

DAKSHIN HARYANA BIJLI VITRAN NIGAM

Instruction No. 01 /2020/PD&C

To

1. The Chief Engineer/OP, DHBVN, Delhi & Hisar.
2. All SEs/XENs(Op) in DHBVN:
3. The SE/XENs/Construction under DHBVN.

Memo No. Ch- SPC-I/DDD-6/Tech. Vol-V/PA Dated: 07/05/2020

Sub:- New configuration/guidelines for laying HT& LT lines.

Different configuration of layout for HT & LT lines being followed by different field offices has necessitated formulation of the standardized guidelines for construction of LT, 11 KV & 33 KV lines in order to ensure adoption of universal design for carrying out construction activities. Further, the prevailing instruction regarding the construction of LT, 11 KV & 33 KV lines in urban area and rural areas are required to be revised in accordance with requirements of rapid growth, scarcity of land for erection of lines i.e. ROW problems and to take care of aesthetic perspective as well.

In view of above, the draft standard design for laying LT, 11 KV & 33 KV line were prepared and circulated to the field offices for offering their comments/suggestions/modifications there against. Based on feedback received from field offices, the pragmatic suggestions were duly incorporated in the detailed draft guidelines on the subject matter and the same were placed before WTDs of DHBVN in its meeting held on 14.02.2020 vide agenda item no. 222.17. The WTDs after due deliberations considered the proposal contained in the ibid memorandum and approved the same with certain amendments. Accordingly, the aforesaid decision of WTDs alongwith considered agenda item were circulated to all the stakeholders vide this office memo no. Ch-47/DDD-6/Tech/Vol-V/P&D dated 17.04.2020 for adhering to the same.

Pursuant to the above, some amendments were proposed by UHBVN and put up to their WTDs in its meeting held on 21.04.2020 vide agenda item no. 217.10. These amendments were deliberated and approved by WTDs of UHBVN. Thereafter, these amendments were apprised to WTDs of DHBVN in the follow-up action against agenda item no. 222.17 with the request for allowing to incorporate these amendments in the detailed guidelines in order to maintain uniformity in both the DISCOMs. The above was deliberated in the WTDs meeting held on 1.05.2020 and it was decided to incorporate only the changes regarding provision of span length as 50 meter instead of 40 meter in respect of 33KV line with 150 sq.mm ACSR to be erected on lattice tower (twin piece welded tower).

Considering the above chronological sequence of events, comprehensive configuration for laying HT& LT lines shall be under please:-

1. Configuration of LT & 11 KV Line:

a) Urban Area

Description	Pole size (in mtrs)	Span length (In mtrs)	ACSR/Cable size
11 KV Line with conductor	11	50	100 mm ²

11 KV Line with Cable	Underground	---	---	HT XLPE Armoured Cable of size 3Cx185,300/400 sq. mm as per load requirement.
	Overhead	11	30	HT XLPE Armoured Cable of size 3Cx185,300/400 sq. mm as per load requirement (with catenary wire in case of exigencies only)/ conductor of size 100 sq. mm
LT Line with Cable		11/9*	30	LT XLPE Armoured Cable of size 1Cx95 mm ² (Min).
LT Line with Conductor		11/9*	50	ACSR 100 sq. mm

Note-* 11 mtrs PCC Pole should preferably be used. In case of site constraints/ROW, 9 mtrs PCC Poles may also be used.

b) Rural Area

Description	Pole size (in mtrs)	Span length (In mtrs)	ACSR/Cable size
11 KV Line with conductor	*9/11	Within periphery of Village - 50 Beyond periphery of Village: 50 to 70 (As per site requirements/ROW)	For main line- 100 mm ² For spur Line- 50/80 sq. mm (as per requirement)
11 KV Line with Cable	11	30	HT XLPE Un-Armoured Cable of size 3Cx185 sq. mm / conductor of size 100 sq. mm (with catenary wire in case of exigencies only)
LT Line with Cable	11/9*	30	LT XLPE Armoured Cable of size 1Cx50mm ² (Min).

Note-*11 mtrs PCC Pole should preferably be used. In case of site constraints/ROW, 9 mtrs PCC Poles may also be used.

In addition to above, the following guidelines are also proposed for construction of LT & 11 KV line:-

1. LT connection shall be provided through IPC only.
2. Proper ramming of the backfill be done while erection of the pole to avoid tilting of Poles later on.
3. In case of 11 KV lines, rod earthing may be done at every 4th single pole and pipe earthing may be done at every "H" Poles.
4. The stud of 9 Mtr. Pole with 11 Mtr. Pole Lines may be provided in place of conventional stay (Stay wire) wherever required as per site conditions.

5. In case of 11 KV lines, disc insulators be provided in the stay wire at a safe height of 3.5 mtr. from the ground. In case of LT lines, egg insulators be provided in the stay wire at a height of 3.5 mtr.
6. Both the holes (Two no) provided on top of pole for fixing of the top hamper should be used with two no. nuts & bolts without fail. However, for providing the top hamper, full clamp with nuts & bolts and washers (plain and spring) be used invariably for proper tightness.
7. Generally, dead-ends be provided at every 8th pole in the line.
8. At each and every dead end, jumpers be connected through D-formation and that too through PG Clamp. Jumpers should never be connected directly with the line.
9. Insulators may also be provided in between the jumpers for proper support.
10. Guarding may be provided, at crossings of HT/LT lines & roads, densely populated area and guard spacing should be maximum 1mtr.
11. Bimetallic clamps or HT/LT connectors may be provided on DTs for HT & LT connectivity.
12. Sectionalizing switches of capacity 400 Amp may be provided at a distance of about 1 KM and in spur lines or wherever required.
13. **All steel items should be galvanized. Galvanization be done on the steel items after their fabrication.**
14. Wherever there is double supply, X-arm size plates be provided, clearly mentioning the names of both the feeders & feeding sub-station.
15. Bracing may be provided on H-Poles and V-Shape cross arms/cross channel to avoid tilting.
16. Insulated Sleeve may be provided in all HT/LT crossings and other accident prone sites in order to check the potential situations of occurrence of accidents / faults.
17. Standard Clearances for the line erected across the street, along the street and crossing of line along the building should be maintained as per CEA regulations/IE rules.
18. During the erection of an 11 KV line, wherever ROW is available, 11 KV line shall be laid underground with HT XLPE Armoured Cable of size 3Cx185/300/400 sq. mm as per load requirement. In case of ROW problem (in laying underground line), overhead line shall preferably be erected with conductor of size 100 sq. mm. However, HT XLPE Un-Armoured Cable of size 3Cx185/300/400 sq. mm as per load requirement (with catenary wire in case of exigencies only) may be used if situation so warrants.
19. Across the national highway/ state highway, at both extremities of the road, M+6 towers (Galvanized) should be made use of, besides making provision of double run 11 KV HT XLPE Armoured Cable of size 3Cx185,300/400 sq. mm as per load requirement, in HDPE pipe through Horizontal direction drilling method (Trenchless boring). Besides it, along the national Highway/State highway, Twin piece welded tower should be used.
20. In case of 11KV lines, muffing of every 4th single pole and every H pole (enroute the 11KV line) may invariably be done to keep the poles and alignment of 11KV line straight.
21. Square muffing should be used instead of round one.
22. The pole should be erected in such a way that it is not tilted during storms.
23. Angle of stays with Pole at the top side should be between 30 to 45 degree only.

24. In narrow street/lanes, cantilever be made use of at pole to maintain safe horizontal clearances with the protrusion (chhajaa).

c) Schematic/BOM

- i) For 11 KV line with 100 sq. mm conductor and 50 mtrs span length on 11 mtrs PCC Pole in urban area (**Annexure-A**).
- ii) 11 KV line with HT XLPE Un-armoured Cable of size 3Cx185 mm² & 30 mtrs span length in urban area (**Annexure-B**).
- iii) 11 KV line with 50/80 sq. mm conductor and 70 mtrs span length on 11 mtrs PCC Pole in rural area (beyond periphery of village) (**Annexure-C**).

2. Configuration of 33 KV Line:

a) 33 KV line with Twin piece welded tower erstwhile Rajasthan model:

Presently new 33 KV lines with ACSR conductor size upto 150 sq. mm are being erected with Twin piece welded tower (erstwhile Rajasthan model) of height 12.8 mtrs (11.3 mtrs above the ground) and wt. 653 kg (drawing enclosed at **Annexure-D**). At angular locations, stud tower/stay is being made use of with the existing configuration.

b) 33 KV line with narrow base lattice towers:

Recently narrow base lattice towers have been got designed from M/s Takalkar Power Engineers & Consultants Pvt. Ltd., Vadodra (**Annexure-E**) which cover the straight run & angular deviations of the ROW of the 33 KV Line. There are three types of the said towers which are enumerated as under:

Type of tower	Usage	Conductor size	Span length (In mtrs)	Height of the Tower without peak Above ground level (In mtrs)	Depth of Foundation (Including CL 300 mm above GL) (In mtrs)	Weight (In Kg)
Type-A	For straight line (0° to 2° angular deviation)	equivalent ACSR 200 sq. mm	80	15.24	2.3	787.95
Type-B	For line involving angular deviation from 0° to 30°	equivalent ACSR 200 sq. mm	80	14.54	2.3	1133.69
Type-C	For line involving angular deviation from 30° to 60°/bend/dead end	equivalent ACSR 200 sq. mm	80	14.54	2.3	1272.16

Monopole:

Erection of 33 KV lines on monopoles has also been explored. The design of monopole has been got prepared from M/s RAMBOLL, Hyderabad (in association with M/s

Paruthi Engineers (P) Ltd, Murthal, Sonapat) (**Annexure-F**). The salient features thereof are elaborated as per details noted below:

- i) Monopole for double circuit 33 KV line with ACSR 200 sq. mm conductor

Type of Monopole	Angular deviation	Conductor size	Span length (In mtrs)	Total length of monopole (In mtrs)	Weight (including monopole, ACD, FB&T & X Arm)*
PDA	For line involving angular deviation from 0° to 2°	ACSR 200 sq. mm	70	11.3	884
PDC	For line involving angular deviation from 0° to 30°	ACSR 200 sq. mm	70	10.55	1406
PDD	For line involving angular deviation from 30° to 60°	ACSR 200 sq. mm	70	10.55	1939
PDE	For line involving angular deviation from 60° to 90°	ACSR 200 sq. mm	70	10.55	2375

ACD*- Anti climbing device

FB&T*- Foundation Bolt & Nut

Salient feature of M / M+6 Tower:

Tower width	=	0.780 m
Ground clearance from bottom conductor (statutory) for M type tower	=	5.200 m
Total height of M type tower	=	10.300 m
Total weight (without extension)	=	1000 Kg approx..
Additional weight of 3 mtrs extension	=	258 Kg approx..

Note: The tower height may further increase upto 6 mtrs by adding two sections of 3 meters each.

Drawing is placed at Annexure-G.

Accordingly, following configuration may be followed for laying 33 KV double circuit lines:

- i) 33 KV double circuit line with ACSR size 150 sq. mm shall henceforth be erected on Twin piece welded Tower (Rajasthan Model) with span length 50

mtrs for straight run. Every Tower has to be earthed at bottom with GI strip size 25x6 mm. However, at angular locations, narrow base lattice tower Type-B/C (got designed from M/s Takalkar Power Engineers & Consultants Pvt. Ltd., Vadodra) shall be used.

- ii) As per geographical terrain requirements/load requirements, 33 KV line with ACSR 200 sq. mm conductor may be erected particularly at angular locations on Type-A, B & C type towers narrow base lattice tower, got designed from M/s Takalkar Power Engineers & Consultants Pvt. Ltd., Vadodra. Every Tower has to be earthed at bottom with GI strip size 25x6 mm. Standby earthing shall also be used at diagonal leg. GI strip shall be connected to GI pipe buried in ground as per design/drawing.
- iii) For conventional sizes of steel items, in addition to TATA & SAIL make, steel items of other reputed suppliers i.e. RINL (Vizag mark) & JSW Steel & may also be used in fabrication of the towers as well as in other works. Steel items of non-conventional sizes procured from SAIL approved re-rolling mills may be allowed to be used in fabrication of the tower.
- iv) Monopoles can be used for laying double circuit 33 KV line with ACSR 200 sq. mm where there is no ROW issues such as in case of organized sectors, viz. HSVP, HSIDC etc. etc. along/across the highway & any model industrial sector/hub viz SEZ, builders, developer areas etc.
- v) Every Monopole has to be earthed at bottom with GI strip size 25x6 mm. GI strip shall be connected to GI pipe buried in ground.
- vi) Across the national highway/ state highway, at both extremities of the road, M+6 towers (Galvanized) should be made use of, besides making provision of four runs single core 33 KV XLPE cable of size 630 sq. mm in HDPE pipe through Horizontal direction drilling method (Trenchless boring). Besides it, along the national Highway/State highway, Twin piece welded tower should be used.

The above detailed guidelines may be brought to the notice of all concerned for strict and meticulous compliance please.

DA/Annexure-A to G


Chief Engineer/PD&C,
DHBVN, Hisar

CC:-

1. Sr. P.S. to CMD, DHBVN, Hisar for the kind information of the CMD please.
2. P.S. to the Director (Projects/Operation), DHBVN, Hisar for kind information of the Directors, please.
3. Chief Engineer/Planning, HVPN, Panchkula.
4. CE/TS, HVPN, Hisar.
5. The CE/Smart City/Commercial/MM/HR&A, DHBVN, Hisar.
6. CFO, DHBVN, Hisar.

7. CAO/Finance/Accounts/Audit/HQ, DHBVN, Hisar.
8. COS, DHBVN, Hisar.
9. SE/IT, DHBVN, Hisar.
10. SE/M&P, DHBVN, Hisar.
11. SE/RAPDRP, DHBVN, Hisar.
12. SE/TS, HVPN, Faridabad, Gurugram & Hisar.
13. CCO, DHBVN, Hisar.
14. Co-coordinator, DHBVN, Hisar.