shall be suitable for following cable sizes: -			
			Cable Size	Cable Dia. under armour	Cable Dia over armour	Overall dia of cable
			3.5C-25sqmm	18.7 (±1.5mm)	21.8 (±1.5mm)	24.9 (±1.5mm)
			3.5C-50sqmm	24.2 (±2.0mm)	27.4 (±2.0mm)	30.8 (±2.0mm)
			3.5C-95sqmm	31.4 (±2.0mm)	35.4 (±2.0mm)	38.8 (±2.0mm)
7.0	Cable Lugs		By vendor for all incoming and outgoing cables at Pole JB and feeder panel			
a	Type		☒ Crimping type ☐ Ring type			
b	Material		Tinned copper			
c	Size		Suitable for Cable sizes: 3.5C-25sqmm, 3.5C-50sqmm, 3.5C-95sqmm armoured cable.			



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S. No.	Description	Unit	Value
1.0	System Design Data		
a	Rated voltage	V	
b	Rated frequency	Hz	
c	Voltage and frequency variation (permissible)	%	
d	Combined voltage & frequency variation (permissible)	%	
e	System fault level & duration	kA, sec	
2.0	Lighting Poles		
2.1	Type of Pole		
a	PS-1 (11m), Refer 3.1.9 Section-II		
b	PS-2 (11 m), Refer 3.1.9 Section-II		
c	PF-2 (12m), Refer 3.1.9 Section-II		
2.2	Material		
2.3	Tensile Strength	MPa	
2.4	Mounting arrangement		
2.5	Grade of concrete		
2.6	Surface Treatment		
2.7	PAINTING details for poles (if applicable)		
a	Paint shade as per IS:5		
b	Paint Thickness	Microns	
2.8	GALVANISATION details for poles (if applicable)		
a	Process		
b	Min weight of zinc coating	gm/m2	



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c	Avg thickness of zinc coating	Microns	
Note:	Exterior Aluminium paint specified at 2.7 above is not in vendor's scope and is to be carried out at site after installation. It is specified only for completeness of datasheet. However, black bituminous paint & red oxide primer to be applied by vendor as per clause 3.12 of section II.		
3.0	Lighting Masts		
a	Number of luminaires on each mast	nos.	
b	Type of design		
c	Material		
d	Height	meter	
e	Grade of concrete		
f	Galvanisation details		
i)	Process		
ii)	Min weight of zinc coating	gm/m2	
iii)	Avg. thickness of zinc coating	Microns	
4.0	Street Light Junction Box		
a	Enclosure material		
b	Enclosure thickness	mm	
c	Galvanisation details		
i)	Process		
ii)	Min weight of zinc coating	gm/m2	
iii)	Avg. thickness of zinc coating	Microns	
d	Degree of protection		
5.0	Feeder Panel		
a	Enclosure material		
b	Enclosure thickness	mm	



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c	Degree of protection		
d	Paint shade		
e	Paint type		
f	Paint thickness	microns	
5.1	Switch-Fuse Unit		
a	Utilisation category for main contacts		
5.2	Miniature Circuit Breaker		
a	SPN MCB rating (min)	A	
b	DP MCB rating (min)	A	
c	TPN MCB rating (min)	A	
d	Short time rating	kA	
e	Magnetic short circuit protection required		
f	Thermal overload protection required		
5.3	Power Contactors		
a	AC contactors voltage coil rating	V	
b	DC contactors voltage coil rating	V	
5.4	Selector switch		
a	Type of selector switch		
b	Lockable		
5.5	Push Button		
a	Voltage grade	V	
b	Potential free contacts		
5.6	Time switch		
a	Type		
b	Range	Hr	
c	Coil voltage rating	V	
5.7	Timer		
a	Type		
b	ON delay timer range	Sec	
c	OFF delay timer range	Sec	
d	AC Coil voltage rating	V	



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e	DC Coil voltage rating	V	
6.0	Cable Glands		By vendor for all incoming and outgoing cables at Pole JB and feeder panel
a	Type		
b	Material		
c	Nickel Plating provided		
d	Size		
7.0	Cable Lugs		By vendor for all incoming and outgoing cables at Pole JB and feeder panel
a	Type		
b	Material		
c	Size		

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SUB-VENDOR LIST

S. NO.	ITEM	VENDOR
1	AC CONTACTORS	SIEMENS
	AC CONTACTORS	GE-POWER
	AC CONTACTORS	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.
	AC CONTACTORS	L&T
	AC CONTACTORS	BCH
2	AC MCCB	C&S ELECTRIC LTD.
	AC MCCB	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	AC MCCB	SIEMENS
	AC MCCB	GE-POWER
	AC MCCB	L&T
3	AMMETER	CROMPTON GREAVES
	AMMETER	AUTOMATIC ELECTRIC LTD.
4	AUXILIARY RELAYS	RISHABH INST.PVT LTD
	AUXILIARY RELAYS	ABB
	AUXILIARY RELAYS	ALSTOM LTD
	AUXILIARY RELAYS	JYOTI LTD.
	AUXILIARY RELAYS	OEN INDIA LTD
5	CABLE GLANDS	SIEMENS
	CABLE GLANDS	ALLIED TRADERS & EXPORTERS
	CABLE GLANDS	ARUP ENGG & FOUNDARY WORKS
	CABLE GLANDS	BALIGA LIGHTING EQPT PVT LTD
	CABLE GLANDS	COMMET BRASS PRODUCTS
6	CABLE GLANDS	DOWELLS
	CABLE GLANDS	ELECTROMAC INDUSTRIES
7	CABLE LUGS	INCAB
	CABLE LUGS	DOWELLS
	CABLE LUGS	UNIVERSAL MACHINES LTD.
	CONTROL SWITCHES/ SELECTOR SWITCH	KAYCEE
	CONTROL SWITCHES/ SELECTOR SWITCH	GE-POWER
8	CONTROL SWITCHES/ SELECTOR SWITCH	ALSTOM LTD
	CONTROL SWITCHES/ SELECTOR SWITCH	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	CONTROL SWITCHES/ SELECTOR SWITCH	Shrenik & Co.
	CONTROL SWITCHES/ SELECTOR SWITCH	RECOM PVT. LTD.
	CONTROL SWITCHES/ SELECTOR SWITCH	CROMPTON GREAVES
9	D.C. MCCB	L&T
	D.C. MCCB	GE-POWER
	D.C. MCCB	SIEMENS
	D.C. MCCB	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	D.C. MCCB	BHEL (BHOPAL)
10	DC CONTACTORS	ELECTROMAC INDUSTRIES
	DC CONTACTORS	L&T
	DC CONTACTORS	SIEMENS
	DC CONTACTORS	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.
	DC CONTACTORS	GE-POWER
11	DC SWITCH	GE-POWER
	DC SWITCH	KAYCEE
	DC SWITCH	SIEMENS
	EARTH LEAKAGE CB	L&T
	EARTH LEAKAGE CB	SIEMENS
12	EARTH LEAKAGE CB	GE-POWER
	EARTH LEAKAGE CB	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	EARTH LEAKAGE CB	C&S ELECTRIC LTD.
	EARTH LEAKAGE CB	ABB
	EARTH LEAKAGE CB	INDO ASIAN
13	EARTH LEAKAGE CB	MDS SWITCHGEAR LTD
	EARTH LEAKAGE CB	S&S POWER SWITCHGEAR LTD,
	FUSE BASE	INDO ASIAN
	FUSE BASE	GE-POWER
	FUSE BASE	L&T
14	FUSE BASE	C&S ELECTRIC LTD.
	FUSE BASE	SIEMENS
	FUSE BASE	ABB
	FUSE BASE	SPACEAGE SWITCHGEARS LTD.
	FUSE BASE	SCHNEIDER ELECTRIC INDIA PVT. LTD.
15	FUSE BASE	ALSTOM LTD
	FUSE BASE	ESSEN DEINKI
16	GI WIRE & FLAT	Brahampuri Steels Limited

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SUB-VENDOR LIST

13	GI WIRE & FLAT	INDIA ELECTRICALS SYNDICATE
	GI WIRE & FLAT	INDMARK FORMTECH PVT. LTD.
	GI WIRE & FLAT	PREMIER POWER PRODUCTS (CAL) PVT. LTD.
	GI WIRE & FLAT	Patny Systems (P) Ltd.
	GI WIRE & FLAT	PASSIVE INFRA PROJECTS PVT. LTD.
	GI WIRE & FLAT	RUKMANI ELECTRICAL & COMPONENTS PVT LTD
	GI WIRE & FLAT	RATAN PROJECTS & ENGINEERING CO. PVT.LTD.
	GI WIRE & FLAT	RABI ENGINEERING WORKS PVT. LTD.
	GI WIRE & FLAT	RAJASTHAN METAL SMELTING CO.
	GI WIRE & FLAT	SARAL INDUSTRIES
	GI WIRE & FLAT	PARCO Engineers Pvt. Ltd.
14	GI WIRE & FLAT	UNITECH FABRICATORS and ENGINEERS PVT LTD
	HRC FUSES	INDO ASIAN
	HRC FUSES	GE-POWER
	HRC FUSES	L&T
	HRC FUSES	C&S ELECTRIC LTD.
	HRC FUSES	SIEMENS
	HRC FUSES	ABB
	HRC FUSES	SPACEAGE SWITCHGEARS LTD.
	HRC FUSES	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	HRC FUSES	ALSTOM LTD
15	HUME PIPE	ESSEN DEINKI
	HUME PIPE	REPUTED MAKE
16	IND.POWER & WLDG SOCKETS	CROMPTON GREAVES
	IND.POWER & WLDG SOCKETS	CYCLO ELECTRIC DEVICE & SERV.CO.
	IND.POWER & WLDG SOCKETS	BCH
	IND.POWER & WLDG SOCKETS	BEST & CROMPTON
	IND.POWER & WLDG SOCKETS	AJMERA INDUSTRIES & ENGG. WORKS
17	INDICATING LAMPS	BCH
	INDICATING LAMPS	C&S ELECTRIC LTD.
	INDICATING LAMPS	ESSEN DEINKI
	INDICATING LAMPS	VAISHNO(HOTLINE SWGR.& CONTROL)
	INDICATING LAMPS	GE-POWER
	INDICATING LAMPS	SIEMENS
	INDICATING LAMPS	SCHNEIDER ELECTRIC INDIA PVT. LTD.
18	JUNCTION BOXES (FLAME PROOF)	SUDHIR SWITCHGEAR
	JUNCTION BOXES (FLAME PROOF)	SUDHIR SWITCHGEAR
19	JUNCTION BOXES (NON FLAME PROOF)	JASPER ENGINEERS PVT. LTD.
	JUNCTION BOXES (NON FLAME PROOF)	Electro Controls & Devices
	JUNCTION BOXES (NON FLAME PROOF)	Shrenik & Co.
	JUNCTION BOXES (NON FLAME PROOF)	PHOENIX MECANO LTD.,
	JUNCTION BOXES (NON FLAME PROOF)	Adroit Control Engineers Pvt.Ltd.
	JUNCTION BOXES (NON FLAME PROOF)	PHOENIX MECANO LTD.,
	JUNCTION BOXES (NON FLAME PROOF)	MIKA ENGINEERS
	JUNCTION BOXES (NON FLAME PROOF)	PHOENIX MECANO LTD.,
	JUNCTION BOXES (NON FLAME PROOF)	BAJAJ ELECTRICALS
	JUNCTION BOXES (NON FLAME PROOF)	AJMERA INDUSTRIES & ENGG. WORKS
20	JUNCTION BOXES (NON FLAME PROOF)	S.B. ELECTRICAL ENGINEERING CORPORATION
	LIGHTING SWITCH , SOCKET & S/F UNIT	ELEXPRO ELECTRICALS PVT/ LTD.
	LIGHTING SWITCH , SOCKET & S/F UNIT	ANCHOR
	LIGHTING SWITCH , SOCKET & S/F UNIT	KAYCEE
	LIGHTING SWITCH , SOCKET & S/F UNIT	L&T
	LIGHTING SWITCH , SOCKET & S/F UNIT	SIEMENS
	LIGHTING SWITCH , SOCKET & S/F UNIT	INDO ASIAN
21	LT- CURRENT TRANSFORMER	SIEMENS
	LT- CURRENT TRANSFORMER	AUTOMATIC ELECTRIC LTD.
	LT- CURRENT TRANSFORMER	INDCOIL
	LT- CURRENT TRANSFORMER	KAPPA ELECTRICALS
	LT- CURRENT TRANSFORMER	PRAGATI ELECTRICALS
	LT- CURRENT TRANSFORMER	PRECISE ELECTRICALS
	LT- CURRENT TRANSFORMER	SILKAANS ELECT.MFG.CO.PVT.LTD
	LT- CURRENT TRANSFORMER	PRAYOG ELECTRICALS PVT. LTD.
22	LT- CURRENT TRANSFORMER	C&S ELECTRIC LTD.
	LT- POTENTIAL TRANSFORMER	SIEMENS
	LT- POTENTIAL TRANSFORMER	AUTOMATIC ELECTRIC LTD.
	LT- POTENTIAL TRANSFORMER	INDCOIL
	LT- POTENTIAL TRANSFORMER	KAPPA ELECTRICALS
	LT- POTENTIAL TRANSFORMER	PRAGATI ELECTRICALS
	LT- POTENTIAL TRANSFORMER	PRECISE ELECTRICALS
22	LT- POTENTIAL TRANSFORMER	SILKAANS ELECT.MFG.CO.PVT.LTD
	LT- POTENTIAL TRANSFORMER	SILKAANS ELECT.MFG.CO.PVT.LTD

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SUB-VENDOR LIST

	LT- POTENTIAL TRANSFORMER	PRAYOG ELECTRICALS PVT. LTD.
23	MCB	MDS SWITCHGEAR LTD
	MCB	INDO ASIAN
	MCB	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	MCB	S&S POWER SWITCHGEAR LTD,
24	PHOTOELECTRIC SWITCH	REPUTED MAKE
25	PVC WIRES	BIS APPROVED MAKE
26	TERMINAL BLOCKS	WAGO-CONTROLS
	TERMINAL BLOCKS	CONNECT WELL
	TERMINAL BLOCKS	ELMEX CONTROLS PVT. LTD.
	TERMINAL BLOCKS	ESSEN DEINKI
	TERMINAL BLOCKS	TECHNOPLAST
27	TIMERS - ELECTRONIC	ESSEN DEINKI
	TIMERS - PNEUMATIC	BCH
	TIMERS - PNEUMATIC	ALSTOM LTD
	TIMERS - PNEUMATIC	L&T
	TIMERS - PNEUMATIC	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.
	TIMERS - PNEUMATIC	SCHNEIDER ELECTRIC INDIA PVT. LTD.
	TIMERS - PNEUMATIC	ELECTRONIC AUTOMATION PVT. LTD.
28	VOLTMETER	AUTOMATIC ELECTRIC LTD.
	VOLTMETER	RISHABH INST.PVT LTD
29	LIGHTING TRANSFORMER	AUTOMATIC ELECTRIC LTD.
	LIGHTING TRANSFORMER	INDCOIL
	LIGHTING TRANSFORMER	POWER PACK ENTERPRISES
	LIGHTING TRANSFORMER	VIJAY ELECTRICALS LTD.
	LIGHTING TRANSFORMER	GILBERT & MAXWELL
	LIGHTING TRANSFORMER	KAPPA ELECTRICALS
30	LIGHTING TRANSFORMER	Ames Impex Electricals Pvt. Ltd
	GALVANISING	JENCO INDUSTRIAL CORPORATION
	GALVANISING	NATIONAL GALVANISING COMPANY
	GALVANISING	SIGMA GALVANISING PVT.LTD
	GALVANISING	B.P. PROJECTS PVT LTD
	GALVANISING	STANDARD GALVANISERS
	GALVANISING	STEEL PRODUCTS
	GALVANISING	UNITECH FABRICATORS & ENGINEERS PVT. LTD.
	GALVANISING	M/s Shivam Engineers & Fabricators
	GALVANISING	M/s B.G. Shirke Construction Technology Pvt. Ltd.
	GALVANISING	M/s Galbro Ispat Galvanizers Pvt. Ltd.
	GALVANISING	EROS METELS



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SECTION-II GENERAL REQUIREMENTS



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1.0 INTENT OF SPECIFICATION

1.1 The requirement of this specification shall be fully complied with.

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

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

1.4 Make of all equipment and components shall be as per sub vendor list (Section I) and subjected to the approval of BHEL/BHEL’s customer without any commercial implication.

2.0 CODES & STANDARDS

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

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

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

3 DESIGN REQUIREMENTS

3.1 LIGHTING POLES

3.1.1 Lighting poles as required for street lighting and flood lighting shall be of swaged/stepped tubular steel of swan neck construction as per applicable standard.

3.1.2 Where painted type of poles is specified (to be done at vendor’s works);

- a) The poles shall be coated with black bituminous paint, conforming to applicable standard, throughout on the inside surface and on the outside surface up to the level which is embedded in ground.
- b) Exposed outside surface shall be painted with two coats of red oxide and zinc chromate in synthetic compound primer.
- c) Final painting shall be done at site after installation. Same is not in vendor’s scope.

3.1.3 Where galvanization of poles is specified;

- a) All inside and outside surfaces of the pole and base plate shall be hot dip galvanised as per manufacturer’s practice.
- b) Base plate shall be galvanised after welding to the pole base.
- c) Weight and thickness of zinc coating shall be as per Datasheet-A.



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- 3.1.4 Each street lighting pole shall be supplied with necessary pipe-reducer / fixing-bracket for fixing the luminaire.
- 3.1.5 Each street lighting pole shall be suitably provided with weather proof, galvanised steel junction box and two numbers fixing brackets suiting the diameter of the pole. The requirements of junction box are stipulated elsewhere. The fixing brackets shall be supplied loose.
- 3.1.6 Street lighting pole shall be provided with wiring hole. The location shall be coordinated with mounting position of street lighting pole JB. The diameter of hole shall be 20 mm. The hole shall be provided with a rubber / PVC grommet.
- 3.1.7 Flood lighting pole shall be provided with painted MS plate and shall be suitable for the number of flood lighting luminaires and controlgear boxes.
- 3.1.8 Provision for earthing shall be provided for flood / street lighting poles at a height 1 metre above the ground (MS flat size shall be informed during detailed engineering). The pole shall be earthed at two points.
- 3.1.9 Types of Lighting Poles

Exact type and designation of lighting pole is as given in Data Sheet A. Basic types are as follows:

- a) PS1 - Street Lighting Pole for one luminaire with 1200mm bracket arm.
- b) PS2 - Street Lighting Pole for one luminaire with 1800mm bracket arm.
- c) PS4 - Street Lighting Pole for two luminaires with 1800mm bracket arm each.
- d) PF1 - Flood Lighting Pole for one luminaire.
- e) PF2 - Flood Lighting Pole for two luminaires.

Details of luminaire shall be provided during detailed engineering.

3.2 POLE JUNCTION BOXES JB(S)

- 3.2.1 Junction boxes with terminals shall be supplied for branching and terminating lighting wires/cables.
- 3.2.2 Construction Features
- (a) The junction boxes shall be fabricated out of material specified in Datasheet-A and shall be of rectangular shape. The cover shall be hinged or bolted with captive nuts and bolts and shall be provided with neoprene gasket lining all over.
 - (b) The junction boxes shall be provided with suitable knock outs/ gland plates for conduit/ cable connection. The conduit connection shall be properly sealed. The junction boxes meant for cable connection shall be complete with removable gland plates, glands and cable lugs, as required. The junction boxes shall be provided with two earthing terminals suitable for 14SWG GI earthing wires.



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- (c) The junction boxes shall be weather proof type conforming to IP-55 of IS:2147. Junction boxes for street light poles and lighting/lightning masts shall be provided with hinged doors and allen keys with bolts as locking arrangement.
- (d) The boxes and cover shall be hot dip galvanised.
- (e) The junction boxes shall be suitable for mounting on lighting poles, mast etc. The brackets, bolts, nuts, screws and any other erection accessories required for erection shall be provided along with the junction box.

3.2.3 Terminals

- (a) Multiway terminal blocks of approved type and make complete with galvanised screws, nuts, washers and marking strips shall be furnished for terminating the lighting wires.
- (b) All the terminals blocks shall be of 650V grade one piece construction with insulating barriers. These terminals shall be made of copper alloy and shall be stud type. Each terminal provided on junction box shall be suitable for terminating two numbers of aluminium conductors of the size as specified without any damage to the conductors or looseness.

3.2.4 The junction boxes shall be of following types:

Type	Description
JB-S	Provided with four (4) way stud type terminals, each terminal suitable for terminating upto two nos. of 3.5Cx50 mm ² stranded aluminium conductors & with one no.6A HRC fuse and link.
JB-M	Provided with four (4) way stud type terminals, each terminal suitable for terminating upto two nos. of 4Cx16 mm ² stranded aluminium conductors & tap off of 3 nos. 2C x 2.5 sq. mm. Cu cable.

3.3 LIGHTING MASTS

- 3.3.1 Lighting mast shall be continuously tapered polygonal cross section hot dip galvanised. The Mast shall be of height as specified in Datasheet-A with lantern carriage to enable raising/lowering for ease of maintenance, including the Head Frame, Double Drum Winch, continuous stainless steel wire rope, in built power tool, aviation warning light, lightning protection arrangement along with necessary power cables within the mast. The mast shall be delivered only in three sections & shall be joined together by slip stressed fit method without carrying out any welding or bolting of joints at site. Lantern carriage shall be suitable for mounting flood light fixtures, numbers as specified in Datasheet-A (fixture details shall be provided during detailed engineering). Carriage shall be provided with JB type M to facilitate interconnection to lighting fixtures.
- 3.3.2 Permissible design parameters should be according to relevant standard. The deflection under the maximum wind pressure of 150 kg/sq.m shall not exceed 1 in 360. The Mast together with the fixtures shall be capable of withstanding the appropriate wind loads as per IS: 875 Part III.
- 3.3.3 The Mast shall be fabricated from special steel plates conforming to BS-EN10-025 and folded to form a polygonal section.



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3.3.4 A suitable winch arrangement shall be provided to lower & raise the Lantern Carriage Assembly. Winch shall be of completely self-sustaining type without the need for brake shoe, springs or clutches. The min. working load shall not be less than 750 kg. The winch drum shall be grooved to ensure perfect seat for stable and tidy rope lay with no chances for slippage. Winch shall be operated by an internally mounted three phase motor/power tool with necessary reduction gear mechanism. A handle for manual operation of winch shall also be provided. An adequate door opening shall be provided at the base of the Mast.

3.3.5 All surfaces (inside & outside) of steel sections, members and hardware used shall be hot dip galvanised as per applicable standard.

3.3.6 Necessary mounting facilities for mounting of luminaires and control gear boxes shall be provided at top platform. This shall include provision of holes in the fixing bracket for movable fixing plate. Adequate number of movable plates affixed to the bracket shall also be provided. Size of movable plates and the position of holes shall match with the luminaire fixing arrangement.

3.3.7 Mast shall be provided with 1200mm long air termination for the lightning protection (at top of the mast as per IS-2309). Suitable arrangement for connection of down conductor (not in the scope of vendor) shall be provided. Provision of earth connection of GI strip shall also be kept at a height of one metre from the ground (conductor size shall be informed during detailed engineering).

3.3.8 Types of Lighting Masts

- a) LM20 - Lighting Mast with 20 m height
- b) LM25 - Lighting Mast with 25 m height
- c) LM30 - Lighting Mast with 30 m height

4 COMPONENTS OF MAST FEEDER PANEL

Lighting mast shall be complete in all respect and shall be provided with feeder panel complete with power/control circuit along with 63A TPN MCB, contactors, timers, photocell, MCB's, motor protections (O/L & single phase), start/stop PB with indication lamps. Feeder pillar shall have provision of receiving 4Cx16 sq mm. cable. All necessary cables between feeder panel & JB-M and between JB-M & fixtures are also included in the scope of mast and same shall be of proven design.

4.1 SWITCH-FUSE UNITS

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

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

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

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



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- 4.1.5 The switch shall be capable making and carrying the system prospective fault current, but limited in magnitude and duration by the cut off characteristics of the largest HRC fuse link that may be fitted to that unit.
- 4.1.6 The fixed contact shall be so shrouded that maintenance of the unit can be carried out in safety with the busbars live.
- 4.1.7 Where one isolating switch is used as the incoming device, the incoming side fixed contacts shall be shrouded to ensure that maintenance can be carried out with the remote fuse and switch closed.
- 4.1.8 Composite switch-fuse or the combination of switch and fuse shall meet the requirements of its components as follows:
- 4.1.8.1 Isolating Switch
- (a) Switches shall be air-break, quick make, and quick break heavy duty type conforming to applicable standard.
 - (b) All switches shall have visible ON / OFF position indication and shall be padlockable in any (ON / OFF) position.
 - (c) Switches shall be door interlocked such that it shall not be possible to gain access to inside the unit unless the isolating switch is in OFF position.
 - (d) The switches shall be suitable for independent manual operation.
 - (e) The switch contacts shall be of silver alloy or silver plated copper and springs of non-corrosive material.
 - (f) Inter-phase barriers shall be provided to prevent possibilities of phase to phase fault in the switch. The switch shall also be shrouded from all sides to prevent access to live parts on the switch after opening the unit door. The barriers and shrouding shall extend upto the height of switch to fully enclose both side terminals of the device. The arrangement shall permit easy maintenance.
- 4.1.8.2 High Rupturing Capacity (HRC) Fuses
- (a) The fuse serving as the short-circuit protective device in isolating fuse-switch units shall be of HRC cartridge, current limiting and plug-in non-deteriorating type.
 - (b) The fuse carriers shall be easily withdrawable for replacement of fuse. Insulated fuse pullers shall be provided where fuses are not mounted in insulating carriers to remove and replace fuses in live conditions.
 - (c) Fuses shall preferably be fitted with a device to indicate operation (i.e. when the fuse has blown).
 - (d) Live terminals of fuse bases shall be shrouded to prevent contact with personnel where fuse links are not mounted in carriers and are directly plugged into the fuse base. Inter-phase barriers extending throughout the length of the fuse base shall be provided to prevent inter-phase short circuit. They shall be shrouded from all sides to prevent accidental contact.
 - (e) Fuse carriers and bases shall be of good quality moulded insulating material. Porcelain fuse bases and carriers will not be accepted.
 - (f) The rating and characteristics of fuse links shall be chosen appropriately for short circuit protection of circuits down stream.



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4.2 CONTACTORS

- 4.2.1 Contactors shall be of the air break type fitted with arc shields.
- 4.2.2 The operating coil shall be suitable for satisfactory operation in the range of 85% - 110% of nominal voltage, as specified in Datasheet-A. The coil shall be tropicalized having insulation not less than class 'E'.
- 4.2.3 Electrically independent auxiliary contacts not less than 2NO + 2NC for interlocking and indication shall be fitted to individual power contactor.
- 4.2.4 All springs shall be made out of a corrosion proof material.

4.3 MINIATURE CIRCUIT BREAKERS

- 4.3.1 The use of miniature circuit breakers (MCBs) combining thermal overload and magnetic short circuit protection shall be application for the outgoing circuits.
- 4.3.2 MCBs shall have suitable rating but not less than 20A, 10kA.
- 4.3.3 MCBs shall be suitable for housing in the panel and for connection of copper link bus bar at the incoming and copper lugs at the outgoing ends.
- 4.3.4 The terminals of MCB and ON / OFF positions shall be clearly and indelibly marked.

4.4 SELECTOR SWITCHES

- 4.4.1 The rating and other features of the switches shall be suitable for the application. The number of positions and the number of contacts required for each switch shall be as required.
- 4.4.2 Selector switches shall be stay put type, provided with properly designated escutcheon plates clearly marked to show operating position.
- 4.4.3 Terminals carrying potential above 120 Volts shall be shrouded to prevent accidental contact with personnel.
- 4.4.4 Ammeter selector switches shall have make before break contacts.
- 4.4.5 The switches shall be suitable for semi-flush mounting with the front plate and operating handle projecting out. All connection to the switches shall be from the back.
- 4.4.6 The arrangement for front mounting of these devices shall be such as to make them reasonably dust free so as not to interfere with normal operation.

4.5 INDICATION LAMPS

- 4.5.1 Indication lamps shall be complete with lens covers and holders.
- 4.5.2 Each lamp shall be fitted with a durable resistance integrally wired in series with the lamp. Alternatively, lamps with built in transformers are acceptable.
- 4.5.3 The lamp cover (lens) shall be translucent of appropriate colour.
- 4.5.4 Bulbs and covers shall be interchangeable, easily replaceable from the front without the need for any special means.
- 4.5.5 Terminals having potential above 120V shall be shrouded to prevent contact with personnel.

4.6 PUSH BUTTONS

- 4.6.1 Push button shall be heavy duty, flush mounted suitable for the application.



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- 4.6.2 Push button shall be provided with integral escutcheon plates marked with its function identified as per schemes.
- 4.6.3 Colour shall be appropriate to the function.
- 4.6.4 Minimum number of contacts shall be 1 NO + 1 NC or as per the requirements of control scheme.
- 4.7 TERMINALS
- 4.7.1 Terminals shall be stud type of copper material.
- 4.7.2 Terminals shall be provided with transparent cover(s).
- 4.7.3 Separate terminals shall be available for each termination of loop-in and loop-out power connections.
- 4.7.4 Terminals shall be suitable for ring type copper cable lugs of size depending upon the circuit rating.
- 4.8 CABLE GLANDS
- 4.8.1 Whether specifically mentioned or not, cable glands of suitable sizes shall be supplied along with each equipment for power and control cables.
- 4.8.2 Rubber components used in the gland shall be of neoprene.
- 4.8.3 Name / trade name of manufacturer, type no. and applicable range of outer diameter of cable shall be engraved / indelibly printed on the cable gland.
- 4.9 CABLE LUGS
- 4.9.1 All equipment shall be supplied with the power and control cable lugs of suitable size, whether specifically mentioned or not.
- 4.9.2 Name / trade name and size of lug shall be engraved/ indelibly printed on each cable lug.
- 4.10 TIMERS
- 4.10.1 Time Switch
- (a) Time switch shall be suitable for automatic switching ON and OFF of street lighting / flood lighting circuits.
- b) Time switch have 00 - 24 hrs clock base.
- c) Time switch shall indicate actual time and shall permit accurate time setting.
- d) Time switch shall be rugged, independent of normal fluctuations of voltage / frequency and free from maintenance.
- e) Contact rating, clock accuracy, rated voltage rating and frequency rating of timer shall be suitable to its application.
- f) Time switch shall be provided with Ni-Cd battery.
- g) Time switch shall be suitable for mounting inside the panel.
- 4.10.2 On Delay Timer



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- (a) Timer shall be fully static and suitable for operation on normal frequency and system voltage.
- (b) Timer shall have high setting accuracy, high repeat accuracy, low reset time and low power consumption.
- (c) Timer shall have the time setting range of 24 - 240 seconds, unless mentioned otherwise in Data Sheet A.
- (d) Timer shall be suitable for mounting inside the panel.

4.11 CIRCUIT DIAGRAM / DIRECTORY PLATE

- 4.11.1 A diagram is to be prepared for fixing to the inside cover of every mast feeder panel giving details of the points controlled by each circuit.

4.12 SURFACE TREATMENT FOR PANEL

- 4.12.1 All metal parts and the surfaces (exterior & interior) of equipment shall be degreased by dipping in hot alkaline solution and rubbed with wire brush to remove oil & scale from them & then rinsed in water. Alternatively, they may be shot / sand blasted.
- 4.12.2 Parts shall be pickled by dipping in hydrochloric acid tank to remove the rust from the surfaces formed during storage of sheets & then rinsed to remove traces of the acid. The cleaning and pretreatment of all metal parts shall be as per applicable standard.
- 4.12.3 The surfaces to be painted shall then be prepared by phosphatizing to protect them from further rusting & to create a good bond with the paint. The pretreatment shall conform to the applicable standard.
- 4.12.4 All parts shall then be subjected to a coat of red oxide primer paint.
- 4.12.5 All inside and outside surfaces of panel shall be spray painted with synthetic enamel of the shade as per Data Sheet A.
- 4.12.6 Electrostatic or powder coating painting shall be done as specified in Data Sheet A.
- 4.12.7 Wherever possible, finished parts shall be coated with peelable compound by spraying method to protect the finished product from scratches, grease, dirty and oily spots during handling and transportation.

5 PACKING

- 5.1 Loose items shall be packed, duly labelled in a box and sealed properly to avoid damage during transportation. Packing list shall be pasted on every box, listing the contents of the box.

6.0 INSPECTION & TESTING

- 6.1 Bidder shall confirm compliance with the BHEL Standard Quality Plan (PE-QP-999-558-E004) without any deviations. At contract stage, the successful bidder shall submit the same QP for BHEL/ ultimate customer's approval. In case bidder has reference QP agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of any changes in QP during contract stage.



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- 6.2 All the components and completely assembled equipment shall be tested as per the latest edition of standards. Any charges for these shall be deemed to be included in equipment price.
- 6.3 All the specified tests shall be carried out to verify the rating and performance of the equipment.
- 6.4 All manufacturing processes viz. machining, sheet forming, electroplating, wire routing, cleating & crimping, assembly, surface preparation shall conform to good manufacturing practices.
- 7.0 TOOLS AND TACKLE
- 7.1 Tools & tackle which are essential to facilitate assembly, adjustments, erection, maintenance & dismantling of equipment shall be provided as part of equipment supplied.
- 7.2 The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.
- 7.3 Vendor shall also submit a list of recommended tools and tackle. Acceptance of these tools and tackle shall not be a binding on the purchaser.
- 7.4 Schedule of tools & tackle shall be filled up by bidder.
- 8.0 SPARES
- 8.1 Mandatory spares (if applicable) are indicated in BOQ-cum-price schedule.
- 8.2 Erection & commissioning spares are included in the bidder's scope of supply. Bidder to furnish list of E&C spares in the relevant schedules of the Bid Form and Price Schedules.

बी एच ई एल BHEL		QUALITY PLAN	CUSTOMER TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD.			PROJECT TITLE : 1X800 MW NORTH CHENNAI STAGE-III BTG			SPECIFICATION NO. : PE-TS-423-558-E004,R0			
			BIDDER/ VENDOR :			STANDARD QP NO. : PE-QP-999-558-E004, REV.0			SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR POLES & HIGH MASTS			
		SHEET 1 OF 2		SYSTEM			ITEM : POLES & HIGH MASTS			DOC. NO. :		
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1	LIGHTING POLES											
1.1	MATERIAL	1.CHEMICAL COMP.	MA	CHEM. ANALYSIS	SAMPLE : IS-4711, Annex-A	IS-2713., IS : 228,	IS-2713, IS : 228	INSPN REPORT, TEST CERTIFICATES	M/C	-	C,B	COLD BEND TEST NEED NOT BE CARRIED OUT.
		2.PHYSICAL PROP.	MA	PHY.TESTS	SAMPLE: IS 4711, Table-2	IS- 2713, IS : 1161 & IS : 1608	IS- 2713, IS : 1161 & IS : 1608	-DO-	M/C	-	C,B	
1.2	FINAL INSPECTION	1. WORKMANSHIP & FINISH	MA	VISUAL	SAMPLE : 20%	APPD. DRG./ IS:2713, IS 1161	APPD. DRG./ IS:2713, IS 1161	INSPN REPORT	M	C,B	-	
		2.DIMENSIONS	MA	VISUAL & MEASUREMENT	-DO-	APPD DRG/ APPD DATASHEET/ IS-2713	APPD DRG/ APPD DATASHEET/ IS-2713	-DO-	M	C,B	-	
		3.WEIGHT	MA	MEASUREMENT	-DO-	-DO-	-DO-	-DO-	M	C,B	-	
		4.TESTS AS PER IS-2713 CL . NO 10.0	CR	PHY TESTS	SAMPLE:IS-2713	IS-2713	IS-2713	-DO-	M	C,B	-	
		5. PAINTING (as applicable)	MA	VISUAL	SAMPLE : 20%	BHEL SPEC	BHEL SPEC	-DO-	M	C,B	-	
		6. GALVANISING (as applicable)	MA	MEASUREMENT	SAMPLE: IS4759 (Table-2)	APPD DATASHEET/APPD DRG/IS2629,2633,4759	APPD DATASHEET/APPD DRG/IS2629,2633,4759	-DO-	M	C,B	-	
		6. MARKING	MA	VISUAL	SAMPLE : 20%	IS:2713	IS:2713	-DO-	M	C	B	
2.0	HIGH MAST											
2.1	Steel for high mast shaft & frame	a) Chemical Composition	MA	CHEM. ANALYSIS	SAMPLE : IS-4711, Annex-A	IS-2713, IS : 228	IS-2713, IS : 228	INSPN REPORT, TEST CERTIFICATES	M/C	-	C,B	
		b) Physical Properties	MA	PHY.TESTS	SAMPLE : IS-4711, Annex-A	IS- 2713, IS 1161 & IS 1608	IS- 2713, IS 1161 & IS 1608	-DO-	M/C	-	C,B	
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE					BIDDER'S/VENDORS COMPANY SEAL				
LEGEND : B - BHEL/ CUSTOMER C - CONTRACTOR M - MANUFACTURER P - PERFORM W - WITNESS V - VERIFICATION												

		QUALITY PLAN		CUSTOMER TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD.		PROJECT TITLE : 1X800 MW NORTH CHENNAI STAGE-III BTG		SPECIFICATION NO. : PE-TS-423-558-E004,R0				
				BIDDER/ VENDOR :		STANDARD QP NO. : PE-QP-999-558-E004, REV.0		SPECIFICATION TITLE : TECHNICAL SPECIFICATION FOR POLES & HIGH MASTS				
		SHEET 2 OF 2		SYSTEM		ITEM : POLES & HIGH MASTS		DOC. NO. :				
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
2.2	High Mast Shaft	a) Dimensional conformity	MA	MEASUREMENT	SAMPLE:10%	APPD. DRG/ DATASHEET	APPD. DRG/ DATASHEET	TEST CERTIFICATE	M	C,B	-	Test certificate will be submitted by vendor
		b) Galvanising	MA	MEASUREMENT	SAMPLE: IS4759(Table-2)	APPD DATASHEET/APPD DRG/IS2629,2633,4759	APPD DATASHEET/APPD DRG/IS2629,2633,4759	-DO-	M	C,B	-	
2.3	Head Frame	a) Dimensional conformity	MA	MEASUREMENT	SAMPLE:10%	APPD. DRG.	APPD. DRG.	-DO-	M	C,B		
2.4	Lantern Carriage	a) Dimensional conformity	MA	MEASUREMENT	-DO-	-DO-	-DO-	-DO-	M	C,B	-	
		b) Galvanising	MA	MEASUREMENT	SAMPLE: IS4759(Table-2)	APPD DATASHEET/APPD DRG/IS2629,2633,4759	APPD DATASHEET/APPD DRG/IS2629,2633,4759	-DO-	M	C,B	-	
2.5	Double drum Winch	a)Load Capacity	MA	MEASUREMENT	SAMPLE:10%	APPD. DRG.	APPD. DRG.	-DO-	M	C	B	
2.6	Stainless Steel Wire Ropes	a) Breaking Capacity	MA	MEASUREMENT	SAMPLE:10%	-DO-	-DO-	-DO-	M	C	B	
2.7	Feeder panel	a) HV/IR	MA	ELECTRICAL	100%	2KV AC FOR 1 MINUTE	2KV AC FOR 1 MINUTE	INSP. REPORT	M/C	-	C,B	
		b) Powder coating adhesion check by cross hatch method using packing tape	MA	MECHANICAL CHECK	RANDOM SAMPLE	APPD DRG / DATASHEET	APPD DRG / DATASHEET	INSPN. REPORT	M/C	-	C,B	
3.0	JUNCTION BOXES	1.DIMENSIONS	MA	MEASUREMENT	100%	APPD DRG.	APPD DRG.	INSP. REPORT	M/C	-	C,B	
		2.GALVANISING	MA	MEASUREMENT	SAMPLE: IS4759(Table-2)	APPD DATASHEET/APPD DRG/IS2629,2633,4759	APPD DATASHEET/APPD DRG/IS2629,2633,4759	-DO-	M/C	-	C,B	
		3.HV/IR/HV	MA	ELECT.TESTS	100%	2KV AC FOR 1 MINUTE	2KV AC FOR 1 MINUTE	-DO-	M/C	-	C,B	
		4.DEGREE OF PROTECTION	MA	TEST	1/SIZE	IS:13947	IS:13947	TEST CERT.	M/C	-	C,B	
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE									
LEGEND : B - BHEL/ CUSTOMER C - CONTRACTOR M - MANUFACTURER P - PERFORM W - WITNESS V - VERIFICATION												

BIDDER'S/VENDORS COMPANY SEAL