Office of the Chief Engineer

Planning & Procurement Wing

Kashmir Power Distribution Corporation Limited (KPDCL)

Bemina Srinagar.

Guideline for installation of PCC Poles of 200/250 kg, Working Load for LT Lines

P&P Wing, Kashmir Power Distribution Corporation Ltd.		Name	Signature	Date
	Drawn	Er. Javid (AEE)		4/4/22
	CHECKED	Er. Manzoor (EE)		4/4/22
	CHECKED	Er. Muzafar (SE)		04/04/22
	APPROVED	Er. Bashir (CE)		05/04/22
Guideline for installation of PCC Poles of 200/250 KG, WL For LT Lines			Rev	00
No	CE/P&P/2022/PCCGL-002		Sheet	1 of 2
Date of issue		6/4/2022		

Guideline for installation of LT, PCC Poles

- Cost Data for Sub Transmission and Distribution of JKPDD specifies PCC poles of 3 specifications; 200kG WL (Working Load), 300kG, WL and 360 kG WL.

- The 15000 No. poles available in our Central Stores are of minimum working load i,e 200kG (or 250KG having same weight as 200kG but with 2 extra wires) and can be used for LT. These poles have remained un-used for more than 5 years now.

- These poles may be used for construction of new LT lines and for improvement to existing lines.
- The department has used PCC poles in Kashmir at all distribution line voltages earlier also and the poles have stayed there for decades. Our colleagues in Jammu installed around 25000 PCC poles under Saubhagya Scheme successfully.

- These will not require any cement bottoming, Mucci Clamps or Earthing Channel . All you need is D-Clamp, Shackle Insulators, Earth Spiral and Bolts with nuts.

- If you install an ST poles without cement bottoming its life reduces to around 15 years due to rotting at ground level caused by moisture and chemicals in presence of oxygen. PCC pole can stay for 30 to 40 years even more without any cement bottoming.

Guideline for installation of LT, PCC Poles

- It is true that breakage of PCC pole is high but that is mostly due to mishandling. The safety factor of PCC pole is 2.5 along wider surface (Transverse direction) and just 1 along narrow surface. If PCC pole is transported with wider surface resting on the truck, the poles will crack. During loading with crane and installation also this aspect is to be taken care of.

- During installation, it is to be ensured that orientation of end poles and tension poles is such that wider surface is along the line and narrow surface perpendicular to line (Transverse / Lateral) and for remaining poles it is to be vice versa. If end poles and tension poles are not installed with standard orientation, whole line will collapse under snow or wind loading. Wherever space permits, guys may also be provided.

- It is also suggested to load poles in Central Stores with Crane not manually and wherever possible installation with crane may also be explored.

Guideline for installation of LT, PCC Poles

- One narrow surface of PCC poles has got curbed edges and it is well finished. Another narrow surface is rough. The lifting hook is fixed on the rough surface. The orientation of the installed poles should be such that the finished surface with curbed edges (front surface) is towards the road and rough surface on other side.

- Type-2, LT Shackle Insulator may be preferred. The U-Clamp to be 40 X 6 mm and the Bolt size for Shackle to U-Clamp fixing to be 16mm dia, 145 mm length. Type-2 Shackle is preferred because it has failing load of 16.0 kN against 11.5kN for type-1. We use relatively higher conductor sizes due to relatively higher consumer load. We have also snow loading issue, so higher failing load spec may be preferred.

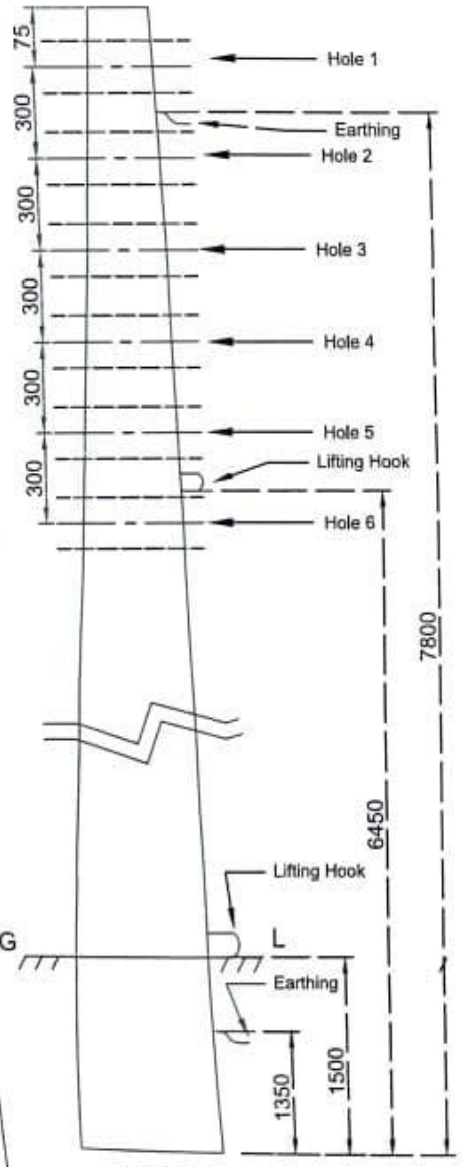
(Source: RE Spec.4/1979 and Drawing No. D-4/1979)

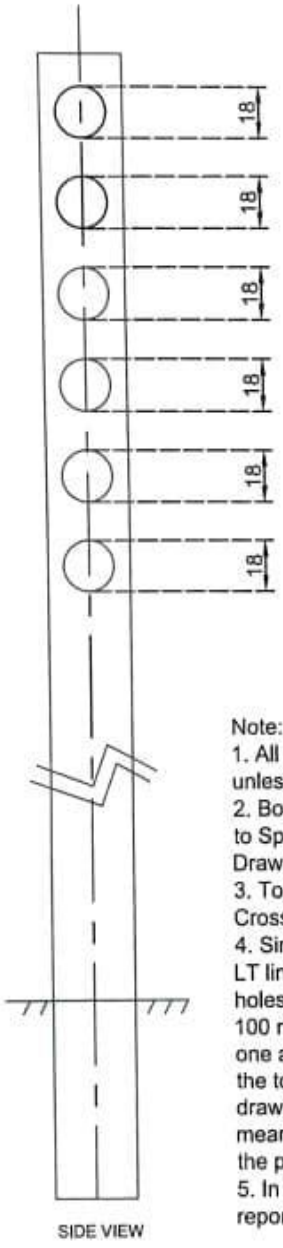
Guideline for installation of LT, PCC Poles

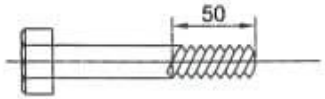
- The Shackle Insulator to be installed in such a manner that the creepage path is not compromised with. It has been observed that at some locations shackle insulator are installed in upside down position, due to which dust accumulates within the shed of the insulator causing leakage to ground especially during wet conditions.

- All bolts for LT lines with Shackle Insulators on PCC Poles to be of 16 mm dia as per RE Standard. Under sized and oversized bolts to be avoided.

- All MS fittings and Bolts with nuts to be hot dip galvanized.







Weight of PCC Pole: 400KG						
Holes	Hole length	Hole Dia	Dimensions of Bolt for fixing shackle insulators		Spring Washers	Flat washers
			Length	Dia		
1	150	18	190	16	1	2
2	150	18	190	16	1	2
3	155	18	190	16	1	2
4	160	18	210	16	1	2
5	165	18	210	16	1	2
6	170	18	210	16	1	2

Note:
1. All measurements are in mm unless otherwise specified.
2. Bottom Earthing to be connected to Spiral Earthing as per RE Drawing J-1
3. Top Earthing to be connected to Cross Arm if fixed on the pole.
4. Since the poles are to be used for LT lines, the two (2) no., 16 mm dia holes one each at a dimension of 100 mm from the top and second one at dimension of 200 mm from the top are not shown in the drawing. These holes are actually meant for pole top bracket in case the pole is used for 11 kV lines.
5. In case of any discripancy, please report to CE, P&P Wing KPDCL.

P&P Wing, Kashmir Power Distribution Corporation Ltd.		Name	Signature	Date
	Drawn	Er. Javid (AEE)		4/4/22
	CHECKED	Er. Manzoor (EE)		4/4/22
	CHECKED	Er. Muzafar (SE)		04/04/22
	APPROVED	Er. Bashir (CE)		05/04/22
Title: Essential Dimensions of 200/250 KG, Working Load PCC Poles			Scale	NTS
			Rev	00
Drawing no	CE/P&P/Dwg./2022-PCC-002		Sheet	2 of 2
Date of issue			6/4/2022	

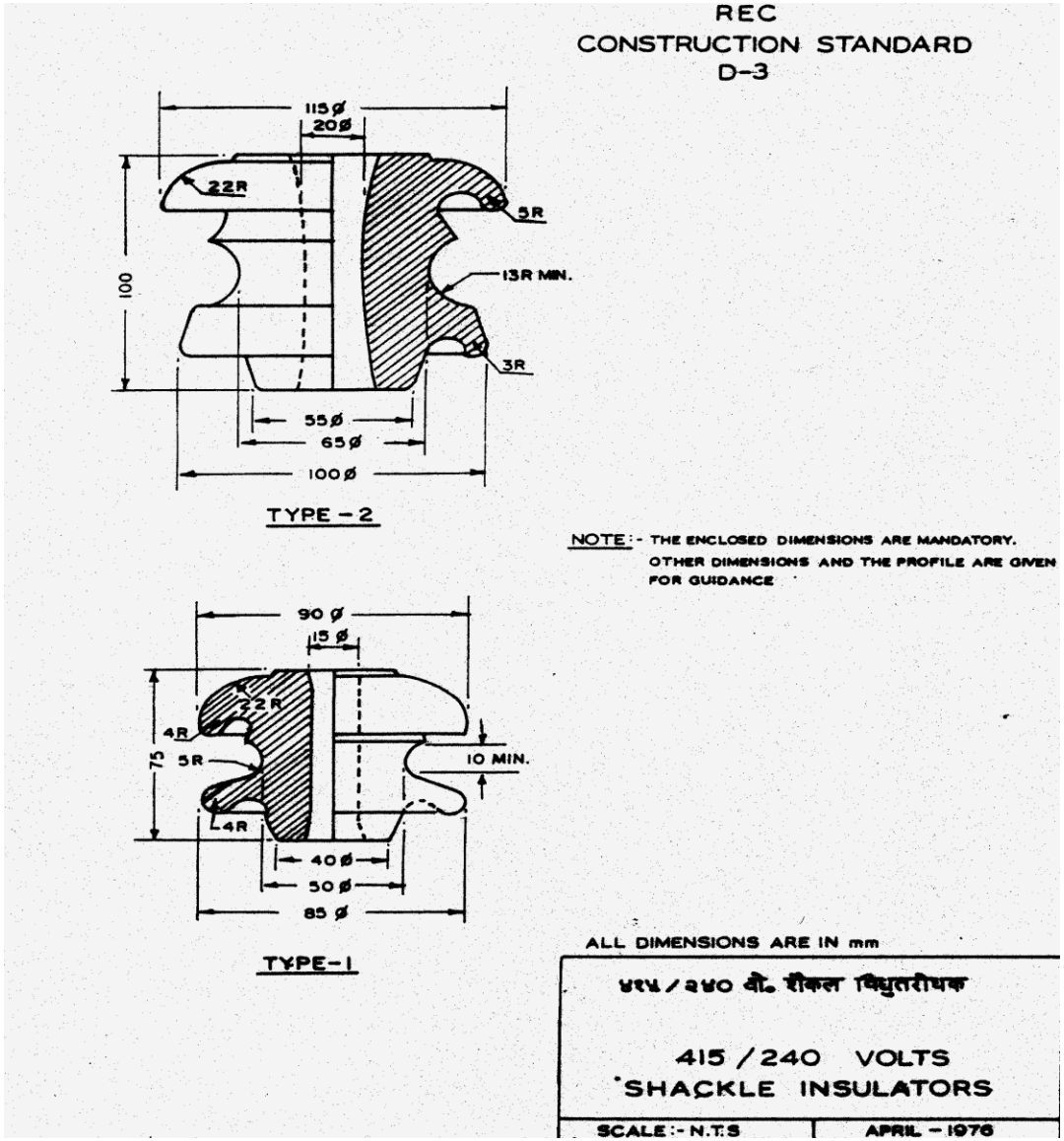
Curbed Edges to be kept towards road side at st. runs for good aesthetic look as this surface is also finished. The rare side is rough to be kept away from road.

Wrong orientation of LT PCC Pole. Rough Surface with lifting hook is towards road.

Unfinished surface and
Lifting hook towards Road

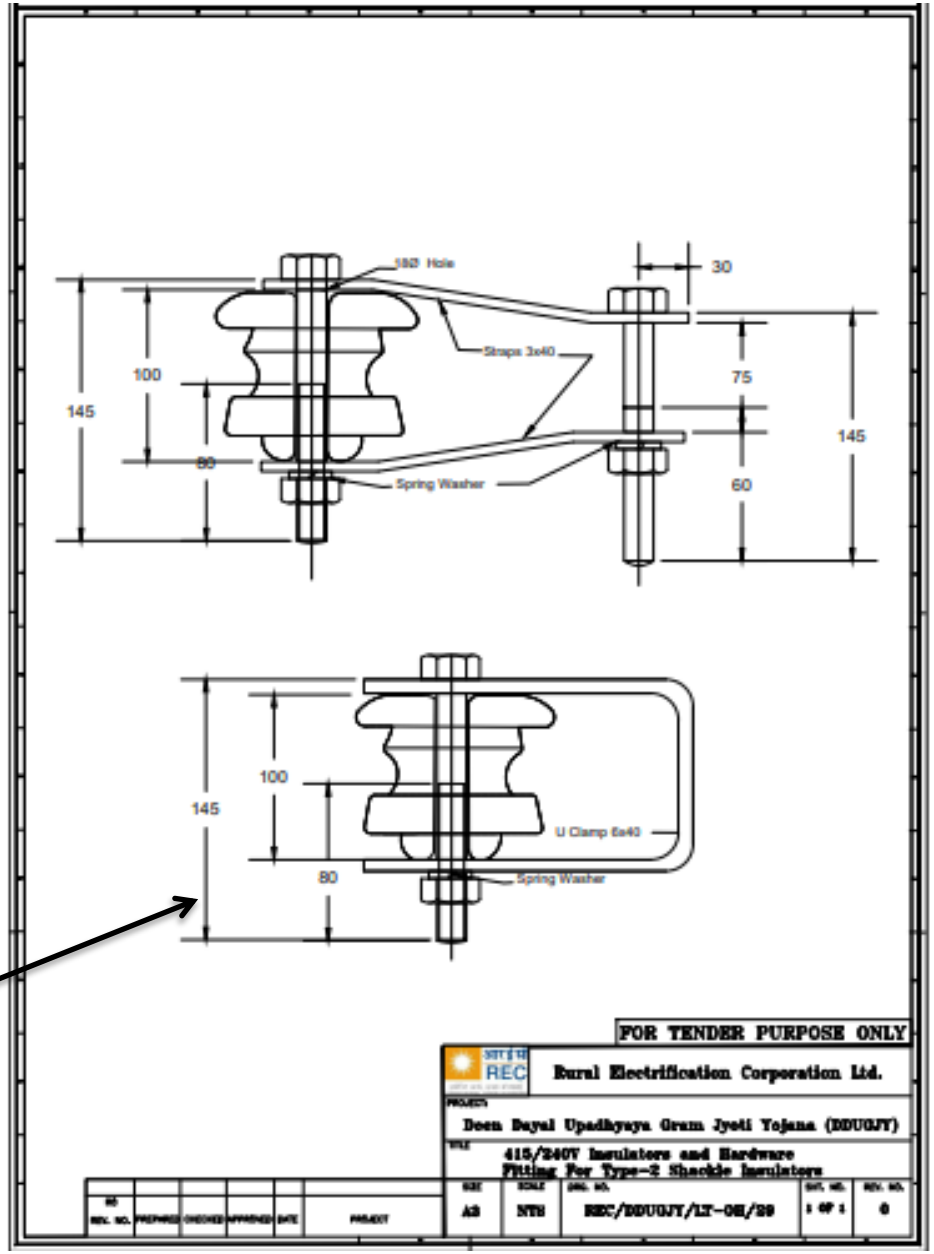
Right orientation of LT PCC Pole. Finished surface with curbed edges towards Road

REC Construction Drawing D-3 for Type-1 and Type-2 Shackle Insulators. Type-1 Failing Load, 11.5kN and Type-2, 16.0kN



Shackle Insulator

This one (i.e Type-2 Shackle) to be preferred. The U-Clamp to be 40 X 6 mm and the Bolt size for Shackle to U-Clamp fixing to be 16mm dia, 145 mm length. Type-2 Shackle is preferred because it has failing load of 16.0 kN against 11.5kN for type-1. We use relatively higher conductor sizes due to relatively higher consumer load. We have also snow loading issue, so higher failing load spec preferred.
(Source: RE Spec.4/1979 and Drawing No. D-4/1979)



Type-2 Shackle Insulator

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BOQ:

1. **U-Clamp 6 X 40 mm = 1 No.**
2. **Bolt- 16 mm dia, 145 mm long = 1**
3. **Spring Washer- 3 mm thick = 1 No.**
4. **Hexagonal Nut = 1 No.**
5. **All MS items hot dip galvanized (Refer RE Drg. D-4)**

Shackle Orientation

Formation of dust cup due to improper installation

Proper installation of Shackle while in service

Upside down installation of Shackle.

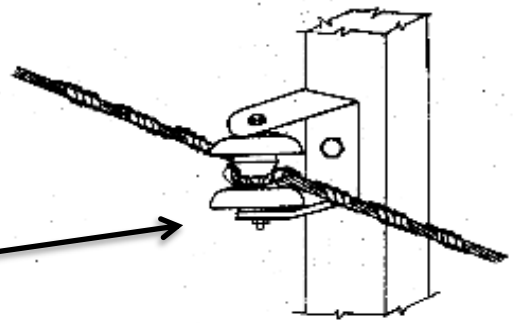
Due to upside down installation of Shackle, dust cup is formed under the upper shed which reduces creepage path and causes leakage to ground especially under wet conditions.

Conductor to Shackle tie

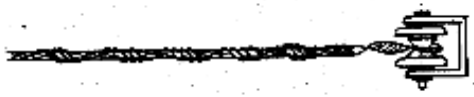
Straight Run:. U-Clamp is perpendicular to Conductor. Conductor between Shackle and U-Clamp. In case binding fails conductor will not fall on ground.

Dead End fixing of Conductor: U-Clamp in line with conductor. In case U-clamp is perpendicular to conductor here, it will bend under line tension.

RED
CONSTRUCTION STANDARD
D-6



L.T. CONDUCTOR SPOOL TIE ON A SHACKLE - INSULATOR (STRAIGHT-RUN)



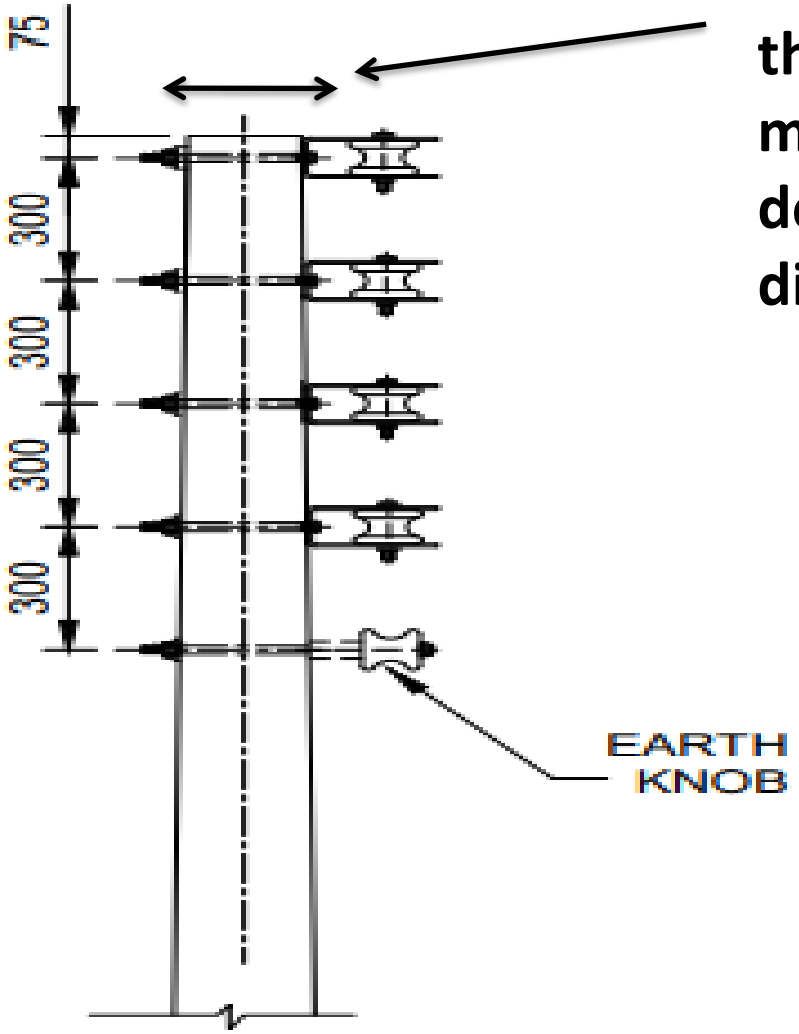
L.T. CONDUCTOR DEAD-END

NOTE :- FOR DETAILS OF HELICALLY FORMED FITTING, REFER REC SPECIFICATION NO. 25/1983

एल. टी. कन्डक्टर स्ट्रेट-रन व
अन्तिम छोर का विन्यास
(सर्पिल आकार के फॉर्मड फिटिंग का प्रयोग करना)
L.T. CONDUCTOR STRAIGHT-RUN AND
DEAD-END ARRANGEMENTS
(USING HELICALLY FORMED FITTINGS)

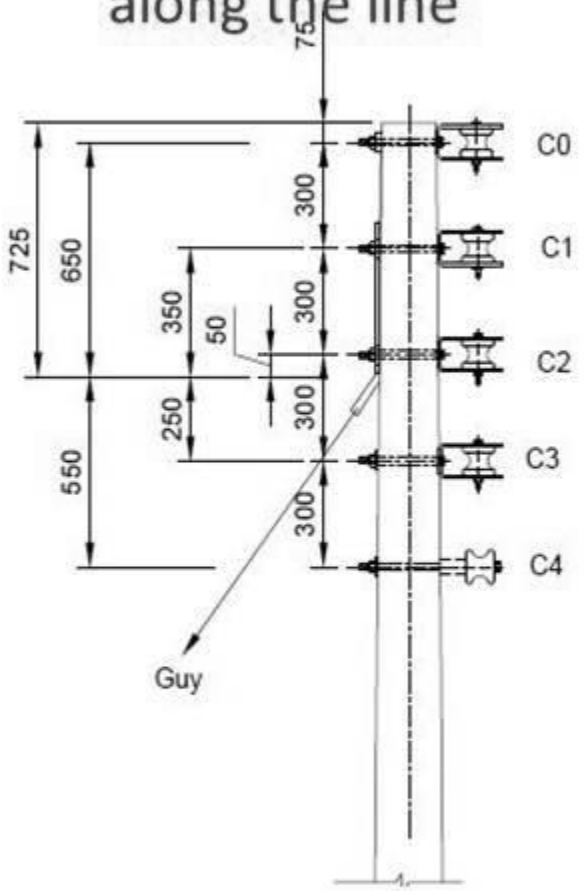
SCALE :- N.T.S | JULY, 1984

Shackle to Pole Bolt Size

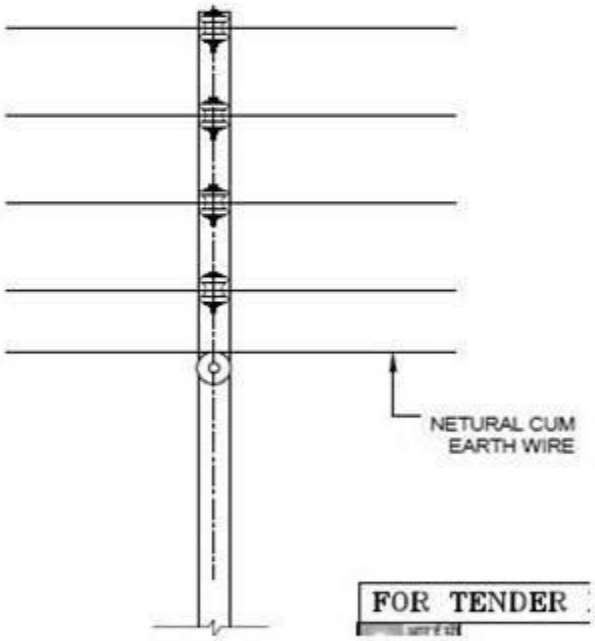


Shackle to Pole Bolt thickness shall be 16 mm and length already depicted under pole dimensions

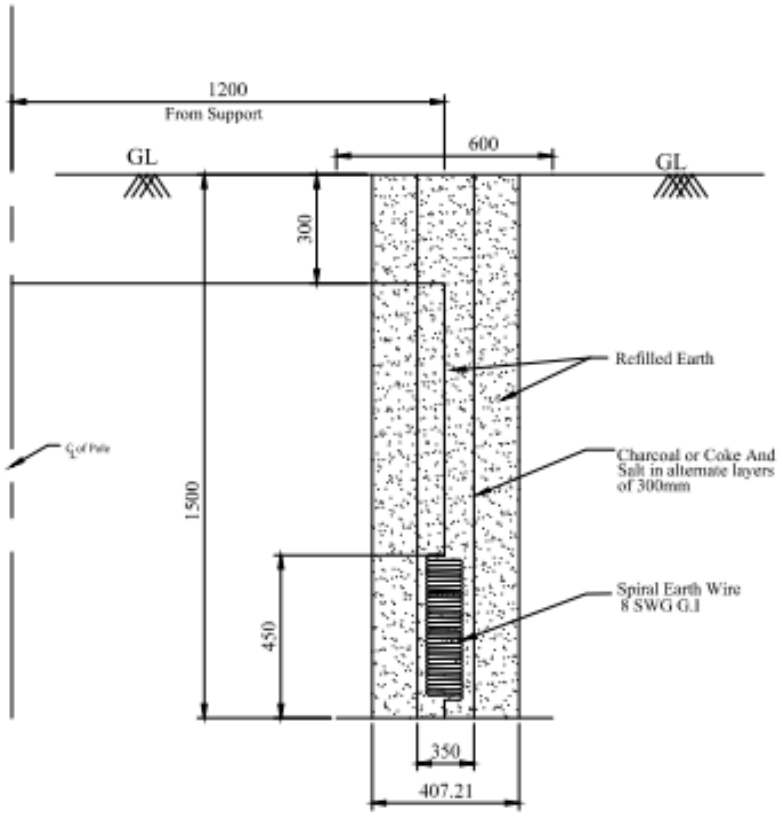
Dead End Pole
Wider surface is along the line



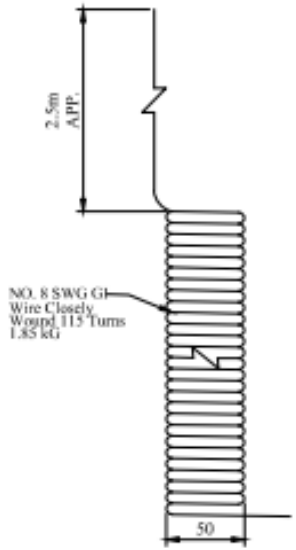
Straight Run Pole, Wider surface is perpendicular to line to withstand transverse load like wind which is the worst load etc. Transverse means perpendicular to line.



Spiral Earthing for LT Poles as per RE Drawing No. J-1



Coil Earthing Details



Earthing Spiral

NOTES:-

1) All dimensions are in mm unless otherwise mentioned.
2) Manufacturing Tolerance.
a) Dia of GI wire : ±2.5%
b) All other dimensions as given below
3) MS wire shall conform to IS 280
4) All MS parts shall be hot dip galvanised as per IS 2629 and IS 4759.
5) In rocky areas where digging upto 1500 mm is not possible,earthing arrangement in horizontal configuration buried at a depth not less than 800 mm shall be used.
6) Weight mentioned is for packing and forwarding purpose only.

FOR TENDER PURPOSE ONLY

Rural Electrification Corporation Ltd.

PROJECT: Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)

TITLE: SPIRAL EARTHING DETAILS

REV. NO.	PREPARED	CHECKED	APPROVED	DATE	
R0					COMMON FOR ALL PROJECT

SIZE	SCALE	DRG. NO.	SHT. NO.	REV. NO.
A3	NTS	REC/DDUGJY/GEN/08	1 OF 1	0

Earthing Spiral for LT Poles as per RE Drawing J-1

No. 8 S.W.G, G.I wire closely wound, 115 turns.

A 50 mm GI Pipe may be used for making the Spiral Earth.

Typical BoQ of 3-Phase, 4-Wire, LT Line on 10 No. PCC Poles of 200 or 250 kG Working Load

(Note: This BoQ is meant for post award construction activity, not for estimation or bidding purpose)

S.No	Description	Quantity Required Per Pole (No.)	Total Quantity Reqired (No.)	Remarks
1	PCC Poles, 8 Mtr. 200 or 250kG WL	1	10	
2	Spiral Earth Coil	1	10	Spiral Earth Coil shall be made from G.I wire, SWG#8 closely wound, 115 turns. (Refer RE Drg. J-1)
3	Shackle Insulator Type-2	4	40	Shackle Insulator shall have min failing load of 16 kN (Refer RE Spec. No. 4/1972 Revised - 1979)
4	U-Clamp of size 40 X 6 mm	4	40	Hot dip galvanized (Refer RE Drg. No. D-4)
5	Spring Washer, 3 mm thick for item # 5 above	4	40	Refer RE Drawing No. D-4
6	Hexagonal Nut for item no. 5 above	4	40	Refer RE Drawing No. D-4
7	16 mm Dia Bolt, 115 mm long for fixing Shackle Insulator to U-Clamp			Hot dip galvanized. The dimension of bolt head is not included in the length of the bolt (Refer RE Drawing No. D-4)
8	16 mm Dia Bolt, 175 mm long for fixing Shackle U-Clamp to Pole. Minimum 50 mm threaded.	2	20	Hot dip galvanized (Refer RE Drg. No. B-6) and actual pole measurements. Bolt head not included in the length of bolt
9	16 mm Dia Bolt, 200 mm long for fixing Shackle U-Clamp to Pole. Minimum 50 mm threaded	2	20	Hot dip galvanized (Refer RE Drg. No. B-6) and actual pole measurements. Bolt head not included in the length of bolt
10	ACSR Conductor	As required	As required	As required

Explore the Possibility of Installation by Mechanized Means

Installation of poles by mechanized means at Village Marhama in District Anantnag

Shackle to Pole Bolt Size

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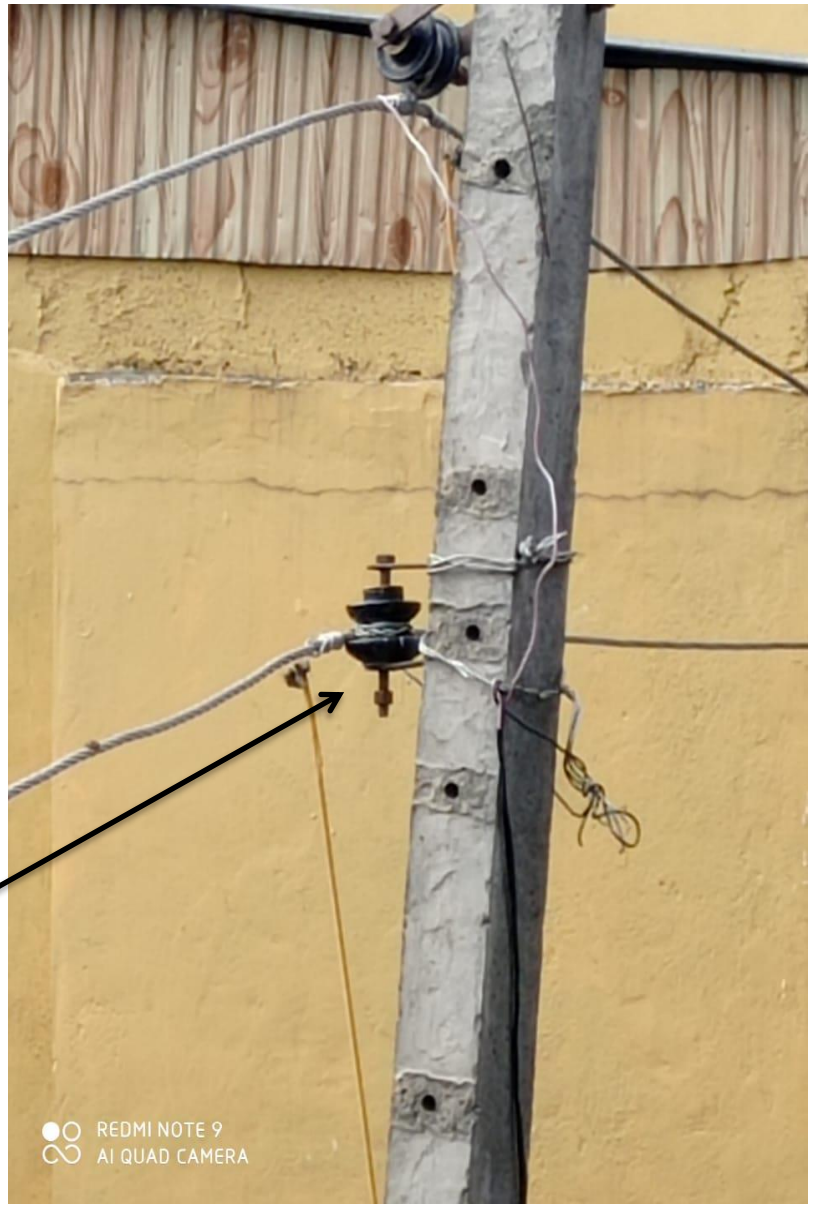
1. Type-1 Shackle of lesser failing load ie 11.5 kN used for higher conductor size and in snow bound area. Standard failing load is 16kN
2. Shackle installed upside down forming dust cup.
3. U-Clamp to Shackle Bolt length oversized and bolt dia undersized. Standard bolt dia is 16mm
4. U-Clamp to pole bolt missing
5. Shackle tied with pole in a crude manner.
6. Conductor not between Shackle and pole. May fall if tie fails.
7. Bolt and U-Clamp, MS, not hot dip galvanized.



Sub Standard Installation

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1. Shackles installed upside down forming dust cup.
2. U. Clamps oversized.
3. Bolt and U-Clamp, MS, not hot dip galvanized.

Don’t compromise on size of bolts

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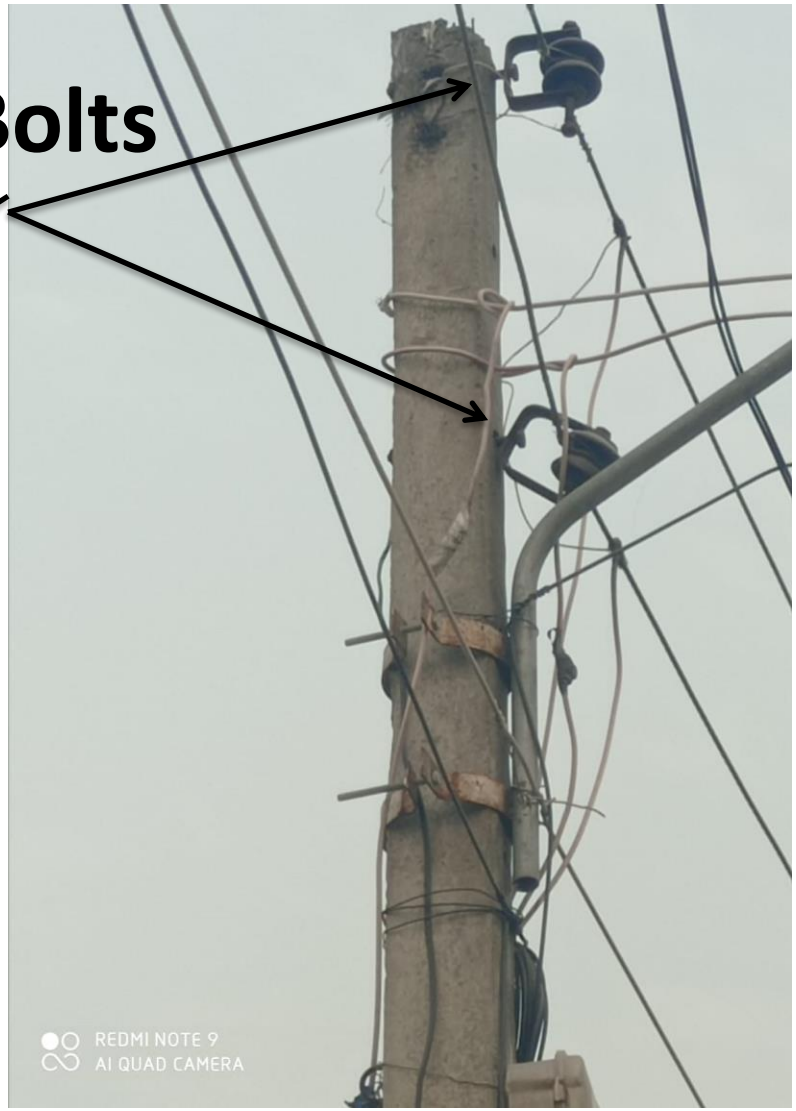
Oversized Bolts



Note:

1. This guideline has been prepared for the awareness of Practicing Engineers and Contractors about handling of PCC poles and construction of lines with these poles because number of complaints have been received about extensive damage to lines with PCC poles due to snow and wind loading. The guidelines shall not be treated as approved tender specification or construction specification. The tendering agencies shall provide the tender drawings and other specifications with the tender documents and the contractors shall be asked to provide their drawings for approval at base design stage and detailed design stage after award of contract. However, tendering agencies may refer prospective bidders to this guideline in the tender documents so as to enable them to understand the various requirements of the lines constructed with PCC poles for submitting a realistic tender as per standards.
2. In case of any conflict between this guideline and the relevant national and international standards, such standards shall prevail.


Thank You