

TELANGANA STATE POWER GEN CO. LTD.

4X270 MW BHADRADRI TPP

VOLUME – II

TECHNICAL SPECIFICATION FOR
POLES & HIGH MAST

SPECIFICATION NO : PE-TS-411-558-E003
REV-0



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



**TECHNICAL SPECIFICATION FOR
POLES & HIGH MAST**

4X270 MW BHADRADRI TPP

SPECIFICATION NO. PE-TS-411-558-E003

VOLUME II

CONTENTS SHEET

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Total number of sheets including cover & separator sheets: 33 SHEETS

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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

<u>S.No.</u>	<u>Reference Clause No. of Section- II</u>	<u>Specific Requirement/ Change</u>
1	Cl. No. 3.1.1	Shall be read as "Lighting poles as required for street lighting and flood lighting shall be of swaged tubular steel of swan neck construction as per applicable standard."
2	Cl. No. 8.2	This clause stands deleted

4.0 DOCUMENTATION

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

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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-V0-411-558-E404	APPROVAL
2	GA DRAWING OF POLE-PS1	PE-V0-411-558-E075	APPROVAL
3	GA DRAWING OF POLE-PS2	PE-V0-411-558-E076	APPROVAL
4	GA DRAWING OF POLE-PF1	PE-V0-411-558-E077	APPROVAL
5	GA DRAWING OF POLE-PF2	PE-V0-411-558-E078	APPROVAL
7	GA DRAWING OF HIGH MAST (including feeder panel, structural calculation & foundation calculation)	PE-V0-411-558-E086	APPROVAL
8	GA DRAWING OF POLE-PS4	PE-V0-411-558-E061	APPROVAL
9	GA DRAWING FOR JB(S) FOR POLES	PE-V0-411-558-E079	APPROVAL
10	GA DRAWING FOR JB(S) FOR HIGH MAST	PE-V0-411-558-E080	APPROVAL
11	MANUFACTURING QUALITY PLAN FOR POLES	PE-V0-411-558-E907	APPROVAL
12	MANUFACTURING QUALITY PLAN FOR HIGH MAST	PE-V0-411-558-E909	APPROVAL
13	FIELD QUALITY PLAN FOR POLES/ HIGH MAST	PE-V0-411-558-E911	INFORMATION
14	BILL OF MATERIAL FOR POLES & HIGH MAST	PE-V0-411-558-E407	APPROVAL
15	INSTRUCTION FOR ERECTION OF POLES & HIGH MAST	PE-V0-411-558-E408	INFORMATION

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



**TECHNICAL SPECIFICATION FOR
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1.0 APPLICABLE STANDARDS & CODES

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 |
| 8. | 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 |

ASSEMBLED EQUIPMENT AND COMPONENTS

- | | | |
|----|---|---------------|
| 1. | Low voltage switchgear and control gear | [√] IEC 60947 |
|----|---|---------------|



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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		As per IS-2713
2.1	Type of Pole		
a	PS-1 (11m), Refer 3.1.9 Section-II		SP51 as per IS-2713
B	PS-2 (13 m), Refer 3.1.9 Section-II		SP67 as per IS-2713
c	PS-4 (13 m), Refer 3.1.9 Section-II		SP67 as per IS-2713
d	PF-1 (11m), Refer 3.1.9 Section-II		SP51 as per IS-2713
e	PF-2 (11m), Refer 3.1.9 Section-II		SP51 as per IS-2713
2.2	Material		MS



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2.3	Tensile Strength	MPa	☒ 410 ☐ 540
2.4	Mounting arrangement		☒ PCC foundation ☐ Base plate
2.5	Grade of concrete		☐ M20 ☐ M25 ☒ M30
2.6	Surface Treatment		☒ Painted ☐ Galvanized
2.7	PAINTING details for poles (if applicable)		Applicable
a	Paint shade as per IS:5		631
b	Paint Thickness	Microns	60 (approx.)
2.8	GALVANISATION details for poles (if applicable)		Not Applicable
a	Process		Hot dip
b	Min weight of zinc coating	gm/m ²	460
c	Avg. thickness of zinc coating	Microns	65
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.	☒ 12 ☐ 16
b	Type of design		Telescopic tubular, Polygonal shape
c	Material		GI
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/m ²	610
iii)	Avg. thickness of zinc coating	Microns	86
4.0	Street Light Junction Box		



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a	Enclosure material		☐ FRP ☒ CRCA Sheet.
b	Enclosure thickness	mm	2
c	Galvanisation details		
i)	Process		Hot dip
ii)	Min weight of zinc coating	gm/m ²	460
iii)	Avg. thickness of zinc coating	Microns	65
d	Degree of protection		IP-55 with canopy
5.0	Feeder Panel		
a	Enclosure material		☐ FRP ☒ CRCA Sheet.
b	Enclosure thickness	mm	2
c	Degree of protection		IP-55
d	Paint shade		631 of IS:5
e	Paint type		☒ Electrostatic coating ☒ Powder coating
f	Paint Thickness	Microns	50
5.1	Switch-Fuse Unit		
a	Utilisation category for main contacts		AC23
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



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5.5	Push Button		
a	Voltage grade	V	500
b	Potential free contacts		2NO+2NC
5.6	Time switch		
a	Type		Digital synchronous /quartz type
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
c	Nickel Plating provided		☒ Yes ☐ No
d	Size		During detailed engineering
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		During detailed engineering



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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 (13 m), Refer 3.1.9 Section-II		
c	PS-4 (13 m), Refer 3.1.9 Section-II		
d	PF-1 (11m), Refer 3.1.9 Section-II		
e	PF-2 (11m), 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	



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2.8	GALVANISATION details for poles (if applicable)		
a	Process		
b	Min weight of zinc coating	gm/m ²	
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/m ²	
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/m ²	
iii)	Avg. thickness of zinc coating	Microns	
d	Degree of protection		



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5.0	Feeder Panel		
a	Enclosure material		
b	Enclosure thickness	mm	
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		



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b	ON delay timer range	Sec	
c	OFF delay timer range	Sec	
d	AC Coil voltage rating	V	
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		

SUBVENDOR LIST

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES12	CABLE LUGS	1	E1040	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE. OFF AAREY ROAD, GOREGOAN (EAST). MUMBAI 400 063.	CEO : Mr. Jayantibhai S. Patel TEL: 022-32504770./022-29270876/ 022-29270878.	
	CABLE LUGS	2	E1149	UNIVERSAL MACHINES LTD.	4,B.B.D.BAG (EAST) 90,STEPHEN HOUSE,5TH FLR CALCUTTA-700001	033 2282 2540	
ES21	CONTROL SWITCHES/ SELECTOR SWITCH	1	E1076	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687	
	CONTROL SWITCHES/ SELECTOR SWITCH	2	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	CONTROL SWITCHES/ SELECTOR SWITCH	3	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479000	
ES22	CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	1	E1009	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482	
	CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	2	E1066	INDCOIL	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305	
	CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	3	K18	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E-MAIL: mira@kappaelectricals.com	
	CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	4	E1106	PRECISE ELECTRICALS	47A-49A,CHAKALA ROAD ANDHERI(E),MUMBAI-99 MUMBAI, MAHARASHTRA, INDIA PIN-400 099	022-8323402 / 022-8216433	
	FUSE BASE	1	E1068	INDO ASIAN	B-24, PHASE - II , NOIDA - 201305, U.P.	120-3042222	
	FUSE BASE	2	G01	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	FUSE BASE	3	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	

ES28	FUSE BASE	4	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
	FUSE BASE	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 ;amit.bhadauria@siemens.com	
	FUSE BASE	6	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	FUSE BASE	7	S02	SPACEAGE SWITCHGEARS LTD.	68 & 13-A INDUSTRIAL DEVELOPMENT COLONY, MEHRAULI ROAD GURGAON, HARYANA-122001	0124-2302711, 4085091	
	FUSE BASE	8	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	FUSE BASE	9	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
ES29	HRC FUSES	1	E1068	INDO ASIAN	B-24, PHASE - II , NOIDA - 201305, U.P.	120-3042222	
	HRC FUSES	2	G01	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	HRC FUSES	3	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	HRC FUSES	4	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
	HRC FUSES	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 ;amit.bhadauria@siemens.com	
	HRC FUSES	6	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	HRC FUSES	7	S02	SPACEAGE SWITCHGEARS LTD.	68 & 13-A INDUSTRIAL DEVELOPMENT COLONY, MEHRAULI ROAD GURGAON, HARYANA-122001	0124-2302711, 4085091	
	HRC FUSES	8	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	HRC FUSES	9	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
ES35	INDICATING LAMPS	1	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000	
	INDICATING LAMPS	2	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	6832259,6918834-37	
	INDICATING LAMPS	3	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
	INDICATING LAMPS	4	E1153	VAISHNO(HOTLINE SWGR.& CONTROL)	G-19, SECTOR - 11, NOIDA - 201301, UTTAR PRADESH, INDIA	8377805157 9818338922	
	INDICATING LAMPS	5	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	9818338922	
	INDICATING LAMPS	6	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	INDICATING LAMPS	7	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	

ES51	MCB	1	E1088	MDS SWITCHGEAR LTD	314-317SHAH NAHAR ESTATE	011 - 25793021	
	MCB	2	E1068	INDO ASIAN	B-24, PHASE - II , NOIDA - 201305, U.P.	120-3042222	
	MCB	3	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	MCB	4	E1120	S&S POWER SWITCHGEAR LTD,	NEW NO. 67, OLD NO. 19, DR. RANGA ROAD, MYLAPORE, CHENNAI - 600004	044 - 24988056, 044 - 24988057, 044 - 24988058	
ES62	TERMINAL BLOCKS	1	C01	WAGO-CONTROLS	C 27, GREATER NOIDA, SECTOR 58, C BLOCK, SECTOR 58, NOIDA, UTTAR PRADESH 201307	0120-2580409/10	
	TERMINAL BLOCKS	2	E1038	CONNECT WELL	309A/4, 3RD FLOOR, KALKAJI, OKHLA IND AREA PH-2, GOVINDPURI, NEW DELHI, DL 110019	9811881085 09871419996 011-65908877	
	TERMINAL BLOCKS	3	E1047	ELMEX CONTROLS PVT. LTD.	12,G.I.D.C.ESTATE,MUKARPURA ROAD,VADODARA-390010	9374631074	
	TERMINAL BLOCKS	4	E1142	TECHNOPLAST	OPP.I.M.INTER COLLEGE, BEGUM SARAI KHURD ROAD, AMROHA - 244221, U.P.	PH:- 05922 264006 CELL NO:- 9012676000, 9319520799, 9319582467	
	TERMINAL BLOCKS	5	PME-01	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	TEL:- +912066745000 Awasthi(09971119006) Tel: ++91 20 6674 5103, Mobile: +91 90499 95985, Fax: ++91 20 6674 5126 contact person : Vishwa	
	TERMINAL BLOCKS	6	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
ES63	TIMERS - PNEUMATIC	1	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000	
	TIMERS - PNEUMATIC	2	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	TIMERS - PNEUMATIC	3	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	TIMERS - PNEUMATIC	4	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	TIMERS - PNEUMATIC	5	E01	ELECTRONIC AUTOMATION PVT. LTD.	20, KHB INDUSTRIAL AREA YELAHANKA BANGLORE-560064	080 -28567561 / 080 - 28567562 / 080 - 42802345	
ES64	TIMERS - ELECTRONIC	1	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
ES86	PHOTOELECTRIC SWITCH	REPUTED MAKE					
	JUNCTION BOXES (NON FLAME PROOF)	1	J01	JASPER ENGINREES PVT. LTD.	A-23, SECTOR - 8, NOIDA-201301	0120-4033520/533	
	JUNCTION BOXES (NON FLAME PROOF)	2	EC05	Electro Controls & Devices	M/S ELECTRO CONTROLS & DEVICES, F-41, SITE-C, SURAJPUR INDUSTRIAL AREA GREATER NOIDA, UTTAR PRADESH :201308	Mr. Sanjay Sharma (Chief Promoter) 0120-2569487, 2560100,2560300	
	JUNCTION BOXES (NON FLAME PROOF)	3	SRC01	M/s Shrenik & Co.	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEJ-BAVLA ROAD, CHANGODAR, AHMEDABAD – 382 213	020-026708100	

ES36	JUNCTION BOXES (NON FLAME PROOF)	4	ACE01	Adroit Control Engineers Pvt.Ltd.	M/S ADROIT CONTROL ENGINEERS PVT.LTD. PLOT-3, KRISHNA INDL. AREA, SECTOR-25 FARIDABAD – 121004	011-47600700, 0129- 4251400	
	JUNCTION BOXES (NON FLAME PROOF)	5	PME-01	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	TEL.- +912066745000 Awasthi(09971119006) Tel: ++91 20 6674 5103, Mobile: +91 90499 95985, Fax: ++91 20 6674 5126 contact person : Vishwa bandhu E-mail:d.gupta@pmipl- online.com ;admin@pmipl- online.com	
	JUNCTION BOXES (NON FLAME PROOF)	6	MK01	MIKA ENGINEERS	BRANCH OFFICE : 'D'-101, DHEERAJ HERITAGE RESIDENCY II, SHASTRI NAGAR, SANTACRUZ (W), MUMBAI 400 054.	Director : Mr. Asgar Karimi Email: asgar@mikaengineers.co m E-mail : mika@mtnl.net.inTelfax : 022- 26610081/82/83/84Tel : 02527-249066/70 Cell : 099230 74373	TYPE-S ONLY
	JUNCTION BOXES (NON FLAME PROOF)	7	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI – 110049	CONTACT PERSON : Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705. MAIL ID : srabans@bajajelectricals. com;	
	JUNCTION BOXES (NON FLAME PROOF)	8	A03	AJMER INDUSTRIES & ENGG. WORKS	AJMER INDL. AND ENGG. WORKS. AJMER HOUSE, A-61 / KHAIRANE MIDC. , TTC INDL. AREA, NAVI MUMBAI – 400705.	Tel : 022 27620299 / 97 / 96 'mail@ajmera.net	
	JUNCTION BOXES (NON FLAME PROOF)	9	SB02	S.B. ELECTRICAL ENGINEERING CORPORATION	03, SARDAR GRIHA BUILDING, LOHAR CHAWAL, MUMBAI-400002	022- 22069831; 022- 66637259	
	CABLE GLANDS	1	E1201	ALLIED TRADERS & EXPORTERS	C-124 A, SECTOR-2, NOIDA -201 301, UTTAR PRADESH, INDIA	Mr. Vijay Mohan Sood +(91)-(120)-2525694 +(91)-(120)-3052594 +(91)-(11)-23287156 vijay_mohansood@yahoo .com	
	CABLE GLANDS	2	E1017	ARUP ENGG & FOUNDARY WORKS	391/119,PRINCE ANWAR SHAH ROAD, CALCUTTA-700068	033 2473 0850	
	CABLE GLANDS	3	E1206	BALIGA LIGHTING EQPT.PVT.LTD.	63A,CP RAMASWAMY ROAD, ALWARPET,P.B.No 6910, CHENNAI- 600018	44-24995505,22680990-4	

ES11	CABLE GLANDS	4	E1036	COMMET BRASS PRODUCTS	NUTAN CHEMICAL COMPOUND, WALBHAT ROAD, GOREGAON, MUMBAI-400063	91-022-26852961/62/63 comet@vsnl.net	
	CABLE GLANDS	5	DW08	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE. OFF AAREY ROAD, GOREGAON (EAST). MUMBAI 400 063.	CEO : Mr. Jayantibhai S. Patel TEL: 022-32504770./022-29270876/ 022-29270878.	
	CABLE GLANDS	6	E1044	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND. ESTT., R. KRISHNA MANDIR RD. JB NGR, ANDHERI(E), MUMBAI-400059	91-22-28324829 / 66919034 devang@electromacglands.com	
	CABLE GLANDS	7	I01	INCAB	HARE STREET, KOLKATA, WEST BENGAL-700001	91-33-2480161/62/63/64 Fax : 91-33-2485766	
ES20	DC CONTACTORS	1	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	DC CONTACTORS	2	E1030	BHEL (BHOPAL)	HEAVY ELECTRICAL PLANT		
	DC CONTACTORS	3	E1044	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND. ESTT., R. KRISHNA MANDIR RD. JB NGR, ANDHERI(E), MUMBAI-400059	91-22-28324829 / 66919034 devang@electromacglands.com	
	DC CONTACTORS	4	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	DC CONTACTORS	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadoria@siemens.com	
	DC CONTACTORS	6	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
ES1	AC CONTACTORS	1	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadoria@siemens.com	
	AC CONTACTORS	2	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	AC CONTACTORS	3	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	AC CONTACTORS	4	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	AC CONTACTORS	5	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000	
ES7	AUXILIARY RELAYS	1	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	AUXILIARY RELAYS	2	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	AUXILIARY RELAYS	3	E1075	JYOTI LTD.	JYOTI LIMITED, E&CS DIVISION, 3/15, BIDC, GORWA, VADODARA - 390 016, E-MAIL ID: ECS@JYOTI.COM	Ph. No.: +91-265-2281214 , Fax No.: +91-265-2281214	
	AUXILIARY RELAYS	4	E1099	OEN INDIA LTD	29/1479, VYTILLA, COCHIN - 682 019 KERALA, INDIA	Phone : +91 484 2301132, 2303709 Fax : +91 484 2302287, 2302221 sales@oenindia.com	
	AUXILIARY RELAYS	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadoria@siemens.com	

ES3	AC MCCB	1	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
	AC MCCB	2	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	AC MCCB	3	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadoria@siemens.com	
	AC MCCB	4	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	AC MCCB	5	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	AC MCCB	6	C02	CROMPTON GREAVES	RAIL TRANSPORTATION SYSTEMS,VANDANA BUILDING, 11, TOLSTOY MARG, TOLSTOY MARG, NEW DELHI, DL 110001	011 3041 6300	
ES13	D.C. MCCB	1	C02	CROMPTON GREAVES	RAIL TRANSPORTATION SYSTEMS,VANDANA BUILDING, 11, TOLSTOY MARG, TOLSTOY MARG, NEW DELHI, DL 110001	011 3041 6300	
	D.C. MCCB	2	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	D.C. MCCB	3	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	D.C. MCCB	4	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadoria@siemens.com	



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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);

- 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.
- Exposed outside surface shall be painted with two coats of red oxide and zinc chromate in synthetic compound primer.
- 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;

- All inside and outside surfaces of the pole and base plate shall be hot dip galvanised as per manufacturer’s practice.
- Base plate shall be galvanised after welding to the pole base.
- 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 control gear 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.
- 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



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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.
- 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.



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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.

4.2 CONTACTORS

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



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



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



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- (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.
- 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.



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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.

		QUALITY PLAN		CUSTOMER : TELANGANA STATE POWER GEN CO. LTD.		PROJECT TITLE : 4X270 MW BHADRADRI TPP		SPECIFICATION NO. : PE-TS-411-558-E003,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	-	FOR DEFLECTION & DROP TEST, TC VERIFICATION BY BHEL
		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 : TELANGANA STATE POWER GEN CO. LTD.		PROJECT TITLE : 4X270 MW BHADRADRI TPP			SPECIFICATION NO. : PE-TS-411-558-E003,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
1	2	3	4	5	6	7	8	9	P	W	V	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									
BIDDER'S/VENDORS COMPANY SEAL												
LEGEND : B - BHEL/ CUSTOMER C - CONTRACTOR M - MANUFACTURER P - PERFORM W - WITNESS V - VERIFICATION												