

Package Name:-Rate Contract for Engineering, Supply, Erection & Commissioning of Power Supply at multiple location in TPSODL-for BSNL Mobile Tower Under 4G Saturation Project Under 100% Deposit Scheme				
Tender No:-NIT No.: TPSODL/OT/2022-24/097				
Reply to Techno Commercial Pre Bid Query				
Sr. No.	Detailed Reference to TPSODL Technical Document. Please specify Document No / Clause No / Page No	Description as per Bid Document	Remarks - Query / Clarification	TPSODL Response
1	2	3	4	5
1	Work Description	Rate Contract for Engineering, Supply, Erection & Commissioning of Power Supply at multiple location in TPSODL-for BSNL Mobile Tower Under 4G Saturation Project Under 100% Deposit Scheme	Please share the detailed multiple location where the work to be executed.	Attached
2	BOQ (Annexure-I)			
3	PART-D CIVIL Works SL No- 9	Boundary wall with Grill Gate arrangement as per TPSODL specifications	Specification of Boundary wall and Grill gate not mentioned. Please provide the specification.	Refer documents named "fencing" for brick wall and chainlink fencing for reference. GA Drawing to be approved during detailed Engineering.
4	PART-D CIVIL Works SL No- 14	sand and metal spreading	Please provide the Area specification, for spreading Sand and Metal	The Fencing area will be 3mx3m (LxB)
5	PART -A SLNo- 5	AB cable (1x35+1x25) mm2	Technical specification not available. Please provide the Technical specification.	Shared refer doc no- ENG-LV-3002
6	PART -A SLNo- 6	AB cable (2x35+1x25) mm2	Technical specification not available. Please provide the Technical specification.	Shared refer doc no- ENG-LV-3002 for lectrical physical properties & approved cable manufacturers only.
7	PART -B SLNo- 12	9KV,5 KA Lighting Arrestor	Technical specification not available. Please provide the Technical specification.	Refer doc. No- ENG-HV-04
8	PART -B SLNo- 15	1.1KV Al 1CX50 Sq.mm Un-armoured Cable	Technical specification not available. Please provide the Technical specification.	Refer doc. No- ENG-ELC-035/2
9	PART -B SLNo- 16	1.1KV 3.5CX50 mm2 PVC Cable (un-armoured)	Technical specification not available. Please provide the Technical specification.	Refer doc. No- ENG-LV-07
10	PART -B SLNo- 17	1.1KV 3.5CX120 mm ² LT PVC cable (Un armoured)	Technical specification not available. Please provide the Technical specification.	Refer doc. No- ENG-LV-07
11	PART -B SLNo- 18	1.1KV 3.5CX95 mm ² LT PVC cable	Technical specification not available. Please provide the Technical specification.	Refer doc. No- ENG-LV-07
12	PART -B SLNo- 25	Transformer mounting bracket (65x65x6mm) suitable for 16kva 11/.23 Transformer	Technical specification not available. Please provide the Technical specification with drawing.	Refer doc. ENG-HV-TECHNICAL SPECIFICATION GI Channel & Angle 6mm Thick
13	PART -B SLNo- 38	LT Distribution box including Kit Kat fuse for 16 KVA.	Technical specification not available. Please provide the Technical specification with drawing.	For LT Distribution Boxes, refer to IS 8623. IP protection 54 (type test report to be submitted at the time of detailed Engineering) and for Kit-kat fuse refer document no.- ENG-LV-3005
14	PART -C SLNo- 45	Clamp for Stud Pole	Technical specification not available. Please provide the Technical specification with drawing.	Support to be given by the 2 Angle for 65x65x6 along with suitable nut bolts. GA drawing for the same will be finalized at the time of detailed Engineering.

Serial No	Circle	Division	Name of Location
1	Aska	GSED	T.Gobindapur
2	Aska	GSED	Podakhala
3	Aska	GSED	Barigaon
4	Aska	GSED	Tada
5	Aska	GSED	Padampur
6	Aska	GSED	Sapuakheta
7	Aska	GSED	Tading
8	Aska	GSED	Babnasahi
9	Jeypore	JED	Champadar
10	Jeypore	JED	Patiasil
11	Jeypore	JED	Bairagiput (Khatipada)
12	Jeypore	JED	Thokal Village
13	Jeypore	JED	Deulapada
14	Jeypore	JED	Litiput (Guneipada)
15	Jeypore	JED	Paldaput (Surengeipada)
16	Jeypore	JED	Gondhiaguda
17	Jeypore	JED	Pipalput
18	Jeypore	JED	Kondajodi
19	Jeypore	JED	Sukriguda
20	Jeypore	JED	Poibeda
21	Jeypore	JED	Lugum
22	Jeypore	JED	Anugu
23	Jeypore	JED	Mantriput
24	Jeypore	JED	Hatapeta
25	Jeypore	JED	Barlipada
26	Jeypore	JED	Litiput
27	Jeypore	JED	Sinibeda
28	Jeypore	JED	Mahulput
29	Jeypore	JED	Chilimala
30	Jeypore	JED	Muduliguda
31	Jeypore	JED	Haradaguda
32	Bhanjanagar	BOED	Tilpanga
33	Bhanjanagar	BOED	Udamud
34	Bhanjanagar	BOED	Babada
35	Jeypore	MED	Banamalipur
36	Jeypore	MED	Bantiguda
37	Jeypore	MED	Bhimaragini
38	Jeypore	MED	Doriguda
39	Jeypore	MED	Durkaguda
40	Jeypore	MED	Durmaguda
41	Jeypore	MED	Ghorsapalli
42	Jeypore	MED	Itelguda
43	Jeypore	MED	Kolakonda
44	Jeypore	MED	Khursanpalli
45	Jeypore	MED	Pegdapalli
46	Jeypore	MED	Penkurai

47	Jeypore	MED	Sanaguma
48	Jeypore	MED	Tentuliguda
49	Berhampur	HED	Patasala
50	Berhampur	HED	BHIMANAGAR
51	Berhampur	HED	Ashokapalli
52	Berhampur	HED	Bhaliaguda
53	Jeypore	NED	Duklikote
54	Jeypore	NED	Baharkarmari
55	Jeypore	NED	Khajuri
56	Jeypore	NED	Chapadapas
57	Jeypore	NED	Tagapali
58	ASKA	AED-II	Kriamba
59	ASKA	AED-II	Talasara
60	ASKA	AED-II	Bhabasara
61	Jeypore	KED	Bilaput
62	Jeypore	KED	Jogiput
63	Jeypore	KED	Sarbati
64	Jeypore	KED	Lekriguda
65	Jeypore	KED	Deola
66	Jeypore	KED	Kulab
67	Jeypore	KED	Kumbhariput
68	Jeypore	KED	Godri
69	Jeypore	KED	Goudaguda
70	Jeypore	KED	Barikanta
71	Jeypore	KED	Mundajhola
72	Jeypore	KED	Talagadala
73	Jeypore	KED	Badabagiri
74	Jeypore	KED	Kandaborigi
75	Jeypore	KED	Kaspabalsa
76	Jeypore	KED	Mundigura
77	Jeypore	KED	Gatiguda
78	Jeypore	KED	Gechela
79	Jeypore	KED	Dumusil
80	Jeypore	KED	Pedakidibhadra
81	Jeypore	KED	Jogipaluru
82	Jeypore	KED	Mandiaguda
83	Jeypore	KED	Alasi
84	Jeypore	KED	Badagoluru
85	Jeypore	KED	Dumuriguda
86	Jeypore	KED	Kandili
87	Jeypore	KED	Nuagaon
88	Jeypore	KED	Pangiguda
89	Jeypore	KED	Thuria
90	Jeypore	KED	Totabalsa
91	Jeypore	KED	Kanapadi
92	Jeypore	KED	Janagarada
93	Jeypore	KED	Tedda
94	Jeypore	KED	Godraguda
95	Jeypore	KED	Pandribalasa

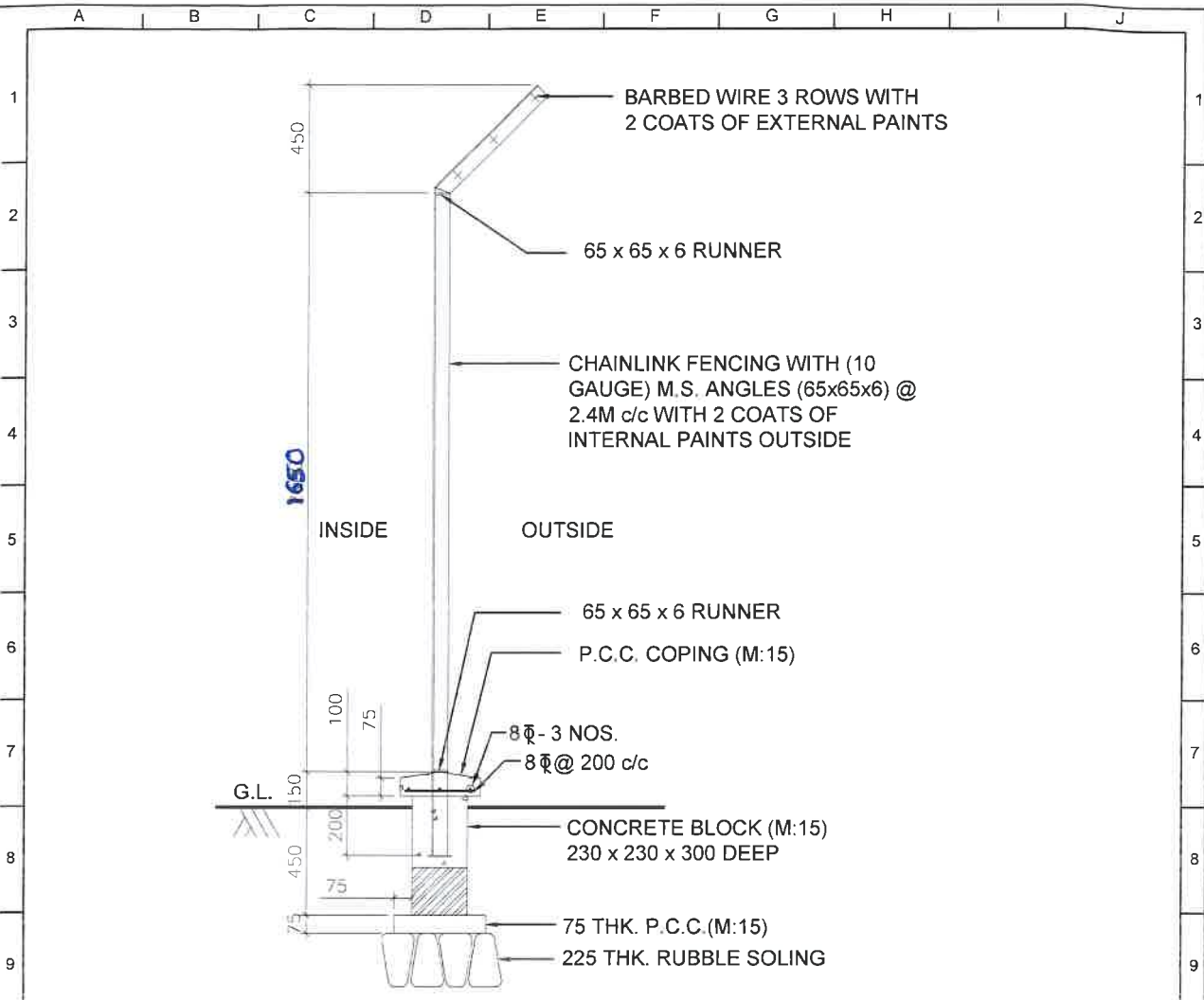
96	Jeypore	KED	Phatkijam
97	Jeypore	KED	Gadikhal
98	Jeypore	KED	Sembi
99	Jeypore	KED	Sukraput
100	Jeypore	KED	Girli
101	Jeypore	KED	Nuaguda
102	Jeypore	KED	Sambai
103	Jeypore	KED	Sandehi
104	Jeypore	KED	Chikuguda
105	Jeypore	KED	Chuchukona
106	Jeypore	KED	Kejeka
107	Rayagada	RED	Agiponga
108	Rayagada	RED	Badalubadi
109	Rayagada	RED	Baiganguda
110	Rayagada	RED	Banteji
111	Rayagada	RED	Barichguda
112	Rayagada	RED	Benadanga
113	Rayagada	RED	Bethipada
114	Rayagada	RED	Bhatudi
115	Rayagada	RED	Bhitarpadamajhi
116	Rayagada	RED	Bhramarjodi
117	Rayagada	RED	Birli
118	Rayagada	RED	Bondel
119	Rayagada	RED	Budubali
120	Rayagada	RED	Chandragiri
121	Rayagada	RED	Dandabad
122	Rayagada	RED	Dandapada
123	Rayagada	RED	Debadiguda
124	Rayagada	RED	Dhepaguda
125	Rayagada	RED	Dumerkona
126	Rayagada	RED	Dumurneli
127	Rayagada	RED	Fakira
128	Rayagada	RED	Janata
129	Rayagada	RED	Kachpai
130	Rayagada	RED	Kangtuma
131	Rayagada	RED	Kanhuguda
132	Rayagada	RED	Kantamal
133	Rayagada	RED	Karamkupa
134	Rayagada	RED	Karkamarka
135	Rayagada	RED	Kundam
136	Rayagada	RED	Kusumapadar
137	Rayagada	RED	Laktiguda
138	Rayagada	RED	Lataguda
139	Rayagada	RED	Madagalu
140	Rayagada	RED	Mahajal
141	Rayagada	RED	Metabadi
142	Rayagada	RED	Mitikesh
143	Rayagada	RED	Otalimal
144	Rayagada	RED	Palkapadar

145	Rayagada	RED	Phatamunda
146	Rayagada	RED	Pindapadar
147	Rayagada	RED	Pipalguda
148	Rayagada	RED	Pipalpanga
149	Rayagada	RED	Porikona
150	Rayagada	RED	Porlang
151	Rayagada	RED	Pukimaska
152	Rayagada	RED	Rodang
153	Rayagada	RED	Samudrabuduni
154	Rayagada	RED	Sarambai
155	Rayagada	RED	Silagumapadar
156	Rayagada	RED	Suruni
157	Rayagada	RED	Talapadikhal
158	Rayagada	RED	Tulasipadar
159	Rayagada	RED	Upparpadikhal
160	Bhanjanagar	PED	Danga
161	Bhanjanagar	PED	Bareguda
162	Bhanjanagar	PED	Bunduli
163	Bhanjanagar	PED	Arapaju
164	Bhanjanagar	PED	Aktatapha
165	Bhanjanagar	PED	Tambisuga
166	Bhanjanagar	PED	Kuaghara
167	Bhanjanagar	PED	Sitakapati
168	Bhanjanagar	PED	Baligata
169	Bhanjanagar	PED	Basapanga
170	Bhanjanagar	PED	Srakipada
171	Bhanjanagar	PED	Jargipada
172	Bhanjanagar	PED	Dandikia
173	Bhanjanagar	PED	Pathakhhol
174	Bhanjanagar	PED	Lamapadar
175	Bhanjanagar	PED	Kutiguda
176	Bhanjanagar	PED	Nandapadar
177	Bhanjanagar	PED	Banduli
178	Bhanjanagar	PED	Baimela/ Badabanga
179	Bhanjanagar	PED	Badagaon
180	Bhanjanagar	PED	Bijali
181	Bhanjanagar	PED	Chhadakia
182	Bhanjanagar	PED	Kalingbadi
183	Bhanjanagar	PED	Kidramala
184	Bhanjanagar	PED	Kusipanga
185	Bhanjanagar	PED	Sikanbadi
186	Bhanjanagar	PED	Sipubadi
187	Bhanjanagar	PED	Suganiketa
188	Bhanjanagar	PED	Sujamaju
189	Bhanjanagar	PED	Tudubiju
190	Bhanjanagar	PED	Tekangia
191	Bhanjanagar	PED	Manikjodi
192	Bhanjanagar	PED	Mahagudi
193	Bhanjanagar	PED	Gudriguda

194	Bhanjanagar	PED	Sikesaru
195	City	BED-III	Bhaliguda
196	City	BED-III	Raipada
197	City	BED-III	Sarakata
198	City	BED-III	Kandhalabandha
199	Bhanjanagar	BNED	Kupati
200	Bhanjanagar	BNED	Ghogada
201	Bhanjanagar	BNED	Narabari
202	Bhanjanagar	BNED	Naragadu
203	Berhampur	PSED	Khura
204	Berhampur	PSED	Khumula
205	Berhampur	PSED	Chenga
206	Berhampur	PSED	Mala Biripur
207	Berhampur	PSED	Kumbhirakhan
208	Rayagada	GED	Tabalaguda
209	Rayagada	GED	Kandha Chakundaa
210	Rayagada	GED	Abada
211	Rayagada	GED	Marama
212	Rayagada	GED	Paridi
213	Rayagada	GED	Gothalapadar
214	Rayagada	GED	Regingtal
215	Rayagada	GED	Badamosingi
216	Rayagada	GED	Labaguda
217	Rayagada	GED	Sikla
218	Rayagada	GED	Tunakhal
219	Rayagada	GED	Padidi
220	Rayagada	GED	Dhepaguda
221	Rayagada	GED	Sorishapadar
222	Rayagada	GED	Entimunigaon
223	Rayagada	GED	Taski
224	Rayagada	GED	Badagortha
225	Rayagada	GED	Gabadapadar
226	Rayagada	GED	G. Dhepaguda
227	Rayagada	GED	Kinjiri
228	Rayagada	GED	Dambali
229	Rayagada	PKED	Saratal
230	Rayagada	PKED	Talasing
231	Rayagada	PKED	Tempagiri
232	Rayagada	PKED	Udasing
233	Rayagada	PKED	Sukei
234	Rayagada	PKED	Minjiri
235	Rayagada	PKED	K.C Pur
236	Rayagada	PKED	Tumkur
237	Rayagada	PKED	Tarmangada
238	Rayagada	PKED	Bantilada
239	Rayagada	PKED	Tarjasing
240	Rayagada	PKED	Roising
241	Rayagada	PKED	Rangalmet
242	Rayagada	PKED	Ayoda

243	Rayagada	PKED	Buraising
244	Rayagada	PKED	Tabarada
245	Rayagada	PKED	Namnagada
246	Rayagada	PKED	Lumudasing
247	Rayagada	PKED	Jhirjhira
248	Rayagada	PKED	Lailai
249	Rayagada	PKED	Kuruguba
250	Rayagada	PKED	Andhariguma
251	Rayagada	PKED	Talamunda
252	Rayagada	PKED	Ukarsing
253	Rayagada	PKED	Abasing
254	Rayagada	PKED	Lobaguma
255	Rayagada	PKED	Munising
256	Rayagada	PKED	Tudumul
257	Rayagada	PKED	Sunapur
258	Rayagada	PKED	Raida
259	Rayagada	PKED	Raiguma
260	Rayagada	PKED	Tarmalsing
261	Rayagada	PKED	Jeerang Nuasahi
262	Rayagada	PKED	Sankurada
263	Rayagada	PKED	Daraba
264	Rayagada	PKED	Ruuamba
265	Rayagada	PKED	Sialilati
266	Rayagada	PKED	Suluba
267	Rayagada	PKED	Sabara Sahi, Bahadapada
268	Rayagada	PKED	Kesariguda
269	Rayagada	PKED	Panasapadara
270	Rayagada	PKED	Bausapoi
271	Rayagada	PKED	Gambhariganda
272	Rayagada	PKED	Keranjholi
273	Rayagada	PKED	Padmapur
274	Rayagada	PKED	Halagadi
275	Rayagada	PKED	T Raising
276	Rayagada	PKED	Tanglipadara
277	Rayagada	PKED	Rachaguda
278	Rayagada	PKED	Huri
279	Rayagada	PKED	Guluba
280	Rayagada	PKED	Raipanka
281	Rayagada	PKED	Ludungi
282	Rayagada	PKED	Dengili
283	Rayagada	PKED	Kudikima
284	Rayagada	PKED	Jaraganda
285	Rayagada	PKED	Sindhiba
286	Rayagada	PKED	Bampada
287	Rayagada	PKED	Muthaguda
288	Rayagada	PKED	Ladiguda
289	Rayagada	PKED	Hadupadara
290	Rayagada	PKED	Bhaliasahi
291	Rayagada	PKED	Tikalama

292	Rayagada	PKED	Kamering
293	Rayagada	PKED	Bandhaguda
294	Rayagada	PKED	Sikilima
295	Rayagada	PKED	Solaguda
296	Rayagada	PKED	Pangulu
297	Rayagada	PKED	Lenjeri
298	Rayagada	PKED	Palapur
299	Rayagada	PKED	Gudur
300	Rayagada	PKED	Kintchartal
301	Rayagada	PKED	S Antarada
302	Rayagada	PKED	Tarmangada
303	Rayagada	PKED	Jangjang
304	Rayagada	PKED	Gobindpur
305	Rayagada	PKED	Kanada
306	Rayagada	PKED	Luhangar
307	Rayagada	PKED	Rebidi
308	Rayagada	PKED	Kijang
309	Rayagada	PKED	Sauri
310	Rayagada	PKED	Kumjang
311	Rayagada	PKED	Guar
312	Rayagada	PKED	Bastriguda
313	Rayagada	PKED	Badapur
314	Rayagada	PKED	Luhakhunti
315	Rayagada	PKED	Pariveta
316	Rayagada	PKED	Simiri
317	Rayagada	PKED	Jiranga
318	Rayagada	PKED	Putrupada
319	Rayagada	PKED	Kimiling
320	Rayagada	PKED	Raising
321	Rayagada	PKED	Tubursing
322	Rayagada	PKED	Anjarba
323	Rayagada	PKED	Anagha
324	Rayagada	PKED	Udaypur
325	Rayagada	PKED	Loba
326	Rayagada	PKED	Rumunda
327	Rayagada	PKED	Balisahi
328	Rayagada	PKED	Dabaraguda
329	Rayagada	PKED	Khristapur
330	Rayagada	PKED	Rupasing
331	Rayagada	PKED	Gangapur
332	Rayagada	PKED	Gadar
333	Rayagada	PKED	Arakhapada
334	Rayagada	PKED	Poipani
335	Rayagada	PKED	Katangapada
336	Rayagada	PKED	Dambadiha
337	Rayagada	PKED	Endri
338	Rayagada	PKED	Allada
339	Rayagada	PKED	Ghatisahi




TYPICAL DETAILS OF FENCING
NTS.

NOTES:-

1. ALL DIMENSIONS ARE IN mm & ALL LVLS ARE IN MTRS.
2. ALL DIMENSIONS TO BE CHECKED AT SITE BEFORE FABRICATION & CONSTRUCTION.
3. \varnothing REPRESENT HIGH YIELD STRENGTH DEFORMED BARS CONFORMING TO I.S. 1786.
4. CONCRETE GRADE M20 U.N.O (IS CODE 456/2000)
5. CLEAR COVER TO MAIN BARS FOOTING BOTTOM 75mm TOP & SIDE PEDESTAL / COLUMN 40mm BEAMS 25mm & SLAB 15mm.
6. LAP LENGTH SHALL BE MIN '50 D' FOR BARS IN COMPRESSION & 60D, FOR BARS IN TENSION. (D. DIAMETER OF SMALLER BAR)
7. CEMENT SHALL BE PORTLAND POZZOLANA CEMENT CONFORMING TO IS 1489 WITH CALCINED CLAY AS POZZOLANA.

ISSUE	REVISIONS	DRN	CLEARED					APPD	DATE
			CIVIL	ELEC	T & C	MECH	P & L / AUTOM		
THE TATA POWER COMPANY LIMITED TITLE: TYPICAL DETAILS OF FENCING			SCALE :	NTS		DWG NO.: STD-001			
			DRAWN :	MANGESH		DATE: (R0 ISSUE) 15-12-2018			
			CHECKED :			DATE: (CURRENT ISSUE) 15-12-2018			
			REVIEWED :			REV. NO.: 0			
			APPROVED :						

 <small>(A Joint Venture of Tata Power and Government of Odisha)</small>	TATA POWER SOUTHERN ODISHA DISTRIBUTION LIMITED, BERHAMPUR	
	TECHNICAL SPECIFICATION	
Document Title	SPECIFICATION FOR 1.1kV UNARMoured CONTROL CABLE 1CORE X (4 TO 630 sq.mm)	
Document No.	ENG-ELC-035/2	Issue Date: 23.04.2024
Revision No.	00	Page 1 of 13
Prepared by:	Reviewed By:	Approved & Issued By:

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Document Title	SPECIFICATION FOR 1.1kV UNARMOURED CONTROL CABLE 1CORE X (4 TO 630 sq.mm)	
Document No.	ENG-ELC-035/2	Issue Date: 23.04.2024
Revision No.	00	Page 2 of 13
Prepared by:	Reviewed By:	Approved & Issued By:

1. SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store and performance of unarmored Control Cables for trouble free and efficient operation.

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

Ref IS/IEC	Description
IS-1554 (Part-I)	PVC insulated (heavy duty) electric cables
IS-8130:1984	Conductor for insulated electric cables & flexible cords
IS-5831:1984	PVC insulation and sheath of electric cables
IEC-60228/3-2004	Conductor of insulated cables
IEC 60332-1:1993	Flame retardant, characteristics of electrical cables.
IS-3975:1979	Mild steel wires strips and tapes for armoring cables.
IS:3961-(Part-2)	Recommended current ratings for cables
IS 10418: 1982	Drums for Electric Cables

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	95%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	120
7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	300 Km/hr.
9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)


Document Title	SPECIFICATION FOR 1.1kV UNARMoured CONTROL CABLE 1CORE X (4 TO 630 sq.mm)	
Document No.	ENG-ELC-035/2	Issue Date: 23.04.2024
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Prepared by:	Reviewed By:	Approved & Issued By:

TPSODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS:


a. Physical Parameters:

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al'm Cond.	With Cu Cond.
	No's	No's					AYY	YY
Sq. mm	No's	No's	mm	mm	mm	mm	Kg/Km	Kg/Km
4	1/3	1/3	1.00	1.80	8	80	100	4
6	1/3	1/3	1.00	1.80	9	90	120	6
10	1/7	6	1.00	1.80	10	110	170	10
16	6	6	1.00	1.80	10	150	250	16
25	6	6	1.20	1.80	12	200	350	25
35	6	6	1.20	1.80	13	250	450	35
50	6	6	1.40	1.80	15	300	600	50
70	12	12	1.40	1.80	16	400	800	70
95	15	15	1.60	1.80	18	500	1050	95
120	15	18	1.60	2.00	20	600	1300	120
150	15	18	1.80	2.00	22	700	1600	150
185	30	30	2.00	2.00	24	850	1950	185
240	30	34	2.20	2.00	27	1100	2500	240
300	30	34	2.40	2.00	30	1300	3100	300
400	53	53	2.60	2.20	34	1700	3950	400
500	53	53	3.00	2.20	37	2100	5000	500
630	53	53	3.40	2.40	42	2700	6450	630

 TP SOUTHERN ODISHA DISTRIBUTION LIMITED <small>(A Joint Venture of Tata Power and Government of Odisha)</small>	TATA POWER SOUTHERN ODISHA DISTRIBUTION LIMITED, BERHAMPUR	
	TECHNICAL SPECIFICATION	
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b. Electrical parameters:

Size (Cross Sectional Area)	Max. Conductor D.C. Resistance at 20 °C		Approx. Conductor A.C. Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 Second Duration	
	Aluminium	Copper	Aluminium	Copper			For Aluminium Conductor			For Copper Conductor			Aluminium	Copper
							Ground	Duct	Air	Ground	Duct	Air		
Sq mm	Ohm/Km	Ohm/Km	Ohm/Km	Ohm/Km	Ohm/Km	µF/Km	Amps	Amps	Amps	Amps	Amps	Amps	K.amps	K.amps
4	7.41	4.61	8.89	5.53	0.140	0.58	—	—	—	39	38	35	0.304	0.460
6	4.61	3.08	5.53	3.70	0.127	0.68	39	37	35	49	48	44	0.456	0.690
10	3.08	1.83	3.70	2.20	0.118	0.83	51	51	47	65	64	60	0.760	1.15
16	1.91	1.15	2.29	1.38	0.110	1.01	66	65	64	85	83	82	1.22	1.84
25	1.20	0.727	1.44	0.87	0.105	1.05	86	84	84	110	110	110	1.90	2.88
35	0.868	0.524	1.04	0.63	0.100	1.22	100	100	105	130	125	130	2.66	4.03
50	0.641	0.387	0.769	0.464	0.098	1.22	120	115	130	155	150	165	3.80	5.75
70	0.443	0.268	0.532	0.322	0.091	1.43	140	135	155	190	175	205	5.32	8.05
95	0.320	0.193	0.384	0.232	0.088	1.47	175	155	190	220	200	245	7.22	10.90
120	0.253	0.153	0.304	0.184	0.086	1.62	195	170	220	250	220	280	9.12	13.80
150	0.206	0.1240	0.247	0.1488	0.085	1.62	220	190	250	280	245	320	11.40	17.30
185	0.164	0.0991	0.197	0.1189	0.084	1.62	240	210	290	305	260	370	14.10	21.30
240	0.125	0.0754	0.151	0.0912	0.082	1.72	270	225	335	345	285	425	18.20	27.30
300	0.100	0.0601	0.122	0.0733	0.080	1.74	295	245	380	375	310	475	22.80	34.50
400	0.0778	0.0470	0.0961	0.0580	0.080	1.81	325	275	435	400	335	550	30.40	46.00
500	0.0605	0.0366	0.0759	0.0459	0.079	1.86	345	295	480	425	355	590	38.00	57.50
630	0.0469	0.0283	0.0610	0.0368	0.077	1.87	390	320	550	470	375	660	47.90	72.50

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5. GENERAL CONSTRUCTION:

- i) Cable code- AYY/YY
- ii) The PVC Insulated Cable shall be manufactured and tested strictly in accordance with the Indian Standard IS 1554 (Part – I):1988 and its latest amendments.
- iii) All material used in the manufacturing of cables shall be new and shall be selected as the best available for the intended use and shall withstand the requirement of following tests:
 - Tensile test & Wrapping test (for aluminium)
 - Annealing test (for copper)
- iv) 1.1 kV stranded copper conductor, PVC Insulated type-C, extruded PVC inner sheath, galvanized round wire unarmored, extruded outer sheathed FRLS type cable conforming to IS:1554 (Part-I) with latest amendment. Overall outer sheath in blue color.

5.1 ARMOURING (if applicable only)

The armoring shall be with galvanized steel wires for multi core cables. The galvanized steel wires shall comply with the requirements of IS: 3975 with latest amendments

5.2 OUTER SHEATH:


The Outer Sheath shall be of polyvinyl chloride (PVC) compound conforming to the requirements of Type ST1 of IS: 5831 with FRLS properties with latest amendments. The outer sheath shall be applied by extrusion process. The thickness of the outer sheath shall be as per IS: 1554(Part – I). No tolerance on the negative sides shall be acceptable

5.3 CORE IDENTIFICATION:

Individual core of multi-core cable shall be colour-coded and/or numbered for proper identification in accordance with relevant IS/manufacturer's standard.

5.4 REELS/DRUMS:

Cables shall be supplied in the wooden drums in specified length. Wooden drums shall be strong, weatherproof and non-returnable. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

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6. MARKING:

Wooden drums shall be of good quality. It shall be free from any damages & sharp edges of nails/hardware inside the drums. A protective covering of polymeric sheet shall be applied inside the drum before winding the cable on the drum.

I. The drum shall carry the following information stenciled on both sides of the drum:


- a) Manufacturer's name
- b) Type of Cable
- c) Size of Cable
- d) Voltage Grade
- e) Length of the cable on the drum
- f) Direction of the rotation of the drum
- g) Gross mass
- h) Country of manufacture
- i) Year and month of manufacturing
- j) Purchase Order no.
- k) Drum No.

II. Following details shall be embossed on the outer sheath of the Cable at regular intervals every meter

- i) Manufacturer's name
- ii) Voltage grade
- iii) Number of cores, size, type
- iv) FRLSH
- v) TPSODL
- vi) ISI Mark
- vii) PO Number
- viii) Material code
- ix) Year of manufacturing
- x) Sequential length marking shall be provided on the outer sheath of the cable by printing

7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer: -

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7.1 ACCEPTANCE TESTS

- i) Tensile Test (for aluminium)
- ii) Annealing test (for copper)
- iii) Wrapping Test (for aluminium)
- iv) Conductor Resistance Test
- v) Test for thickness of insulation and sheath
- vi) Tensile strength and elongation at break test for insulation and sheath
- vii) High Voltage test at room temperature
- viii) Insulation resistance test


7.2 ROUTINE TESTS

- i) Conductor Resistance test
- ii) High Voltage test at room temperature

7.3 TYPE TESTS

- a) Tests on Conductor
 - Conductor resistance test
- b) Test for round steel wires/armoring wires (if applicable)
- c) Test for thickness of insulation and sheath (outer and inner)
- d) Physical tests for insulation & outer sheath
 - Tensile strength and elongation at break
 - Ageing in air oven
 - Hot deformation
 - Shrinkage test
 - Loss of mass in air oven
 - Heat shock test
 - Thermal stability
- e) Insulation Resistance test
- f) High voltage test (water immersion test) – AC & DC
- g) High voltage test at room temperature
- h) Flammability test

8. TYPE TEST CERTIFICATES:

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The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at **CPRI / ERDA** as per relevant IS. Type tests should have been conducted during the period not exceeding 10 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPSODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPSODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.

Following documents shall be sent along with material.


- a) Test reports
- b) MDCC issued by TPSODL
- c) TPSODL Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPSODL, Berhampur store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product

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delivered under this contract. In the event any defect is found by the Company up to a period of 60 months from the date of commissioning or 72 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

12. PACKING:

The cable shall be wound on strong weatherproof and non-returnable wooden drums packed in coil lengths of 500 meters/1000 meters in line with the requirement of IS 10418 – 1982 and its latest amendments. The ends of the cable shall be sealed by means of non-hygroscopic sealing material. Bidder shall ensure that cable covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

13. TENDER SAMPLE:

Bidder shall have to submit the sample of material (1-meter length) with the offer (in case of first supply) to TPSODL.

14. QUALITY CONTROL:

The bidder shall submit QAP indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. TESTING FACILITIES:

Supplier/ Manufacturer shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant Indian standards.

16. MANUFACTURING FACILITIES:

The successful bidder shall submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

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17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS:

Drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS:

Sr. No	General Technical Particulars	UNITS	To Be Furnished by the Bidder			
1	Reference Standard					
2	Voltage grade					
3	Type of cable					
A	Size of cable	sq.mm				
1	Conductor					
a.	Conductor Material					
b.	No. of cores	Nos.				
c.	Size of conductor	sq.mm.				
d.	Shape of conductor					
e.	No. & diameter of eachwire in conductor					
2	Insulation					
a.	Material					
b.	Nominal thickness	mm				
c.	Core identification					
3	Inner sheath					
a.	Material					
b.	Minimum thickness (atany point of measurement)	mm				

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4	Armour					
a.	Material					
b.	Nominal Diameter	mm				
c.	Type					
5	Outer Sheath					
a.	Material					
b.	Color					
c.	Minimum thickness (at any point of measurement)	mm				
6	Diameter					
a.	Approx. overall diameter	mm				
b.	Tolerance of diameter	mm				
7	Short circuit capacity for one second	kA				
8	Approx. Weight of cable	Kg/km				
9	Standard length of cable drum with tolerance	m				
10	Allowable conductor temperature at continuous current	°C				
11	Allowable conductor temperature during shortcircuit	°C				
12	Max. DC resistance at 20°C – Main	Ohm/km				
13	Max. AC resistance at max. Operating temp.	Ohm/km				
14	Guaranteed value of minoxygen index at 27°C	%				
15	Guaranteed value of min. temp. index at 21 oxygen index	°C				

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16	Smoke Density Rating					
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20. SCHEDULE “B” DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:


SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation

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1.0	SCOPE	<p>1. This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading of 12 kV,05kA, DH class Lightning Arrester at site/stores complete with all accessories for efficient and trouble free-operation. The specific requirements are covered in the enclosed technical data sheet.</p> <p>2. The material shall be complete with all components and accessories, which are necessary or usual for their efficient performance and trouble-free operation under the various operating and atmospheric conditions specified in clause no. 3</p> <p>3. Such of the parts that may have not been specifically included, but otherwise form part of the Lightning arrester as per standard trade and/or professional practice and/or are necessary for proper operation, will be deemed to be also included in this specification. The successful bidder shall not be eligible for any extra charges for such accessories etc. notwithstanding the fact that at the time of an initial offer bidder had segregated such items and quoted for them separately.</p>												
2.0	APPLICABLE STANDARDS	<p>The equipment (and the materials used) covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian standards & other relevant standards for components, BEE & CEA guidelines with latest amendment from time to time, thereof, some of which are listed below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Indian Standards (IS /IEC</th> <th style="text-align: left;">Title</th> </tr> </thead> <tbody> <tr> <td>IS-3070:1993 (Part-3)</td> <td>Specification for Lightning arresters for alternating current system.</td> </tr> <tr> <td>IS-4759:1996 Reaffirmed 2006</td> <td>Hot dip-zinc-coating on structural steel and other allied products.</td> </tr> <tr> <td>IS-2633:1986 Reaffirmed 2006</td> <td>Method for testing uniformity of coating on zinc coated particles.</td> </tr> <tr> <td>IS-6209:1982 Reaffirmed 2006</td> <td>Method of Partial Discharge Measurement</td> </tr> <tr> <td>IS:6745:19824 Reaffirmed 2006</td> <td>Method for determination of mass of zinc coating on zinc coated iron and steel articles.</td> </tr> </tbody> </table> <p><i>*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.</i></p>	Indian Standards (IS /IEC	Title	IS-3070:1993 (Part-3)	Specification for Lightning arresters for alternating current system.	IS-4759:1996 Reaffirmed 2006	Hot dip-zinc-coating on structural steel and other allied products.	IS-2633:1986 Reaffirmed 2006	Method for testing uniformity of coating on zinc coated particles.	IS-6209:1982 Reaffirmed 2006	Method of Partial Discharge Measurement	IS:6745:19824 Reaffirmed 2006	Method for determination of mass of zinc coating on zinc coated iron and steel articles.
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3.0	CLIMATIC CONDITIONS OF THE INSTALLATION	1	Maximum ambient temperature	50 deg C
		2	Max. Daily average ambient temp	35 deg C
		3	Min Ambient Temperature	0 deg C
		4	Maximum Humidity	95%
		5	Average Annual Rainfall	150 cm
		6	Average No. of rainy days per annum	120
		7	Altitude above MSL not exceeding	1000m
		8	Wind Velocity	300 Km/hr
		9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
		10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)
		TPSODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.		
4.0 GENERAL TECHNICAL REQUIREMENTS				
S No	Description	Requirements for 12kV 05kA Distribution Class (DH)		
1	Installation	Outdoor		
2	Type	Metal Oxide gapless with adhesive coated single wrap type / nylon direct injection molding		
3	Housing Material	Injection molded silicone rubber		
4	Service Voltage	11 Kv		
5	Rated Voltage	12 kV		
6	Rated Frequency	50 Hz		
7	Maximum Continuous Operating Voltage (MCOV) , U _c	7.65 kV (rms)		
8	Arrester Rating U _r	12 kV (rms)		
9	Nominal Discharge Current I _n	5 Ka		
10	Distribution Class	DH		
11	Repetitive Charge transfer withstand (Coulombs) Q_{rs}	≥0.4 C		
12	Thermal Energy	Q_{th} (C)	≥1.1 C	
		W_{th} (kJ/kV)	-	

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	withstand rating	
13	Insulation Voltage Withstand on Arrester Housing	
13.1	Power Frequency Voltage (Dry/ Wet) for one minute.	28 kV (rms)
13.2	Lightning Impulse Voltage kV Peak	75kV (Peak)
14	Rated Short Circuit Current	16KA or better
15	High Current impulse Operating Duty (4/10 μ s impulse wave) (kAp)	65 (kAp)
16	Partial Discharge at 1.05 times M.C.O.V	<10 Pc
15	Disconnecter	As per IEC 60099 ed 03
15.1	Disconnecter connecting lead	Insulated flexible tinned plated copper braid with lugs
15.2	Size of Insulated Tinned copper braid	25 sqmm.
15.3	Length of Insulated Tinned copper braid	300 mm
16	Material of Insulating Bracket	UV resistant Fire-retardant DMC
17	Material of End fittings	Machined / pressure die casted Aluminum
18	Pull Strength (Min.)	1000N
19	Cantilever Strength (Min.)	12 KGM
20	Creepage Distance of Arrester Housing	300 mm (Nom.)
21	Stack Height	To be submitted by bidder
22	Rating of individual ZnO blocks used for assembly	3kV /4.5Kv
23	Temporary Over Voltage rating (TOV)	Bidders to submit the offered product values
23.1	0.1Sec	Min. 11Kv rms
23.2	1 Sec	Min. 10Kv rms
23.3	10Sec	Min. 9.5Kv rms
24	Maximum Residual Voltage during impulse discharge of 8/20microsec.	Desired Maximum Values
24.1	5kAp	28 kVpeak
25	Max Steep lightning current impulse 1/20 μ s residual voltage	40 kVpeak
26	Material of Insulating terminal cap	Polyolefin
27	Material of Nut Bolt washers	Stainless Steel
28	Current at MCOV	
28.1	a. Resistive Current	Bidders to submit
28.2	b. Capacitive Current	Bidders to submit
29	The bolt grade	All hardware bolt shall be of 8.8 grade

5.0	GENERAL CONSTRUCTION	<ol style="list-style-type: none"> Lightning arresters shall be designed with gapless metal oxide elements with silicon housing suitable for operation under the system conditions specified. Arresters shall be completely molded units with absolutely no air volume inside, suitable for mounting on bracket. Arresters of tubular construction i.e
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		<p>arresters assembled in hollow core insulators with enclosed air volume are not acceptable</p> <ol style="list-style-type: none"> The end fittings shall be non-magnetic and of corrosion proof material. The end fittings used in polymer arrester shall be made from aluminum through machining process/pressure die-casting process. Sand casted and gravity casted end fittings are not acceptable. MOV blocks shall have full metallization to have full face contact and to reduce contact resistance between adjacent discs. Each unit of arrester assembly shall be hermetically sealed, leak tested and protected against ingress of moisture. The seal shall be properly designed and tested for operation under extreme weather conditions. Lightning arrester construction shall be suitable to withstand Seismic Loading, Short Circuit Forces and wind load and the force exerted on the arrester base and to the terminal imposed by the line conductor.
5.1	ASSEMBLY	<ol style="list-style-type: none"> Lightning arrester shall be supplied along with disconnecter, insulating bracket, insulating terminal Cap, disconnecter, Insulated tinned copper braid and necessary hard-wares. The Assembly consists of stack of nonlinear Metal Oxide (ZnO) elements with highly non-linear voltage current characteristics, connected in series. All the contact surfaces of metal oxide elements and Aluminum blocks must be smooth to have uniform contact surface. Housing shall be made of Silicon rubber via injection molding to provide thermal dissipation of heat generated in the metal oxide elements during overvoltage and line discharge. Polymeric housing shall be free from air bubble, flaws affecting the mechanical and electrical strength of the arrester. Housing shall be capable to withstand the desired pollution stresses without flashover. The polymer material used for the arrester housing must be tracking and erosion resistant, stabilized against UV radiation. All metal parts shall be of non-rusting and non-corroding metal. The arrester disconnecter shall be suitable for screwing directly to L.A with terminal of M10. Stainless Steel Bolts, Nuts, washers shall be provided. All similar parts, particularly removable ones, shall be interchangeable. The arrester shall have thermal stability to withstand the heat generated from the ZnO element due to continuous operating voltage and surges. The 12kV 05kA Distribution class Lightning Arrester shall have L-shaped terminal clamp suitable for conductor size of 9mm-16mm diameter.
5.2	DISCONNECTOR	<ol style="list-style-type: none"> Each individual unit of Lightning Arrester with disconnecter shall be hermetically sealed and fully protected against ingress of moisture.

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		<ol style="list-style-type: none"> 2. The hermetic seal shall be effective for the entire life time of the Lightning Arrester with disconnecter under the specified service conditions. 3. Disconnectors shall give the visible indication of the failed arrester. 4. The Lightning Arrester with disconnecter shall be suitable for bracket type mounting. . 5. The corresponding units of Lightning Arrester with disconnecter of the same rating shall be interchangeable without adversely affecting the performance. 6. All the necessary flanges, bolts, nuts, clamps etc. required for assembly of complete Lightning Arrester with disconnecter and accessories and mounting on purchaser's support structure shall be included in bidder's scope of supply. 7. The mounting details for mounting the Lightning Arrester with disconnecter on purchaser's support shall be given along with the bid.
5.3	MOUTING BRACKET	<ol style="list-style-type: none"> 1. The 12kV 05kA Distribution class Lightning Arrester shall be fixed over a mounting bracket made of UV resistance, Fire retardant DMC material. 2. The 12kV 05kA Distribution class Lightning Arrester shall be fixed over a mounting arrangement made of Hot dip galvanized MS material and additionally one mounting bracket shall be provided
5.4	MECHANICAL STRENGTH	<ol style="list-style-type: none"> 1. The Lightning Arrester and it base shall withstand rated mechanical terminal load and electromagnetic forces without impairing their operational reliability. 2. The Lightning Arrester shall not come out of their positions by gravity, wind pressure, vibrations or reasonable shocks.
6.0	NAME PLATE AND MARKING	<ol style="list-style-type: none"> 1. The Lightning Arrester shall be provided with durable and legible name plate embossing, effectively secured against removal. 2. The name plate shall be indelibly and distinctly marked with all essential particulars as per the relevant standards along with the following : 3. The Name plate/product shall have marking of "PO no. with date" & "Property of TPSODL" 4. The following information shall be mentioned on the Name Plate: <ol style="list-style-type: none"> i. Continuous operating Voltage ii. Rated Voltage iii. Rated Frequency iv. Nominal Discharge Current v. Manufacturer's Name vi. Type and Identification of the complete arrester vii. Year of Manufacture viii. Serial Number
7.0	TESTS	<ol style="list-style-type: none"> 1. All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. 2. All acceptance tests shall be witnessed by the purchaser/his authorized representative. 3. All the components and fittings shall also be type tested as per the relevant standards. 4. Following tests shall be necessarily conducted on the Lightning Arrester in addition to others specified in IS/IEC standards.

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		<i>*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.</i>																																													
7.1	TYPE TEST	<p>List of type test Reports to be submitted along with offer as per IEC 60099-4 Ed.3</p> <table border="1"> <thead> <tr> <th>Sr. No.</th> <th>Test to be done</th> <th>Reference BIS / Document</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Power Frequency reference Voltage test(Both in Dry and Wet condition)</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.2</td> </tr> <tr> <td>2</td> <td>Lightning impulse residual voltage on complete arrester</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.2</td> </tr> <tr> <td>3</td> <td>Residual voltage tests</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.3</td> </tr> <tr> <td>4</td> <td>Test to verify long term stability under continuous operating voltage</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.4</td> </tr> <tr> <td>5</td> <td>Test to verify the repetitive charge transfer rating, Qrs</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.5</td> </tr> <tr> <td>6</td> <td>Heat dissipation behaviour</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.6</td> </tr> <tr> <td>7</td> <td>Operating duty test</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.7</td> </tr> <tr> <td>8</td> <td>Power-frequency voltage-versus-time test characteristic</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.8</td> </tr> <tr> <td>9</td> <td>Tests of arrester disconnector</td> <td>As per IEC 60099-4 Ed.3 clause 10. 8.9</td> </tr> <tr> <td>10</td> <td>Operating withstand Test for Disconnector</td> <td>As per IEC 60099-4 Ed.3 clause 8.9.2</td> </tr> <tr> <td>11</td> <td>Disconnector operation test – Current vs time</td> <td>As per IEC 60099-4 Ed.3 clause 8.9.3</td> </tr> <tr> <td>12</td> <td>Short-circuit tests a. High current SC b. Low current SC</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.10</td> </tr> <tr> <td>13</td> <td>Bending moment test</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.11</td> </tr> <tr> <td>14</td> <td>Weather aging Test for 1000 hours of slat fog test and 1000 hours of UV test</td> <td>As per IEC 60099-4 Ed.3 clause 10.8.17</td> </tr> </tbody> </table>	Sr. No.	Test to be done	Reference BIS / Document	1	Power Frequency reference Voltage test(Both in Dry and Wet condition)	As per IEC 60099-4 Ed.3 clause 10.8.2	2	Lightning impulse residual voltage on complete arrester	As per IEC 60099-4 Ed.3 clause 10.8.2	3	Residual voltage tests	As per IEC 60099-4 Ed.3 clause 10.8.3	4	Test to verify long term stability under continuous operating voltage	As per IEC 60099-4 Ed.3 clause 10.8.4	5	Test to verify the repetitive charge transfer rating, Qrs	As per IEC 60099-4 Ed.3 clause 10.8.5	6	Heat dissipation behaviour	As per IEC 60099-4 Ed.3 clause 10.8.6	7	Operating duty test	As per IEC 60099-4 Ed.3 clause 10.8.7	8	Power-frequency voltage-versus-time test characteristic	As per IEC 60099-4 Ed.3 clause 10.8.8	9	Tests of arrester disconnector	As per IEC 60099-4 Ed.3 clause 10. 8.9	10	Operating withstand Test for Disconnector	As per IEC 60099-4 Ed.3 clause 8.9.2	11	Disconnector operation test – Current vs time	As per IEC 60099-4 Ed.3 clause 8.9.3	12	Short-circuit tests a. High current SC b. Low current SC	As per IEC 60099-4 Ed.3 clause 10.8.10	13	Bending moment test	As per IEC 60099-4 Ed.3 clause 10.8.11	14	Weather aging Test for 1000 hours of slat fog test and 1000 hours of UV test	As per IEC 60099-4 Ed.3 clause 10.8.17
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7.2	ROUTINE TEST	<p>The test shall be as per IEC 60099-4 Ed.3 clause no. 9.1 and or IS3070 latest editions,</p> <ol style="list-style-type: none"> 1. Measurement of reference voltage test 2. Residual Voltage Test on complete arrester 																																													

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		<ol style="list-style-type: none"> 3. Internal partial discharge test. This test shall be performed on each arrester unit. The test sample may be shielded against external partial discharges. Internal partial discharge shall not exceed 10 pC 4. Satisfactory absence from partial discharges and contact noise shall be checked on each unit by any sensitive method adopted by the manufacturer. 5. Disconnecter Assembly- Proper assembly of each disconnecter has to be demonstrated by either measurement of resistance / capacitance or partial discharges. 																								
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8.0	TYPE TEST CERTIFICATES	The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPR/ERDA as per relevant standard. Type tests should have been conducted during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPSODL.																								
9.0	PRE-DESPATCH INSPECTION	<ol style="list-style-type: none"> 1. Equipment shall be subject to inspection by a duly authorized representative of TPSODL. 2. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. 3. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. 4. Inspection by TPSODL or authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. 5. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL. 																								

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		<p>6. Following documents shall be sent along with material:</p> <ol style="list-style-type: none"> Test report MDCC issued by TPSODL Invoice in duplicate Packing list Drawings & catalogue Guarantee / Warrantee card Delivery Challan Other Documents (as applicable)
10.0	INSPECTION AFTER RECEIPT AT STORE	The material received at TPSODL, Berhampur, Odisha store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.
11.0	GUARANTEE:	<p>Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 18 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.</p> <p>The bidder shall further be responsible for ' free replacement' for another period of THREE years from the end of guarantee period for any 'latent defects' if noticed by the company.</p>
12.0	PACKING	<ol style="list-style-type: none"> Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. The material should be packed in vertical position in individual box in such a way that the shape of rain shed does not get deformed during transportation and storage. <p>Note: Single use plastic not to be used for packing of the material.</p>
13.0	TENDER SAMPLE	NA
14.0	TRAINING	NA
15.0	QUALITY CONTROL	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TPSODL's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

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		<p>The following information shall necessarily be submitted with the bid:</p> <ol style="list-style-type: none"> 1. List of important raw materials, names of sub-suppliers for raw materials, standards to which raw material is tested and the copies of test reports of the tests carried out on raw materials in presence of Bidder's representatives. 2. List of manufacturing facilities available, level of automation achieved and the areas where manual process exists. 3. List of areas in manufacturing process where stage inspections are normally carried out for quality control and details of these tests and inspections 4. List of testing equipment for final testing with valid calibration reports. Manufacturer shall possess 0.1 class instruments for measurement of losses. 5. QAP withhold points for TPSODL 6. inspection.
16.0	MINIMUM TESTING FACILITIES	Bidder shall have adequate in-house testing facilities for carrying out all routine tests, acceptance tests and pre-dispatch inspection as per relevant International / Indian standards.
17.0	MANUFACTURING ACTIVITIES	<p>The successful bidder will have to submit technical compliance document and drawing as per RC line items for getting approval before mass manufacturing.</p> <p>Manufacturing shall start only after getting CAT-A approved drawings or as per intimation from TPSODL.</p>
18.0	SPARES, ACCESSORIES ND TOOLS	Not Applicable
19.0	DRAWINGS AND DOCUMENTS	<p>Following drawings and documents shall be prepared based on TPSODL specifications and statutory requirements and shall be submitted with the bid:</p> <ol style="list-style-type: none"> a. Completely filled in Technical Particulars and compliance to each clause of the specification General Technical Requirements to Additional Details. b. Description of the equipment and all components including brochures. c. General Drawing arrangement of lightning arrester. d. Sectional drawing showing internal blocks etc. e. Bill of material. f. Experience Certificate and list. g. Type test certificates. h. List of makes of major components. <p>Drawings / documents to be submitted after the award of the contract are as under:</p> <p><u>List of Drawings/Parameters to be submitted:</u></p> <ol style="list-style-type: none"> 1. Technical Parameters as asked in Specification (General Technical Particulars, General Technical Requirements, Additional Details, Fittings, Type test Reports and Routine test certificates of bought out accessories).

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		<ol style="list-style-type: none"> 2. General Arrangement Drawing of the Lightning arrester (Front view and Top view. Complete list of fittings to be displayed and quantities to be mentioned with the drawing). 3. Sectional drawing showing the blocks arrangement. 4. Terminal and connection drawings 5. Type Test Certificates. 6. Installation/ Mounting Instructions/Drawing. <p><u>Additional Documents to be submitted :</u></p> <ol style="list-style-type: none"> a. List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer. b. Type test certificates of the raw materials and bought out accessories. c. The successful Bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing. <p>All the documents & drawings shall be in English language. After the receipt of the order, the successful bidder will be required to furnish all relevant drawings/parameters/calculation to TPSODL for approval.</p> <p><u>Instruction Manuals:</u> Bidder shall furnish softcopies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.</p>
20.0	GUARANTEED TECHNICAL PARTICULARS	All clauses and points in the Specification to be complied for along with GTR.
21.0	SCHEDULE OF DEVIATIONS	



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(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:


S.No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:


Signature

Designation

	TATA POWER SOUTHERN ODISHA DISTRIBUTION LIMITED, BERHAMPUR	
	TECHNICAL SPECIFICATION	
Document Title	SPECIFICATION FOR GI CHANNEL (100x50x6),(75x40x6) AND ANGLE (65x65 & 50x50)x6	
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1. SCOPE:

This specification covers the design, manufacture, testing and supply of GI Structural Items includes Channel, Angle to be used in Structures. Scope also includes transportation & unloading at store / site.


2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

IS 2062	Hot Rolled Medium and High Tensile Structural Steel
IS 1852	Rolling and Cutting Tolerances for Hot Rolled Steel products
IS 2633	Methods for testing uniformity of coating of zinc coated articles
IS 4759	Hot-dip zinc coatings on structural steel and other allied products
IS 6745	Method for determination of mass of zinc coating on zinc coated iron and steel articles

3. CLIMATIC CONDITIONS OF THE INSTALLATION:


SL. NO.	CONDITIONS	VALUES
1	Max. altitude above sea level	1200m
2	Max. Ambient Temperature	50 °C
3	Max. Daily average ambient temp	35 °C
4	Min Ambient Temp	0 °C
5	Maximum temperature attainable by an object exposed to sun	60 °C
6	Maximum Humidity	95%

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7	Minimum Humidity	10%
8	Average No. of thunderstorm days per annum	70
9	Average Annual Rainfall	150 cm
10	Average No. of rainy days per annum	120
11	Thermal Resistivity of soil	150 Deg. Ccm/W
12	Wind Pressure	126 kg/sq. m up to anelevation of 10 meter.
14	Earthquakes of intensity in horizontal direction	equivalent to seismicacceleration of 0.3g
15	Earthquakes of intensity in vertical direction	equivalent to seismicacceleration of 0.15g
16	Wind velocity	300 km/hr.

Environmentally, some of the regions, where the work will take place include coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas. Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere.


The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.

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	TECHNICAL SPECIFICATION	
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Prepared by:	Reviewed By:	Approved & Issued By:

4. GENERAL TECHNICAL REQUIREMENTS:

SL. NO.	TECHNICAL PARTICULARS	DESIRED VALUE			
		100X50X6 mm	75X40x6 mm	65X65X6 mm	50X50X6 mm
1	Material	Hot-Dip Galvanized Channel	Hot-Dip Galvanized Channel	Hot-Dip Galvanized Angle	Hot-Dip Galvanized Angle
2	Relevant Standard	IS: 2062, IS: 2633, IS: 2629, IS: 4759	IS: 2062, IS: 2633, IS: 2629, IS: 4759	IS: 2062, IS: 2633, IS: 2629, IS: 4759	IS: 2062, IS: 2633, IS: 2629, IS: 4759
4	Grade of Steel	E 250 A	E 250 A	E 250 A	E 250 A
5	Minimum Tensile Strength in Mpa	410	410	410	410
6	Yield Stress in Mpa	250	250	250	250
7	Percentage Elongation (Min.) at Gauge Length	23%	23%	23%	23%
8	Bend Test (Internal Dia)	Min-2t	Min-2t	Min-2t	Min-2t
9	Mass of Zinc Coating	Min 705 gm/m ²	Min 705 gm/m ²	Min 705 gm/m ²	Min 705 gm/m ²
10	Zinc Coating Thickness & No of Dips	Min. 100 Micron at every point with 6 Dips	Min. 100 Micron at every point with 6 Dips	Min. 100 Micron at every point with 6 Dips	Min. 100 Micron at every point with 6 Dips
11	Chemical composition	Grade: E 250 A (As per IS: 2062)	Grade: E 250 A (As per IS: 2062)	Grade: E 250A (As per IS: 2062)	Grade: E 250A (As per IS: 2062)
12	Standard length of supply For Channel and Angles only	6 Metre Long			
13	Tolerances	As per IS 1852 latest Amendment			

5. GENERAL CONSTRUCTION:

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The Chemical composition and Physical properties of the finished material shall be as per the equivalent standards. Chemical Composition and Physical Properties shall conforming to IS: 2062. Mass of the Channel and Angles are as follows:-

- a) 100x50x6 mm:- 9.2kg/m
- b) 75x40x6mm:- 6.8kg/m
- c) 65x65x6 mm:- 5.8kg/m
- d) 50x50x6 mm:-4.5kg/m

5.1 CHEMICAL COMPOSITION


Chemical composition for E 250 A Grade

- a) C - 0.23% Max
- b) Mn - 1.5% Max
- c) S - 0.045% Max
- d) P - 0.045%Max
- e) SI - 0.40% Max
- f) CE (Carbon Equivalent)- 0.42%

5.2 Galvanization:

All the channels and angles shall be hot dip galvanized, are as following:

- a) All galvanizing shall be carried out by the hot dip process, in accordance with Specification IS 2629.
- b) The zinc coating (Min 705 gms per sq.mt / Min. 100 Micron at every point with 6 Dips) shall be smooth, continuous and uniform. It shall be free from acid spot and shall not scale, blister or be removable by handling or packing.
- c) There shall be no impurities in the zinc or additives to the galvanic bath which could have a detrimental effect on the durability of the zinc coating. Purity of zinc shall be Zn 99.95% or better.
- d) In the event of damage to the galvanizing the method used for repair shall be subject to the approval of the Engineer in Charge or that of his representative. Repair of galvanization at site

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will not be permitted in any situation.

- e) Partial immersion of the work shall not be permitted and the galvanizing tank must therefore be sufficiently large to permit galvanizing to be carried out by one immersion.
- f) After galvanizing no drilling or welding shall be performed on the galvanized parts. To avoid the formation of white rust galvanized materials shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization. The galvanized steel shall be subjected to test as per IS-2633.
- g) Quality of Hot Dip Galvanization should comply with IS 2629, ISO 1461 & should be guaranteed for any type of damage due to harsh climatic condition for 5 Years. These channels and angles are to be used in coastal areas of Odisha where climate is hot, humid & saline. These areas are prone to flood & frequent rainfall.

6. MARKING:

Following distinct non-erasable embossing is to be made on each Channel and Angles and to be supplied to TPSODL under this Tender.

- a) Manufacturer Name/ Trade Mark
- b) E-250 A

Engraved Marking (Punching before galvanization)


- a) "TPSODL"
- b) Year of manufacturing
- c) PO Number

7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer:

7.1 ACCEPTANCE TESTS

- i) Chemical Composition

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- ii) Mechanical Properties
- iii) Dimension Test & Weight (kg/M) Visual Examination,
- iv) Test in respect of Hot Dip Galvanization i.e. Thickness of zinc coating in microns
- v) Mass of Zinc Test

7.2 ROUTINE TESTS

Same as Acceptance Test

7.3 TYPE TESTS


- i) Chemical Composition
- ii) Mechanical Properties
- iii) Test in respect of Hot Dip Galvanization i.e. thickness of zinc coating in microns

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at **CPRI/ERDA/NABL** as per relevant IS. However, TPSODL. TATA-POWER reserves the right to allow any other NABL accredited/ Govt. lab report under exceptional circumstances after due diligence/ scrutiny by DISCOM. Type tests should have been conducted during the period not exceeding 5years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. anytest report not acceptable, same shall be carried out without any cost implication to TPSODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPSODL. Inspection may be made at any stage of manufacture atthe discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the

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specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPSODL
- c) TPSODL Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).


10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPSODL, Odisha store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre- dispatch inspection and one copy of the report shall be sent to Engineering department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 54 months from the date of commissioning or 60 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

Galvanization Guarantee- Quality of Hot Dip Galvanization should be guaranteed for any type of

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damage due to harsh climatic condition for 5 Years.

12. PACKING:

Supplier shall ensure that all material covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

13. TENDER SAMPLE:

NA

14. QUALITY CONTROL:

The bidder shall submit QAP indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. TESTING FACILITIES:

Supplier/ Manufacturer shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant Indian standards.

16. MANUFACTURING FACILITIES:

The successful bidder shall submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.




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18. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS:

SL. NO.	TECHNICAL PARTICULARS	To Be Furnished By The Bidder			
		100X50X6 mm	75X40x6 mm	65X65X6 mm	50X50X6 mm
1	Material				
2	Relevant Standard				
4	Make				
5	Grade of Steel				
6	Minimum Tensile Strength in Mpa				
7	Yield Stress in Mpa				
8	Percentage Elongation (Min.) atGauge Length				
9	Bend Test (Internal Dia)				
10	Mass of Zinc Coating				
11	Zinc Coating Thickness & No of Dips				
12	Standard length of supply for channel and angles only				
13	Tolerances				

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19. SCHEDULE “B” DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-LV-3002

**Specification Name : TECHNICAL SPECIFICATION FOR LT AB cable- 3 cores /
Insulated messenger / Street Light**

JYOTIPRAKASH MOHANTY	SATYA PRASAD NAYAK	Vijender Goyal	SHANTAPRIYA JENA	ANUP JAWASE	VARUN BHATNAGAR
Prepared by	Reviewed by	Reviewed by	Reviewed by	Approved by	Released by
TPWODL	TPCODL	TPSODL	TPNODL	TPWODL	TPWODL
02-01-2023	03-01-2023	03-01-2023	03-01-2023	03-01-2023	04-01-2023

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TPWODL*

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19. SCHEDULE "A" GUARANTEED TECHNICAL PARTICULARS
20. SCHEDULE "B" DEVIATIONS

1. SCOPE:

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at store/site and performance of LT ABC cable for trouble free and efficient operation. The specific requirements are covered in the enclosed technical data sheet.

The sizes specified in the specifications are tabulated below:

SI.No	Phase Conductor (No. of Cores x Size in sqmm)	Insulated Messenger (No. of Cores x Size in sqmm)	Streetlight (No. of Cores x Size in sqmm)
1	3C x 95	1C x 70	1C x 16
2	3C x 70	1C x 50	1C x 16
3	3C x 50	1C x 35	1C x 16
4	3C x 35	1C x 25	1C x 16
5	1C x 35	1C x 25	-
6	3C x 50	1C x 35	-
7	3C x 35	1C x 25	-

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:





IS-398 (Part IV)	Aluminum conductor for overhead transmission purposes- Part IV Aluminum alloy stranded conductor
IS-5216	Guide for safety procedures and practices in electric works
IS-7098 (part-I)	Specification for Cross-linked_ polyethylene insulated PVC sheathed cables- Part I for working voltage up to and including 1100 volts.
IS-8130	Specification for Conductor for insulated electric cables & flexible cords.
IS-10418	Specification for drums for electric cables
BS-5468	Cross-linked polyethylene insulation of electric cables
IEC-540	Test methods for insulations and sheaths of electric cables and cords
IEC-60228/3	Conductor for insulated cables
IEC-60502-1	Power cables with extruded insulation and their accessories for rated voltages from 1kV (Um=1.2kV), up-to 30kV(Um=36kV)-Part 1:Cables for rated voltages of 1 kV /Um=1,2kV) and 3kV/Um=3.6kV)
ASTM G-53/DIN 56687	UV testing of XLPE insulation
SANS 1713	South African Standard for Aerial Bunched conductor
IS14255	Aerial Bunched conductors for working voltages up to and including 1100 volts

3. CLIMATIC CONDITIONS:

SL.NO.	CONDITIONS	VALUES
1	Max. altitude above sea level	1200m
2	Max. Ambient Temperature	50 °C
3	Max. Daily average ambient temp	35 °C
4	Min Ambient Temp	0 °C
5	Maximum temperature attainable by an object exposed to sun	60 °C
6	Maximum Humidity	95%
7	Minimum Humidity	10%
8	Average No. of thunderstorm days per annum	70
9	Average Annual Rainfall	150 cm
10	Average No. of rainy days per annum	120
11	Thermal Resistivity of soil	150 Deg. Ccm/W
12	Wind Pressure	126 kg/sq. m up to an elevation of 10 meter.
14	Earthquakes of intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
15	Earthquakes of intensity in vertical direction	equivalent to seismic acceleration of 0.15g
16	Wind velocity	300 km/hr.





Environmentally, some of the regions, where the work will take place include coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas. Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere.

The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces as mentioned above.





 	 	Specification No: ENG-LV-3002 Specification Name: Specification for LT AB cable 3 Cores insulated messenger street light
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4. GENERAL TECHNICAL REQUIREMENTS:

SL NO	DESCRIPTION	UNITS	3C×95 mm ² (P)+1C×70mm ² (M)+1CX16 mm ² (StreetLight)	3C X 70 mm ² (P)+ 1C X 50 mm ² (M) +1C x 16 mm (Street Light)	3C×50 mm ² (P)+1C×35mm ² (M)+1CX 16mm ² (Street Light)	3C X 35 mm ² (P) + 1C X 25(M)+ 1C x 16 mm ² (StreetLight)
1	Type of Cable		LT ABC cable with cross linked polyethylene insulated Phase and streetlighting core twisted around the insulated neutral cum messenger wire			
2	Size of Aerial Bunched cable		3C×95 mm ² (P)+1C×70 mm ² (M)+1CX 16 mm ² (Street Light)	3C X 70 mm ² (P)+ 1C X 50 mm ² (M) +1C x 16 mm (Street Light)	3C×50 mm ² (P)+1C×35 mm ² (M)+1C X16 mm ² (Street Light)	3C X 35 mm ² (P) + 1C X 25 mm ² (M)+ 1C x16 mm ² (Street Light)
3	Rated Voltage	kv	1.1	1.1	1.1	1.1
4	System Voltage	kv	0.415- 0.433	0.415 - 0.433	0.415 - 0.433	0.415 - 0.433
5	Nominal Area of Phase Conductor	mm ²	95	70	50	35
6	Nominal Area of Messenger	mm ²	70	50	35	25
7	Phase Core		Stranded compacted circular aluminum conductor, Extruded XLPEinsulated			
8	Neutral core & MessengerWire		Stranded compacted circular aluminum alloy conductor, Extruded XLPEinsulated			
9	Maximum conductor temperature during continuous operation	Deg C	90	90	90	90
10	Maximum conductor temperature during short circuit	Deg C	250	250	250	250
11	Phase Core RYB insulated					
a)	Conductor					
(i)	Material		EC Grade Aluminum of H4Grade to IS: 8130:1984	EC Grade Aluminum of H4 Grade to IS: 8130:1984	EC Grade Aluminum of H4Grade to IS: 8130:1984	EC Grade Aluminum of H4Grade to IS: 8130:1984





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(ii)	No. of Cores & Nominal Size	mm ²	3Cx95	3Cx70	3Cx50	3Cx35
(iii)	Minimum number of strand wires		15	12	6	6
(iv)	Diameter		Shall be suitably selected to meet conductor DC resistance as per IS 8130			
(v)	Max. DC Resistance of phase conductor at 20 deg.C	Ω/km	0.32	0.443	0.641	0.868
(vi)	Shape of Conductor		Stranded Compacted Circular			
(vii)	Short Circuit current rating of conductor for 1 sec	kA	8.93	6.58	4.7	3.29
(viii)	Continuous current rating in air at 40Deg. C	A	230	200	149	125
b)	Insulation					
i)	Material		XLPE Insulation as per IS 14255:1995			
ii)	Nominal Thickness	mm	1.5	1.5	1.5	1.2
iii)	Tolerance in Insulation Thickness	mm	XLPE Insulation as per IS 14255			
12	Street light core					
a)	Conductor					
i)	Material		EC grade aluminum of H4 grade to IS: 8130:1984			
ii)	Nominal size	mm ²	16	16	16	16
iii)	Nominal no. of wire		7	7	7	7
iv)	Max DC resistance at 20 deg. C	Ohm/km	1.91(As per IS 8130:1984)	1.91(As per IS 8130:1984)		
v)	Shape of conductor		Stranded compacted circular			
b)	Insulation					
i)	Material		As per IS: 14255:1995			
ii)	Nominal thickness	mm	1.2	1.2	1.2	1.2
iii)	Tolerance in Insulation Thickness		XLPE Insulation as per IS 14255:1995			
13	Neutral Cum Messenger Wire					
a)	Messenger wire					
i)	Material		Aluminum Alloy Wire			
ii)	Nominal size	mm ²	70	50	35	25

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iii)	No. and Nominal Dia. of each strand	No./m m	7/3.57	7/3.02	7/2.54	7/2.14
iv)	Calculated Maximum resistance at 20 deg C	ohm/k m	0.492	0.689	0.986	1.38
v)	Shape of conductor		Stranded circular-compacted			
vi)	Short circuit rating for 1 sec	kA	6.58	4.7	3.29	2.35
vii)	Material of insulation		XLPE Insulation as per IS 14255			
viii)	Thickness of insulation	mm	1.5	1.5	1.2	1.2
ix)	Min Breaking load of messenger wire	KN	19.7	14	9.8	7
14	Core Identification		RIDGES for Phase identification: 1 ridge for R phase 2 ridges for Y phase 3 ridges for B phase For neutral core identification non-contact type laser printing or ink jet printing to be provided with 'N' printed on it at every span of 1 mtr.			
15	Formation of cable		3 phase cores & 1 street lighting core xlpe insulated are laid up over insulated messenger with R-H direction of Lay			
17	Maximum conductor temperature during continuous operation (RYBN)	Deg C	90	90	90	90
18	Maximum conductor temperature during Short circuit (RYBN)	Deg C	250	250	250	250
19	Standard Drum Length	Mtr	500	500	500	500
20	Tolerance in Drum length	%	+/-5%	+/-5%	+/-5%	+/-5%
21	Reference Standard		IS 14255			
22	Embossing on XPLE cable		Embossing on phase insulation of the cable: manufacturer name 1100V, size of cable, ISI, month & year of manufacturing, Property of TPCODL/TPNODL/TPWODL/TPSODL, PO number & date.			

SL NO	DESCRIPTION	UNITS	1C X 35 mm ² (P) + 1C X 25 mm ² (M)	3C×50 mm ² (P)+1C×35 mm ² (M)	3C X 35 mm ² (P) + 1C X 25 mm ² (M)
1	Type of Cable		LT ABC cable with cross linked polyethylene insulated Phase core twisted around the insulated neutral earth cum messenger wire		
2	Size of Aerial Bunched cable		1C X 35 mm ² (P) + 1C X 25 mm ² (M)	3C×50 mm ² (P)+1C×35 mm ² (M)	3C X 35 mm ² (P) + 1C X 25 mm ² (M)
3	Rated Voltage	kV	1.1	1.1	1.1
4	System Voltage	kV	0.415-0.433	0.415-0.433	0.415-0.433
5	Nominal Area of Phase Conductor	mm ²	35	50	35
6	Nominal Area of Messenger	mm ²	25	35	25
7	Phase Core		Stranded compacted circular Aluminum Conductor, Extruded XLPE Insulated		
8	Neutral core & Messenger Wire		Stranded compacted circular aluminum alloy conductor, Extruded XLPE insulated		
9	Maximum conductor temperature during continuous operation	Deg C	90	90	90
10	Maximum conductor temperature during shortcircuit	Deg C	250	250	250
11	Phase Core RYB insulated				
a)	Conductor				
(i)	Material		EC Grade Aluminum of H4 Grade to IS: 8130:1984	EC Grade Aluminum of H4 Grade to IS: 8130:1984	EC Grade Aluminum of H4 Grade to IS: 8130:1984
(ii)	No. of Cores & Nominal Size	mm ²	1C*35	3C*50	3C*35
(iii)	Minimum number of Strand wires		6	6	6
(iv)	Diameter		Shall be suitably selected to meet conductor DC resistance as per IS 8130		

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(v)	Max. DC Resistance of phase conductor at 20 deg. C	Ω/km	0.868	0.641	0.868
(vi)	Shape of Conductor		Stranded Compacted Circular		
(vii)	Short Circuit current rating of conductor for 1 sec	kA	3.29	4.7	3.29
(viii)	Continuous current rating in air at 40Deg.C	A	125	149	125
b)	Insulation				
i)	Material		XLPE Insulation as per IS 14255:1995		
ii)	Nominal Thickness	mm	1.2	1.5	1.2
iii)	Tolerance in Insulation Thickness	mm	XLPE Insulation as per IS 14255:1995		
c)	Messenger wire				
i)	Material		Aluminum Alloy Wire	Aluminum Alloy Wire	Aluminum Alloy Wire
ii)	Nominal size	mm ²	25	35	25
iii)	No. and Nominal Dia. of each strand	No./m	7/2.14	7/2.54	7/2.14
iv)	Calculated Maximum resistance at 20 degC	ohm/km	1.38	0.986	1.38
v)	Shape of conductor		Stranded circular-compacted	Stranded circular-compacted	Stranded circular-compacted
vi)	Short circuit rating for 1sec	kA	2.35	3.29	2.35
vii)	Material of insulation		XLPE Insulation as per IS 14255	XLPE Insulation as per IS 14255	XLPE Insulation as per IS 14255
viii)	Thickness of insulation	mm	1.2	1.2	1.2
ix)	Min Breaking load of messenger wire	KN	7	9.8	7



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12	Core Identification		RIDGES for Phase identification: 1 ridge for R phase 2 ridges for Y phase 3 ridges for B phase. For neutral core identification non-contact type laser printing or ink jet printing to be provided with 'N' printed on it at every span of 1 mtr.		
13	Formation of cable		1 phase core XLPE insulated shall be twisted around the insulated earth cum messenger wire, with R-H direction of lay	3 phase cores XLPE insulated shall be twisted around the insulated earth cum messenger wire, with R-H direction of lay	3 phase cores XLPE insulated shall be twisted around the insulated earth cum messenger wire, with R-H direction of lay
14	Continuous current rating in air at 40DegC of phase conductor	A	125	149	125
15	Maximum conductor temperature during continuous operation (RYBN)	Deg C	90	90	90
16	Maximum conductor temperature during short circuit (RYBN)	Deg C	250	250	250
17	Standard Drum Length	Mtr	500	500	500
18	Tolerance in Drum length	%	+/-5%	+/-5%	+/-5%
19	Reference Standard		IS 14255		
20	Embossing on XPLE cable		Embossing on phase insulation of the cable: manufacturer name 1100V, size of cable, ISI, month & year of manufacturing, Property of TPCODL/ TPNODL/ TPWODL/ TPSODL, PO number & date.		

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5. GENERAL CONSTRUCTION

5.1 Conductors:


- 5.1.1 All conductors shall be Class 2, Stranded, compared circular, High electrical conductivity, Aluminum, Grade H2/H4 as per IS 8130:1984.
- 5.1.2 Before stranding, the conductor shall be circular in cross section, uniform in quality, solid, smooth and free from scale, sharp edges and other defects.
- 5.1.3 Conductor shall conform to the standards for permissible number of joints in any one of the single wires forming every complete length of conductor, for location of joints in same layer of conductors and for method of making such joints. No joint shall be made in any conductor after it is stranded.
- 5.1.4 All conductors shall be of high electrical conductivity Aluminum as specified, conforming to requirement of relevant standards.

5.2 INSULATION

- 5.2.1 The insulating material shall be Cross Linked Polyethylene (XLPE) applied by extrusion as per latest IS:14255 and its latest amendments.
- 5.2.2 The insulation shall be both heat and moisture resistant and shall be suitable for continuous operation at conductor temperature of 90 Degree Centigrade, rising momentarily to 250 Degree Centigrade under short circuit conditions.
- 5.2.3 It shall be free from any foreign material or porosity visible to unaided eye. The insulation shall be so applied that it fits closely to the conductor and it shall be possible to remove insulation without damaging the conductor. The XLPE insulation shall be ultraviolet protected for operation in direct sunlight.
- 5.2.4 It shall be free from any foreign material or porosity visible to unaided eye. The insulation shall be so applied that it fits closely to the conductor and it shall be possible to remove insulation without damaging the conductor. Average thickness of the insulation shall not be less than nominal value specified in latest IS:14255 with latest amendments. The tolerance on the thickness shall be as specified in latest IS:14255.
- 5.2.5 The insulating material shall have excellent electrical properties with regard to resistivity, dielectric constant and loss factor and shall have high tensile strength and resistance to abrasion. This shall not deteriorate at elevated temperatures or when immersed in water. The insulation shall be preferably fire resistant and resistant to chemicals like acids, alkalis, oils and ozone.

5.3 MESSENGER WIRE

The insulated messenger wire shall be made of aluminum alloy, generally conforming to latest IS:14255. The conductor shall be of heated aluminum-magnesium-silicon alloy wires containing approximate 0.5% magnesium and approximately 0.5% silicon conforming to IS 398(Part 4). Insulation shall be as per IS 14255.

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5.4 CORE IDENTIFICATION

The following shall be embossed on the one side of the core:

RIDGES REQUIRED for Phase identification:

- 1 ridge for R phase
- 2 ridges for Y phase
- 3 ridges for B phase

For neutral core identification non-contact type laser printing or ink jet printing to be provided with 'N' printed on it at every span of 1 mtr.

5.5 LAYING OF CORES

Cores shall be laid up with a right-hand lay, and shall have a lay length not exceeding $28(d1+d2)$, where;

d1 is the core diameter, including sheath, in mm.

d2 is the diameter of the messenger, including the outer protective covering where applicable, in mm.

5.6 STRANDING

The wire used in the construction of a stranded conductor shall, before and after stranding, satisfy all the relevant requirements of IS 398(Part-IV): 1994. The lay ratio of the different layers shall be within the limits given in IS 398(Part-IV): 1994. The successive layers shall have opposite directions of lay, the outermost layer being right-handed. The wires in each layer shall be evenly and closely stranded. The lay ratio of any layer shall not be greater than the lay ratio of layer immediately beneath it.


5.7 CABLE DRUM

Cables shall be furnished in the specified reels or coil lengths of 500 meters. Drums shall be of non-returnable wooden drums as per IS 10418:1982 and the drums should be free from defects such as through cracks, knots, warps and split. The ends of the cables shall be suitably sealed by means of non-hygroscopic sealing. The tolerance on the Drum length shall be +/- 5% / as per PO terms.

6. MARKING:

The cable shall carry the following information either stenciled on the drum or contained in a label attached to it:

- a) Reference to the Standards.
- b) Manufacturer's name.
- c) Type of cable.
- d) Voltage grade.
- e) Number of cores.
- f) Nominal cross-section area of the conductor.
- g) Length of the cable on the drum.
- h) Length of the cable perm.

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- i) Marking of PO
- j) Direction of rotation of the drum.
- k) Gross mass.
- l) Country of manufacture.
- m) Year of manufacture.
- n) ISI Certification mark.

7. TESTS:

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All Routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested_ as per the relevant standards. Following tests shall be necessarily conducted on the LT ABC cables in additions to others specified in the IS/IEC/SANS Standards.

7.1 ACCEPTANCE TESTS

- i) Tensile test (for phase/street light conductor)
- ii) Wrapping Test (for phase/street light conductor)
- iii) Breaking load test for messenger conductor
- iv) Elongation test for messenger conductor
- v) Conductor Resistance test for messenger and phase conductor.
- vi) Test for thickness of insulation
- vii) Hot set test for XLPE insulation
- viii) Tensile strength and elongation test at break for test of insulation
- ix) High voltage test.
- x) Insulation resistance (volume resistivity test).
- xi) UV test for XLPE insulation (black carbon content and dispersion test).


7.2 ROUTINE TESTS

- i) Conductor resistance test
- ii) High voltage test

7.3 TYPE TESTS

- i) Tests on phase/street light Conductor
 - a) Tensile test
 - b) Wrapping test
 - c) Resistance test
- ii) Tests on messenger Conductor
 - a) Breaking load test
 - b) Elongation test.
 - c) Resistance test.

iii) Physical Test for XLPE Insulation:

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- a) Tensile strength and elongation at break
- b) Ageing in air oven
- c) Hot test
- d) Shrinkage test
- e) Water absorption (gravimetric)
- f) Carbon black:
 - 1) Content
 - 2) Dispersion.
- g) Insulation resistance (Volume resistivity) test.
- iv) Test for thickness insulation.
- v) High voltage test.

7.4 OPTIONAL TESTS

- i) Bending Test

8. TYPE TEST CERTIFICATES:


The Bidder shall furnish the type test certificates of the cable for the tests as mentioned as above as per the corresponding standards. All the tests shall be conducted at **CPRI/ ERDA/ Approved Govt. Labs by TATA ODISHA DISCOM** as per relevant IS. Type tests should have been conducted in certified Test laboratories during the period not exceeding 10 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e., any test report not acceptable, or any/all type tests (including additional same shall be carried out without any cost implication to TPCODL/ TPNODL/ TPSODL/ TPWODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL/ TPNODL/ TPSODL/ TPWODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacturing to TPCODL/ TPNODL/ TPSODL/ TPWODL's representatives at all times when the work is in progress. Inspection by the TPCODL/ TPNODL/ TPSODL/ TPWODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL/ TPNODL/ TPSODL/ TPWODL.

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPCODL/ TPNODL/ TPSODL/ TPWODL
- c) TPCODL/ TPNODL/ TPSODL/ TPWODL Invoice in duplicate

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- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPCODL/ TPNODL/ TPSODL/ TPWODL, Odisha store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department and contracts department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the company up to a period of 30 months from the date of commissioning or 36 months from the date of last supplies made under the contract, whichever is earlier, (the time scale of 30/36 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

The bidder shall further be for "free replacement" for another period of three years from the end of the guarantee period for any latent defects if noticed and reported by the purchaser.

12. PACKING AND TRANSPORT:

The cable shall be wound on wooden drums and packed in line with requirements of IS 10418-1982. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

13. TENDER SAMPLE:

Bidder shall submit the sample of material with the offer (in case of first supply to TPCODL/ TPNODL/ TPSODL/ TPWODL).

14. QUALITY CONTROL:

The bidder shall submit Quality Assurance Plan (QAP) indicating the various stages of inspection,

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the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. TESTING FACILITIES:

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International/Indian standards.

16. MANUFACTURING FACILITIES:

The successful bidder shall submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

17. SPARES, ACCESSORIES AND TOOLS

The bidder shall provide a list of complete set of accessories and tools required for erection and maintenance of LT ABC along with the installation procedure.





18. DRAWINGS AND DOCUMENTS:

Following drawings and documents shall be prepared based on TPCODL/ TPNODL/ TPSODL/ TPWODL Specifications and statutory requirements with complete BOM and shall be submitted with bid.

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars.
- b) Work Experience details
- c) Type test certificates.
- d) General descriptions of the equipment and all components including brochure.

After the award of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (compact Disk CD) of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser.

Following Drawings/Documents shall be submitted after the award of the contract.

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SL.No	Description	For Approval	For Review information	Final Submission
1	Technical Particulars	✓		✓
2	Manual/Catalogues/drawings for all components		✓	
3	Technical details and test certificates of XLPE compound		✓	✓
4	Cross sectional area of the cable		✓	✓
5	Installation instructions		✓	✓
6	Instructions for use		✓	✓
7	Transport/shipping dimension drawing		✓	✓
8	QA & QC Plan	✓	✓	✓
9	Routine, Acceptance and type test certificates	✓	✓	✓
10	Fault level calculation for armor and manual	✓	✓	✓

All the documents and drawings shall be in English language only.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS: (To be furnished by bidder)

All clauses and points in the specification to be complied as per **Clause Number 4.0 (GENERAL TECHNICAL PARAMETERS)** & **Clause Number 5.0 (GENERAL CONSTRUCTION)**

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20. SCHEDULE “B” DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-LV-3005

Specification Name : Specification For Kit-Kat Fuse

Vijender Goyal	SATYA PRASAD NAYAK	SHANTAPRIYA JENA	JYOTIPRAKASH MOHANTY	Shailendra Kumar Jaiswal	SHIRISH SHARAD DIKAY
Prepared by	Reviewed by	Reviewed by	Reviewed by	Approved by	Released by
TPSODL	TPCODL	TPNODL	TPWODL	TPSODL	TPSODL
27-12-2022	29-12-2022	02-01-2023	03-01-2023	03-01-2023	03-01-2023

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1.0 SCOPE

This specification covers technical requirements of design, manufacture, testing at manufacture's work, packing, forwarding, supply and unloading of Kit Kat Fuse unit with porcelain base & carrier complete with extended terminals at stores/site complete with all accessories for efficient and trouble free-operation. The specific requirements

are covered in enclosed technical data sheet.

'Kit Kat Fuse unit with porcelain base & carrier' covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest revisions of relevant Indian Standards /IEC/ International Standards and shall conform to the regulations of local statutory authorities.

2.0 APPLICABLE STANDARDS

IS: 2086/1993 with latest amendments	specification for fuses
IS1264/1981 with latest amendments	grade DCB-1/DCB-2 as per (amended up to date)/IS 410 of 1977 (amended upto date)
IS:1897/1983 with latest amendments	The material shall be of electrolytic tough pitch (ETP) grade with minimum 99.9% of copper
IS: 1364-2002	The metal composition for casting of brass sheet Method for Testing Uniformity of Coating on Zinc coated Articles (SECOND REVISION)
Note - *In case of any conflict on any technical particular in the specification, THE REQUIREMENT mentioned in the relevant standard shall be valid	

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION:

The material shall be suitable for following climatic conditions.

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	95%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	120
7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	300 Km/hr
9	Earthquakes of an intensity in horizontal Direction	Equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in Vertical Direction	Equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

TPCODL/TPNODL/TPSODL/TPWODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed up to 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4.0 GENERAL TECHNICAL REQUIREMENTS

RATED VOLTAGE AND FREQUENCY: The fuses shall be suitable for continuous operation at AC 415 V \pm 10% and frequency 50 Hz

RATED CURRENTS: The rated currents of fuse units shall be 63/100/200/300/400/500 Amps

5.0 GENERAL CONSTRUCTION

5.1 **MATERIALS:** This rewirable fuses units shall be of sand fine grain homogenous nonporous chemically insert and high electrical and mechanical strength and shall be thoroughly verified and smoothly glazed. It shall be non-ignitable/ The porcelain and glaze shall be white or cream in colour. The glaze shall cover at least those surfaces which are exposed when the, fuses have been mounted in the intended manner. The mounting surface may be left unglazed. The materials should not have any defect such as –

- I. **Crazing:** A hairline crack in glaze of ceramic material.
- II. **Dunt:** A hair line fracture extending through the body and the glaze and caused by strains set-up in the process of manufacture of ceramics materials.
- III. **Projection:** A raised imperfection, projecting more than 0.75 mm above the Surface of the ceramic material.
- IV. **Water:** The ceramics material shall not absorb more than 2% of its weight of water when broken and tested for.

5.2 The design and dimension of the fuses shall be in accordance with relevant IS – 2086 -and latest amendment.

5.3 **PROTECTION:** The carrier and fuse base when installed in the intended manner shall have all live parts so protected as to prevent inadvertent contact with such live parts.

5.4 **HANDLING GRIP:** The fuse carrier shall be provided with a handle or grip and shall be shaped in acceptable manner so that it will be easy to withdraw the carrier without use of any tools and without danger to any L.M. or operator.

5.5 **METAL PARTS:** All metal parts shall be protected against corrosion.

5.6 FUSE BASE:

5.6.1 The fuses base shall be provided with two fixing holes for fixing the fuse base by means of screwier bolts.

5.6.2 The fuse base shall have contacts for suitably engaging with the contacts of the fuse carrier rigidly under any condition. The contacts shall be made out of such a metal which will not lose its electricity due to heating of the contracts on full load with 20% overload current or heat generated and required pressure is maintained even after repeated engagements and disengagement. The contact for rating 63 A and above will also have extended strips for fixing cable lugs by means of bolt.

5.6.3 Live parts on the underside of the fuse base for surface mounting shall be either covered by a shield or barrier of insulating materials or be counter not less than 3mm below the surface of the base

and covered with water proof insulating sealing compound which will not deteriorate or flow at a temp. lower than 100 degree C or on full load current with 20% overload or blowing of fuse under short circuit condition or shall have clearance of not less 9mm for 63A, 100A, 200A, 300A, 400A & 500 A size from the mounting surface and reliably prevented from loosening.

5.7 FUSE CARRIER:

5.7.1 The fuse carrier shall have contacts suitable for engaging with fuse base contacts. They shall be provided with suitable terminals for the connection of the fuse elements. The fuse carrier shall be so constructed that it is capable of being reversible for introduction into the fuse base. The contacts shall be made out of the metal which will not lose its elasticity on account of heating of the contacts on full load with 20% overload conditions or heating due to blowing of the fuse element due to short circuit and required pressure is maintained and even after repeated engagement and disengagement.

5.7.2 Live parts of the fuse carrier shall be covered either by a shield for barrier of insulating materials or be counter sunk not less than 3 mm below surface of the base and covered with water proof insulating sealing compound which will not deteriorated or flow at temp. lower than 100-degree C.

5.8 The asbestos cloth to be provided in fuse base shall be fire proof insulating and of sufficient length width and thickness.

5.9 SPRING FOR BASE PHOSPHOR BRONZE CONTACT (For 63 Amp to 500 Amp only): This should be round/elliptical made from high quality spring steel sufficient to maintain uniform pressure on the contact surface when fuse carrier is fitted. The spring shall be of sufficient width and having 1 mm thickness.

5.10 SCREWS:

- i) Screws upon which the general assembly of the fuse base and carriers' terminals and contacts depend shall be prevented from loosening or backing out by lock, washers, stacking or other reliable means.
- ii) If screws used in the assembly of a fuse are loosened or removed in order to install the fuse elements or to connect the fuse into a circuit, they should be thread into metal and shall be provided with washers.

5.11 CURRENT CARRYING PARTS:

- i) Current carrying parts shall be of robust construction and capable of carrying their rated current without exceeding the temp. rise limits clause 4.2.1 of IS specification 2086-1993. i.e. 55 degree centigrade for rating 63 amps to 100amps & 65 degree centigrade for 200 amps to 500amps kit kat fuse for an ambient not exceeding 40 Deg C
- ii) Iron and steel parts shall not be used for current carrying parts except as clamping device or pressure such as punching screws, clamps or wire binding screws and nuts.

5.12 CONTACTS:

The contacts of the fuse base, fuse carrier, terminal blocks/strips shall be as under:

- i) Fuse carrier contacts (Male Contacts) Tinned Copper
- ii) Fuse Base Contacts (Female Contacts) Tinned Brass with terminal.
- iii) Terminal block/strips Tinned Brass The current carrying screws and washers shall be of tinned brass while the screw, washers not carrying current shall be of Galvanized bolt and nut with one plain washer and one spring washer suitable up to 120 mm², 185 mm², 240 mm² / 300 mm² cable lugs shall be provided with extended strips for 63A, 100A , 200A , 300A ,400A & 500 A fuse respectively.

5.13 **Chemical composition** of the contacts. Electrolytic copper (tinned phosphor bronze (Tinned) use for contacts of KK fuse shall confirm to various IS as stated below.

- a) Electrolytic Copper strips used for contacts of kit kat fuse should confirm to IS:1897/1983 with latest amendments. The material shall be of electrolytic tough pitch (ETP) grade with minimum 99.9% of copper & silver as per table I of IS191 part IV.
- b) Phosphor Bronze The phosphor bronze used for contacts of KK fuse shall confirm to any of the grade-I, II or III given in IS: 7814/1985 (with latest amendments). The requirement of metal composition should be as per IS- 7814.
- c) Brass It shall confirm to grade LCB1/DCB2 of IS-1264/1997 (with latest amendment)/IS 4101/1977 with latest amendment). The metal composition for casting shall be as per IS 1264 and that of brass sheet, as per IS 410.

5.14 The contact fixing screw holes in fuses shall be fitted with insulating material fully into the surface of the kit kat fuse carrier.

6.0 NAME PLATE AND MARKING

The identifying markings which shall be indelibly marked on fuse-base are given below:
On Fuse Base:

1. Manufacturer's name
2. Rated voltage
3. Rated current
4. Size of fuse wire
5. Property of "TPSODL/TPCODL/TPNODL/TPWODL"
6. Date of Manufacturing
7. ISI marking (refer IS)

7.0 TESTS

All routine, acceptance and type tests shall be carried out in accordance with the relevant standards. All routine/acceptance tests shall be witnessed by the TPCODL/TPNODL/TPSODL/TPWODL his authorized

representative. All the components should have been type tested as per the relevant standards. Following tests shall be necessarily conducted on the Fuse wire in addition to others specified in IS standards.

- i) Type Test for the tests for rewirable fuses (mechanical test) (As per IS 2086-1993)
 - a) Visual examination.
 - b) Dimensional check.
 - c) Test for mechanical endurance
 - d) Test for mechanical strength
 - e) Test for Withdrawal force

- ii) Type Test for the tests for rewirable fuses (Electrical test) (As per IS 2086-1993)
 - a) Test for temperature rise
 - b) Insulation Resistance test
 - c) High Voltage test
 - d) Test for breaking capacity

- iii) Type Test for proving material property (Electrical test) (As per IS 2086-1993)
 - a) Test for water absorption (Non ceramic)
 - b) Test on ceramic material.
 - c) Ignition test

S.no.	Routine Test	Reference standard
1	Visual examination	I.S.2086-1993
2	High voltage test.	I.S.2086-1993
S.no.	Acceptance Test	Reference standard
1	Visual examination.	I.S.2086-1993 – 9.1
2	Dimensional check	I.S.2086-1993 – 9.2
3	Test for Mechanical endurance	I.S.2086-1993 – 9.3
4	Test for withdrawal force	I.S.2086-1993 – 9.5
5	Test for temp. rise	I.S.2086-1993 – 9.6
6	Insulation resistance test	I.S.2086-1993 – 9.7

7	High voltage test	I.S.2086-1993 – 9.8
8	Test for water absorption	I.S.2086-1993 – 9.10
9	Temp. Cycle test	I.S.2086-1993 – 9.11.1

8.0 Type Test Certificates

Requirement: Bidder shall furnish the type test report of Kit kat Fuse for the tests as mentioned in Clause no. 7 of this specification and as per reference standards.

Test Laboratories: Complete set of Type Tests shall be conducted at certified test laboratories, which are CPRI / ERDA/Any other Govt. Lab only.

Type test report shall be submitted for the type, size and rating of the Kit kat Fuse mentioned in the bid/ OR for any size higher (than required) of similar type and similar or higher voltage grade. Type test should have been conducted in certified test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL/TPNODL /TPSODL/TPWODL.

9.0 PRE-DISPATCH INSPECTION

The Material shall be subject to inspection by a duly authorized representative of the TPCODL/TPNODL /TPSODL/TPWODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPCODL/TPNODL /TPSODL/TPWODL's representatives at all times when the work is in progress. Inspection by the TPCODL/TPNODL /TPSODL/TPWODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL/TPNODL /TPSODL/TPWODL.

Following documents shall be sent along with material:

- a) Test reports
- b) PO copy
- c) MDCC issued by TPCODL/TPNODL /TPSODL/TPWODL
- d) TPCODL/TPNODL /TPSODL/TPWODL Invoice in duplicate
- e) Packing list
- f) Inspection report
- g) Delivery Challan
- h) Other Documents (as applicable).

10.0 INSPECTION AFTER RECEIPT AT STORES

The material received at TPCODL/TPNODL /TPSODL/TPWODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering and Contracts department.

11.0 GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is earlier. Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the

Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be.

12.0 PACKING

The fuse wires shall be supplied in spools weighing 1kg. The bidder shall ensure that all the fuse wire spools shall be adequately protected and specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

Note: Single use plastic not to be used for packing of the material.

13.0 TENDER SAMPLE

Bidder shall submit the 1 sample of each size during technical evaluation of Tender.

14.0 TRAINING

Not Applicable

15.0 QUALITY CONTROL

The bidder shall submit 'Quality Assurance Plan' followed in respect of bought out Items manufactured by him

- a) Raw materials in process
- b) Final inspection
- c) Packaging
- d) Marking.

As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TPCODL/TPNODL /TPSODL/TPWODL reserves the sole rights for the type test of random sample from the lot and in case of any discrepancy or deviation from the Type test certificates submitted along with the bid, the complete Lot shall be rejected. TPCODL/TPNODL /TPSODL/TPWODL's nominated representative shall have free access to the bidder's works to carry out inspections.

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections. The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars as specified in the specifications.

16.0 MINIMUM TESTING FACILITIES

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant Indian standards. In case of supply by the channel partner, the manufacturer shall have the in-house testing facilities to carry out the routine and acceptance tests.

17.0 MANUFACTURING ACTIVITIES

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

The successful bidder will have to submit (after placement of RC/ PO) technical compliance document and drawing of Kit Kat Fuse as per RC line items for getting approval before mass manufacturing.

Manufacturing mass quantity to start only after getting CAT-B/CAT-A approved drawings or as per intimation from TPCODL/TPNODL /TPSODL/TPWODL.

18.0 SPARES, ACCESSORIES AND TOOLS

Not applicable

19.0 DRAWINGS AND DOCUMENTS

Following documents shall be prepared based on TPCODL/TPNODL /TPSODL/TPWODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- a) General description of the equipment and all components including brochures.
- b) Type test Certificates
- c) Experience List.
- d) Completely filled-in clause wise compliance of the specification.
- e) Cross sectional drawing of the Kit kat Fuse.

FOLLOWING DOCUMENTS SHALL BE SUBMITTED AFTER THE PLACEMENT OF RC/PO

- a. Completely filled in clause wise compliance of the Specification.
- b. Type Test Certificates for each specified test if not submit during Technical Evaluation.
- c. Drawing of Fuse.
- d. Compliances of undertaking submitted during Technical Evaluation.

S.No	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	Manual/Catalogues/drawings for all components.		√	
3	Technical details of fuse wire.		√	√
4	Cross sectional area of the Kit kat fuse		√	√
5	Installation Instructions		√	√
6	Instructions for use		√	√
7	Transport/shipping dimensions		√	√
8	QA & QC Plan	√	√	√
9	Routine, Acceptance and Type test Certificates	√	√	√

All the Documents and Drawings shall be in English Language.

20.0 GUARANTEED TECHNICAL PARTICULARS

Bidder to submit clause wise compliance of the Technical Specification.

21. SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S. No	Clause No.	Details of deviation with justifications

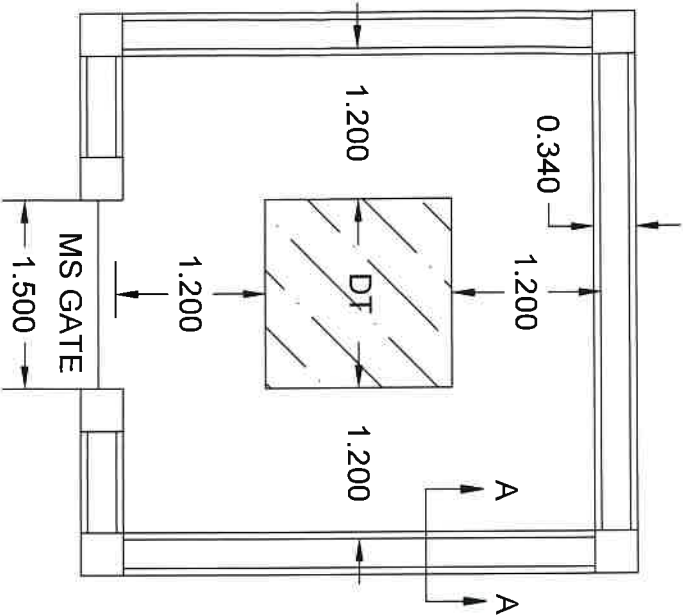
We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

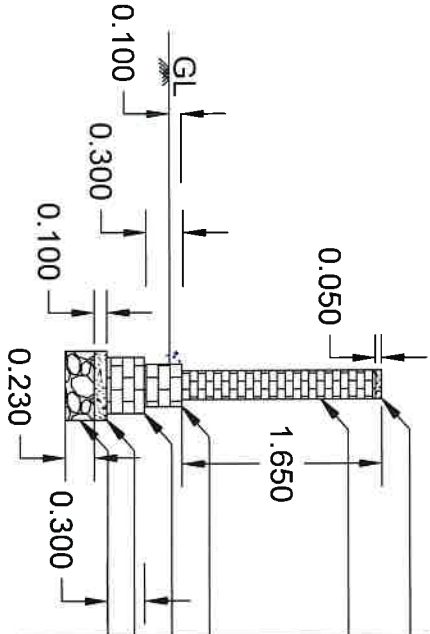
Signature

Designation

DTR FENCING DETAILS



TYP. PLAN.




SECTION A-A

- 50mm thick coping(M15)
 - 230mm thick Brick Work
 - 340mm thick Brick Work
 - 450mm thick Brick Work
 - 100mm thick PCC
 - Needbase Rubble soiling (230mm)
- depends on state*


Seena
 07/08/23
 Hdb Cwd-

Based on disc. w/in. dept.
Under structural dept.
 8/8/23

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1. SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store and performance of unarmored Control Cables for trouble free and efficient operation.


2. APPLICABLE STANDARDS:

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

Ref IS/IEC	Description
IS-1554 (Part-I)	PVC insulated (heavy duty) electric cables
IS-8130:1984	Conductor for insulated electric cables & flexible cords
IS-5831:1984	PVC insulation and sheath of electric cables
IEC-60228/3-2004	Conductor of insulated cables
IEC 60332-1:1993	Flame retardant, characteristics of electrical cables.
IS-3975:1979	Mild steel wires strips and tapes for armoring cables.
IS:3961-(Part-2)	Recommended current ratings for cables
IS 10418: 1982	Drums for Electric Cables

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	95%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	120
7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	300 Km/hr

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9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

TPSODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS:


a. Physical Parameters:

Size (Cross Sectional Area)	Minimum No. of Strand in Conductor		Nominal Insulation Thickness	Minimum Inner Sheath Thickness	Nominal Outer Sheath Thickness	Approx. Overall Dia of Cable	Approx. Weight of Cable	
	Aluminium	Copper					With Al'm Cond.	With Cu Cond.
							YY	YY
Sqmm	No's	No's	mm	mm	mm	mm	Kg/Km	Kg/Km
3X 25+16	6/6	6/6	1.20/1.00	0.30	2.00	23	700	1250
3X35+16	6/6	6/6	1.20/1.00	0.30	2.00	25	800	1550
3X 50+25	6/6	6/6	1.40/1.20	0.30	2.20	28	1050	2050
3X70+35	12/6	12/6	1.40/1.20	0.40	2.20	32	1400	2800
3X95 +50	15/6	15/6	1.60/1.40	0.40	2.20	36	1800	3700
3X120+70	15/12	18/12	1.60/1.40	0.50	2.40	39	2200	4700
3X150+70	15/12	18/12	1.80/1.40	0.50	2.40	43	2550	5550
3X 185+95	30/15	30/15	2.00/1.60	0.50	2.40	47	3150	6900
3X240+120	30/15	34/18	2.20/1.60	0.60	3.00	53	4050	8950
3X300+150	30/15	34/18	2.40/1.80	0.60	3.20	58	4900	11100
3X400+185	53/30	53/30	2.60/2.00	0.70	3.40	64	6150	14000
3X500+240	53/30	53/34	3.00/2.20	0.70	3.80	76	7900	18050
3X630+300	53/30	53/34	3.40/2.40	0.70	4.00	84	9900	22950

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b. Electrical parameters:

Size (Cross Sectional Area)	Max. Conductor D.C.Resistance at 20 °C		Approx. Conductor A.C.Resistance at 70 °C		Reactance of Cable at 50 Hz (Approx.)	Capacitance of Cable (Approx.)	Normal Current Rating						Short Circuit Current Rating for 1 Second Duration	
	Aluminium	Copper	Aluminium	Copper			For Aluminium Conductor			For Copper Conductor			Aluminium	Copper
							Ground	Duct	Air	Ground	Duct	Air		
Sqmm	Aluminium	Copper	Ohm/Km	Ohm/Km	Ohm/Km	µF/Km	Amps	Amps	Amps	Amps	Amps	Amps	K.amps	K.amps
3X25+16	1.2	0.727	1.44	0.87	0.08	0.42	76	63	70	99	81	90	1.90	2.88
3X35+16	0.868	0.524	1.04	0.63	0.08	0.48	92	77	86	120	99	110	2.66	4.03
3X50+25	0.641	0.387	0.769	0.46	0.08	0.49	110	95	105	145	125	135	3.80	5.75
3X70+35	0.443	0.268	0.532	0.32	0.08	0.56	135	115	130	175	150	165	5.32	8.05
3X95+50	0.32	0.193	0.384	0.23	0.08	0.58	165	140	155	210	175	200	7.22	10.90
3X120+70	0.253	0.153	0.304	0.18	0.08	0.63	185	155	180	240	195	230	9.12	13.80
3X150+70	0.206	0.124	0.247	0.15	0.07	0.63	210	175	205	270	225	265	11.40	17.30
3X185+95	0.164	0.0991	0.197	0.12	0.07	0.64	235	200	240	300	255	305	14.10	21.30
3X240+120	0.125	0.0754	0.151	0.09	0.07	0.67	275	235	280	345	295	355	18.20	27.60
3X300+150	0.1	0.0601	0.122	0.07	0.07	0.68	305	260	315	385	335	400	22.80	34.50
3X400+185	0.0778	0.047	0.0961	0.06	0.07	0.7	335	290	375	425	360	435	30.40	46.00
3X500+240	0.0605	0.0366	0.0759	0.05	0.07	0.7	370	320	425	470	390	520	38.00	57.50
3X630+300	0.0469	0.0283	0.061	0.04	0.07	0.7	405	350	480	555	470	675	47.90	72.50

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5. GENERAL CONSTRUCTION:

- i) The PVC Insulated Cable shall be manufactured and tested strictly in accordance with the Indian Standard IS 1554 (Part – I):1988 and its latest amendments.
- ii) All material used in the manufacturing of cables shall be new and shall be selected as the best available for the intended use and shall withstand the requirement of following tests:
 - Tensile test & Wrapping test (for aluminium)
 - Annealing test (for copper)
- iii) 1.1 kV stranded copper conductor, PVC Insulated type-C, extruded PVC inner sheath, galvanized round wire unarmored, extruded outer sheathed FRLS type cable conforming to IS:1554 (Part-I) with latest amendment. Overall outer sheath in blue color.

5.1 ARMOURING (if applicable only)

The armoring shall be with galvanized steel wires for multi core cables. The galvanized steel wires shall comply with the requirements of IS: 3975 with latest amendments

5.2 OUTER SHEATH:


The Outer Sheath shall be of polyvinyl chloride (PVC) compound confirming to the requirements of Type ST1 of IS: 5831 with FRLS properties with latest amendments. The outer sheath shall be applied by extrusion process. The thickness of the outer sheath shall be as per IS: 1554(Part – I). No tolerance on the negative side shall be acceptable

5.3 CORE IDENTIFICATION:

Individual core of multi-core cable shall be colour-coded and/or numbered for proper identification in accordance with relevant IS/manufacturer's standard.

5.4 REELS/DRUMS:

Cables shall be supplied in the wooden drums in specified length. Wooden drums shall be strong, weatherproof and non-returnable. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

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6. MARKING:

Wooden drums shall be of good quality. It shall be free from any damages & sharp edges of nails/hardware inside the drums. A protective covering of polymeric sheet shall be applied inside the drum before winding the cable on the drum.


I. The drum shall carry the following information stenciled on both sides of the drum:

- a) Manufacturer's name
- b) Type of Cable
- c) Size of Cable
- d) Voltage Grade
- e) Length of the cable on the drum
- f) Direction of the rotation of the drum
- g) Gross mass
- h) Country of manufacture
- i) Year and month of manufacturing
- j) Purchase Order no.
- k) Drum No.

II. Following details shall be embossed on the outer sheath of the Cable at regular intervals

every meter

- i) Manufacturer's name
- ii) Voltage grade
- iii) Number of cores, size, type
- iv) FRLSH
- v) TPSODL
- vi) ISI Mark
- vii) PO Number
- viii) Material code
- ix) Year of manufacturing
- x) Sequential length marking shall be provided on the outer sheath of the cable by printing

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7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer: -

7.1 ACCEPTANCE TESTS


- i) Tensile Test (for aluminium)
- ii) Annealing test (for copper)
- iii) Wrapping Test (for aluminium)
- iv) Conductor Resistance Test
- v) Test for thickness of insulation and sheath
- vi) Tensile strength and elongation at break test for insulation and sheath
- vii) High Voltage test at room temperature
- viii) Insulation resistance test

7.2 ROUTINE TESTS

- i) Conductor Resistance test
- ii) High Voltage test at room temperature

7.3 TYPE TESTS

- a) Tests on Conductor
 - Conductor resistance test
- b) Test for round steel wires/armoring wires (if applicable)
- c) Test for thickness of insulation and sheath (outer and inner)
- d) Physical tests for insulation & outer sheath
 - Tensile strength and elongation at break
 - Ageing in air oven
 - Hot deformation
 - Shrinkage test
 - Loss of mass in air oven
 - Heat shock test
 - Thermal stability
- e) Insulation Resistance test
- f) High voltage test (water immersion test) – AC & DC
- g) High voltage test at room temperature

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h) Flammability test

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at **CPRI / ERDA** as per relevant IS. Type tests should have been conducted during the period not exceeding 10 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPSODL.

9. PRE-DISPATCH INSPECTION:


The material shall be subject to inspection by a duly authorized representative of the TPSODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPSODL
- c) TPSODL Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPSODL, Berhampur store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.

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11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 60 months from the date of commissioning or 72 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier’s risks and costs and recover all such expenses plus the Company’s own charges (@20% of expenses incurred), from the supplier or from the “Security cum Performance Deposit” as the case may be.

12. PACKING:

The cable shall be wound on strong weatherproof and non-returnable wooden drums packed in coil lengths of 500 meters/1000 meters in line with the requirement of IS 10418 – 1982 and its latest amendments. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

Bidder shall ensure that cable covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

13. TENDER SAMPLE:


Bidder shall have to submit the sample of material (1-meter length) with the offer (in case of first supply to TPSODL.

14. QUALITY CONTROL:

The bidder shall submit QAP indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer’s/sub-supplier's works to carry out inspections.

15. TESTING FACILITIES:

Supplier/ Manufacturer shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant Indian standards.

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Prepared by: Akankshya Padhy	Reviewed By: Shailendra Kumar Jaiswal	Approved & Issued By: Shirish Sharad Dikay

16. MANUFACTURING FACILITIES:

The successful bidder shall submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS:

Drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.

19. SCHEDULE "B" DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

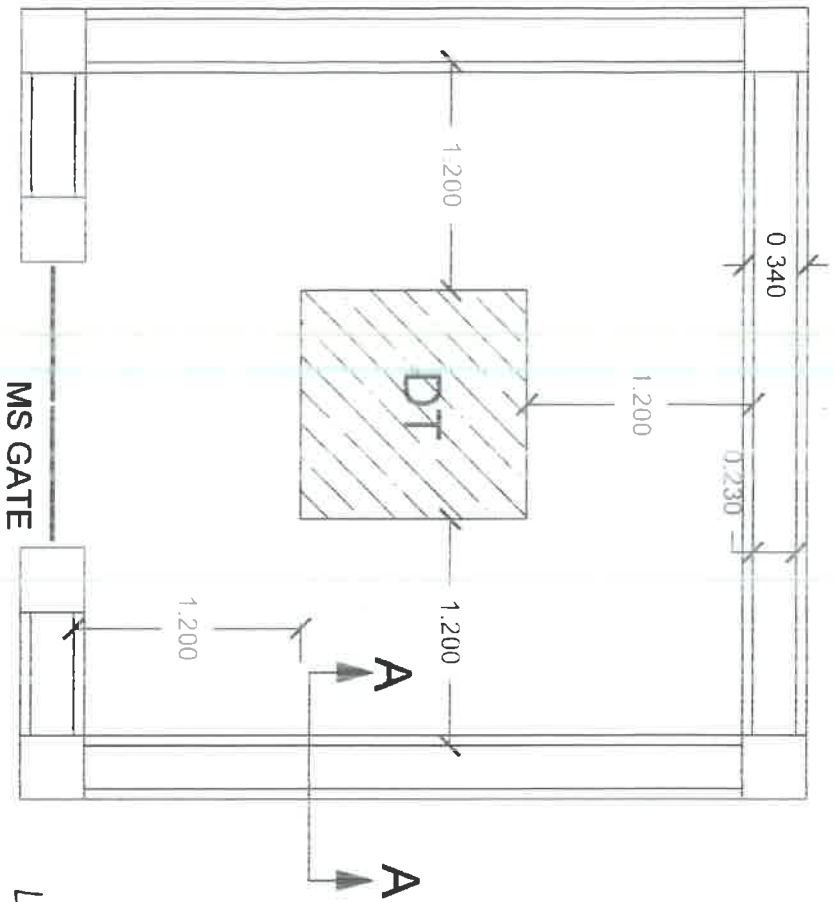
Seal of the Company:

Signature

Designation

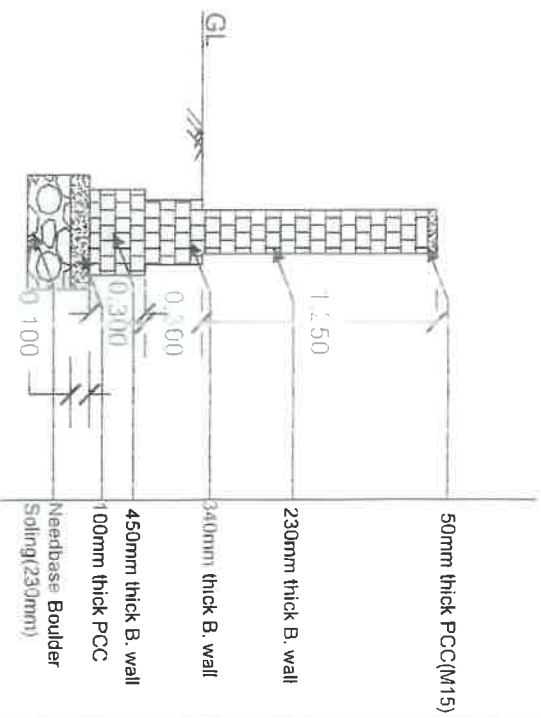
DTR FENCING DETAILS

Note: The standard drawing is for 100/250 / 500 KV Distribution from -
- former.



TYP. PLAN.

DTR Fencing drawing



SECTION A-A

- LC is Required in for scenario's Following:
- 1- 1.2M clearance from the live parts is required.
 - 2- Insulation clearance is less than 1.2M then LC shall be taken for execution gate.
 - 3- Clearance shall be maintained from the live parts.

Note:-All dimension are in meter

Prepared by: *[Signature]*
Date: 10/20/21
Reviewed by: *[Signature]*
Date: 21/6/23