

Manual for Safety / Technical Audit of Power Distribution System



Karnataka Electricity Regulatory Commission

6th & 7th Floors, Mahalaxmi Chambers

#9/2, Mahatma Gandhi Road, Bengaluru – 560 001

[Tel:+91 080 2532 0213/214/335/339](tel:+9108025320213) Fax: 080 25591412

Email : kerc-ka@nic.in

Website : www.karnataka.gov.in/kerc

Sri M.K. Shankaralinge Gowda, I.A.S(Retd.)
Chairman, Karnataka Electricity Regulatory Commission,
Bengaluru

PREFACE

Consequent to expansion of distribution system network to meet the power requirement of the consumers, the power distribution system viz., primary and secondary distribution lines/cables, distribution transformers and associated equipment are installed in the public places and in open fields in the rural area. It is a fact that the unforeseen interruptions in power supply is causing lot of inconvenience to consumers. To arrange satisfactory services to the consumers reducing interruptions in power supply is a major challenge and this requires systematic maintenance of power distribution elements for their efficient operation.

Further, the electrical fatal and non fatal accidents to human being and live stock in the state are increasing year by year. More than 800 fatal accidents have occurred during the FY13 and FY 14. During FY15 alone, 564 fatal electrical accidents to human being besides 514 fatal animal accidents have occurred which needs to be arrested in the overall interest.

It is obligatory on the part of power distribution utilities to construct and maintain the distribution system as per the prescribed standards / practices, not only to prevent electrical accidents but also to improve the power system reliability by preventing unforeseen interruptions in power supply. The energy losses in the distribution system will increase consequent to occurring of earth faults / short circuits and loose contacts in the system which requires to be prevented by effective maintenance of the system.

In this backdrop, the Karnataka Electricity Regulatory Commission has prepared a **“Manual for Safety /Technical Audit for Power Distribution System”**. In this Manual a detailed methodology is given for conducting Safety/Technical Audit of all the power distribution elements along with the check lists to facilitate ESCOMs to identify the technical deficiencies in the system and to take corrective action to bring the distribution system for safe and efficient operation.

I take this opportunity to thank the Committee comprising of late Sri B.G. Rudrappa, former Chairman, KEB & Member, Advisory Committee, Sri V. Ramakrishna, Member, Advisory Committee and Sri P.S.Jagannatha Gupta, Consultant Technical, KERC, for preparing this Manual. I hope **the Manual for Safety /Technical Audit for Power Distribution System** will serve as a useful guide and the ESCOMs will make use of this Manual effectively.

Manual for Safety /Technical Audit for Power Distribution System

1.0. Preamble:

The Electrical fatal and non fatal accidents to human being and live stock in the state are increasing year by year. More than 800 fatal accidents occurred during the FY 13 and FY 14. During FY-14 alone 464 fatal electrical accidents and about 450 non fatal accidents besides about 500 fatal animal accidents have occurred.

2.0. Analysis of accidents:

A study of the accidents indicates that:

- a) More than 95% of electrical accidents are associated with the 11 KV and 400 V distribution systems as these are more extensive and closer to habitation.
- b) The distribution system is not properly maintained and not complying with provisions of the Safety Regulations particularly in regard to clearances.
- c) It is also observed that at the construction stage itself standard construction procedures have not been followed.

2.1. Main causes for occurrence of Electrical accidents:

Main causes for such accidents are:

- a) The construction of distribution system comprising H.V.Lines, DTCs and L.V.Lines not conforming to standards such as not providing adequate ground clearances, horizontal & vertical clearances from the buildings /structures and between the three phase conductors, imperfect earthing etc.
- b) Another factor is that defects that arise on the distribution system during operation are not attended to promptly.
- c) It is also a fact that the buildings & structures are built close to already existing electrical net work with out maintaining adequate horizontal and vertical clearances.
- d) The electrical accidents to human and animals are due to their coming in contact with snapped LT live conductors, accidental contact with live wires generally (inadequate clearances to buildings /structures), accidental energisation of poles, guys and guard wires.
- e) Unauthorised energisation of fences put up around agricultural fields to prevent wild animals entering their fields and defects in consumer installations, etc.

3.0. Obligation on the part of distribution utilities to maintain the distribution system in a safe condition as per the provisions of Electricity Act-2003:

- a) The Distribution licensee shall take all precautions and maintain the distribution system placed in public place in such a way as to prevent danger to the lives of human, animals and damage to the property.
- b) The Distribution Licensees Shall Strictly comply with all the provisions of following CEA regulations for construction and maintenance of distribution system:
 - i. CEA **(Measures relating to safety and electric power supply)** Regulations - 2010.
 - ii. CEA **(Technical Standards for Construction of Electrical Plants and Lines)** Regulation 2010.
 - iii. CEA **(Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines)** Regulation, 2011
- c) Provisions of (i) REC manual, (ii) CBIP Guide lines and (iii) BIS standards (for material procurement), shall also be compiled with.

4.0. Safety / Technical Audit of Power Distribution system

- a) It is essential to conduct strictly and exhaustively Safety / Technical Audit atleast once an year or earlier in case of neccessity for identifying the technical defects /deficiencies and deviations from applicable standards which are likely to cause the accidents in all the elements of the Primary & Secondary distribution system. Immediate and prompt action shall be taken to rectify & set right the defects that have been identified to ensure safety to lives and property of the public.
- b) Such detailed survey shall be carried out, 11 kV feeder wise including DTCs and DTC wise L.T.Lines.

4.1. Main elements of Primary and Secondary power distribution net work are listed below:

- a) 11 kV over head lines.
- b) 11 kV underground cables.
- c) 11 kV Ring Main Units (RMUs) and Auto Re-closers.
- d) 11/0.4 kV distribution Transformer centers.
- e) L.T. 3-Phase 400 volts and Single phase -230 volts over head lines.
- f) L.T. 3-Phase 400 volts and Single phase -230 volts under ground cables

- g) L.T Feeder pillar boxes
- h) Street light control boxes
- i) Service mains of consumer installations

5.0. Procedure for assessing the condition of the distribution network and identification of maintenance needs:

5.1. GPS survey and preparation of Geographical maps of distribution system

- a)** GPS survey shall be carried out to capture the longitude, latitude & altitude coordinates of the elements from (a) to (i) of Para 4.1.
- b)** There after digital maps of appropriate scale shall be prepared based on the data gathered by GPS survey:
 - i.** For each 11 kV feeder indicating the various details like pole numbers, type of poles, span lengths, conductor sizes, number of circuits, sectionalizing points, location of DTCs with its capacity, capacitor banks, RMUs etc. Road references and important land marks of the area also to be marked on the maps.
 - ii.** Details of every DTC indicating capacity, code number and DTC name.
 - iii.** A separate map shall be prepared for LT (400/230 volts) distribution system associated with each DTC indicating pole numbers, type of pole/support, span lengths, conductor sizes, number of conductors in a span, L.T.F.P. Boxes, number of consumers / service mains from each LT Line support / L.T.F.P. Box etc. Road references and important land marks of the area shall also be marked on the maps.
- c)** It shall be made mandatory to update these geographical maps by incorporating any additions, extensions or modifications/alterations immediately after erection and before they are energized / commissioned.

5.2. Conducting Safety / Technical Audit for distribution system

- a)** Along with initial GPS survey, Safety / Technical Audit shall be carried out identifying the deficiencies in each of the major components of distribution system viz (i) 11 kV primary distribution O.H. lines / UG cables, (ii) DTCs and (iii) L.T. secondary distribution O.H. lines/ UG cables, (iv) consumer service mains and (v) street light circuits. The details of the asset wise deficiencies observed to be noted / listed in the standard formats furnished as Annexure - 1, 2, 3, 4 and 5

b) Technical deficiencies of each of following asset to be identified & listed to facilitate rectification of them in order to keep distribution system in safe condition to lives and properties:

- i.** 11 kV feeder wise / pole wise / span wise 11 kV lines.
- ii.** 11 kV feeder wise Ring Main Units(RMU).
- iii.** 11 kV feeder wise DTCs.
- iv.** DTCs wise / pole wise / span wise L.T. Lines.
- v.** DTC wise LT Feeder Pillar Boxes
- vi.** DTC wise, L.T. Line circuit wise, Pole wise, consumer service mains.
- vii.** DTC wise Street light circuit control boxes.

c) Bill of quantities (B.O.Q):

Bill of Quantities for rectifying all the technical deficiencies of 11 kV & LT Lines, DTCs, street light boxes and service mains of consumer installations shall be prepared for:

- i.** Each 11 kV O.H. Line feeder.
- ii.** Each 11 kV U.G.Cable feeder.
- iii.** DTCs.
- iv.** DTC wise overhead L.T. Lines including service mains and street light circuits.
- v.** DTC wise UG cable L.T.Line including L.T.F.P.Boxes , service mains and street light circuits.

6.0. Safe conditions of the distribution system :

The safety norms /conditions for each of the distribution system elements are furnished in Para 6.1. While conducting the Safety / Technical Audit, each element of the distribution system to be inspected / observed and record / list out such of the items not complying with the safety norms in the respective formats attached here with as Annexure.

6.1. 11 kV Overhead line:

6.1.1. Over head Line supports / Poles:

- a)** The condition of the poles / line supports shall be good and not damaged / broken.
- b)** The poles shall be vertical and verticality to be maintained within limits of 2° tolerance and they should not be leaning.

- c) The verticality of poles shall be maintained by taking following precautions at the time of construction and also by setting right the defects during periodical maintenance:
 - i. Minimum of 1/5th (20%) of the length of the pole shall be buried in the ground and earth around to be consolidated.
 - ii. Cement concrete foundation to be provided to the poles in the loose soil & water logged areas.
 - iii. Equal tension on either side of the pole shall be given while stringing.
 - iv. The Guys or stud poles shall be provided to equalise the tension on the poles.
 - v. The storm Guys shall be provided where ever necessary
- d) The metallic poles and non current carrying metallic parts like cross arms etc of the non metallic PCC /RCC/Spun poles shall be effectively earthed by solenoid coil /earthing.

Solenoid / Coil Earthing : It shall be made of 10 Mtrs length of NO-8 SWG, G.I. wire compressed in to a coil of 1.0 Mtr length and diameter of 75 to 100 mm and buried 1.5 Mtr deep minimum .
- e) Danger board & Anti-Climbing devises shall be provided to all the poles.
- f) Earth guard stirrups shall be provided to all supports with in city / town / village limits.
- g) Earthed guardings shall be provided at all the road crossings.

6.1.2. Cross arms and top cleat / single top support:

- a) The cross arms shall be not be rusted , deteriorated and to be provided with anticorrosive paint to prevent rusting.
- b) The cross arms shall be in horizontal position and not tilted.
- c) The top support shall be straight / vertical and not tilted. It shall be painted with anticorrosive paint to prevent rusting.

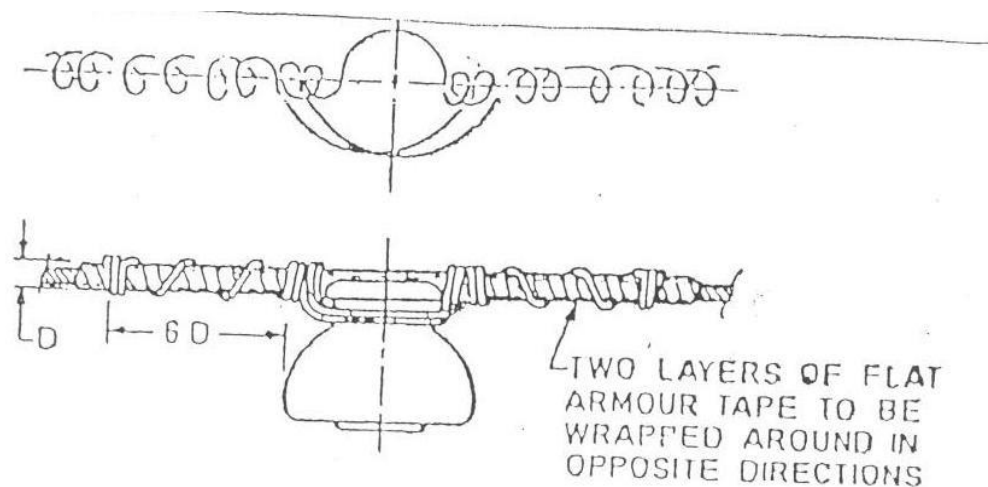
6.1.3. Guys /Stay wires:

- a) Each Guy / Stay wire shall be invariably provided with 15 kV break insulator.
- b) The break insulator shall be at a height of not less than 3.0 meters from the ground level.
- c) The guy shall be provided at 45° to 60° degrees to the ground to make the guy more effective.

- d) The guys shall be in a tightened condition to hold the line supports straight without leaning.
- e) Stud poles shall be provided where ever the Guys cannot be provided.
- f) The guy rods shall be concreted in black cotton /loose soils / water logged areas

6.1.4. Insulators:

- a) The angle of deviation of the line using pin insulators shall be limited 5° and a Guy at opposite direction of angle of deviation to be provided to equalise the tension on the pole.
- b) The 15 kV Strain / 11 kV Disc insulators or 45 kN composite type polymer /silicon insulators shall be used at all angle points of more than 5° for terminating the conductors to the supports.
- c) The 11 kV porcelain or 11 kV composite type polymer insulators shall be used for intermediate supports.
- d) The pin, strain , disc & polymer/silicon insulators shall not be broken / chipped / flashed over, but in good condition.
- e) Two layers of flat aluminum armor tape shall be wrapped in opposite direction over the conductor for a length of about 6 times the diameter of the conductor on either side of the insulator for binding to pin insulator as shown in the following sketch:



6.1.5. Over head line Conductors:

- a) The following adequate ground clearance and vertical & horizontal clearnces from the buildings / structures shall be maintained for 11kV over head lines :

SI No	11 kV overhead lines	Mtrs
1	Minimum height of any conductor of an overhead line	6.1

	across any street.	
2	Minimum height of any conductor of an overhead line along any street.	5.8
3	Minimum height of any conductor of an overhead line erected elsewhere.	4.6
4	Minimum vertical clearance of overhead conductor from buildings & structures.	3.7
5	Minimum Horizontal clearance of overhead conductor from the buildings , structures & tree branches	2.0

- b) A minimum horizontal clearance of **650 mm** between the "R", "Y" & "B" phase conductors shall be maintained .
- c) The condition of the conductor shall be good and not deteriorated. There should not be arcing in any portion of the conductor strands due to short circuits etc. Any section of the conductor should not cause danger and susceptible for snapping.
- d) The jointing of conductors shall be made by using jointing sleeves and twisting wrenches or by compressed joints and not by simply twisting.
- e) The jumper connections shall be made by using P.G.Clamps or wedge type clamps only and not by simply twisting.
- f) There should not be more than one conductor joint per phase in one span.
- g) There should not be loose spans which causes short circuit or flash over during wind and storm (restringing of conductors or requirement of an intermediate pole to be examined)
- h) Earthed guardings to be provided at all the road crossings.

6.1.6. 11 kV GOS / Sectionalisers:

- a) The three blades of GOS (Group operating switch) shall be properly aligned so as to close or open simultaneously during operation.
- b) There should not be any loose connections in GOS causing sparks.
- c) The position of operating rods shall not protrude and cause hindrance public movement.
- d) The mounting plot farm of the GOS shall not be rusted, deteriorated and shall be painted with anticorrosive paint.
- e) The insulators of the GOS shall not be broken / chipped / flashed over, but in good condition.
- f) All non-conducting metallic parts of GOS & mounting plot farm including GOS handle shall be perfectly earthed.

6.2. 11 kV Areal Bunched Cables (A.B.C):

The installation of Areal Bunched Cables on the line supports shall be done with out too much sag and with good / asthetic appearance. The complete installation and terminations shall be as specified in respective REC & CEA Manuals / Regulations.

6.3. H.T. 11 kV Under ground Cable System:

a) 11 kV U.G.cable:

- i.** The cable route markings shall be provided on the ground along the route of the UG Cable for easy identification of Cable route and for cautioning other agencies / utilities to prevent their interfirance.
- ii.** The U.G.Cable armour to be earthed at both ends / terminal points.

b) RMUs (Ring Main Units)

- i.** The name, code number, incoming & outgoing cable details, size of the UG cables shall be painted on the RMU.
- ii.** The body of the RMU including doors, door hinges, locking arrangements shall be in good condition with out rusting and deterioration.
- iii.** The pianting of metallic body shall be good to prevent rusting.
- iv.** The pipe earth electrode as per IS: 3043 shall be provided near each RMU and all the non conducting metallic portions including the metallic body shall be connected to earth electrode by two distinct earth connections with adequate capacity/size earth leads.
- v.** The wodden / PVC bushings at the entry & exit points of UG cable to & from RMUs shall be provided to prevent reptiles enetering the RMU and damage to PVC cable shieth .
- vi.** The Live bus bars of the RMU are to be made inaccessible to public and hence shall ensure that RMU doors are kept closed and locked and are so provided that they can be opened only by means of a key or special key or special appliance
- vii.** The fencing around RMU, if provided shall be earthed.
- viii.** The area around RMU shall be kept clean & tidy to prevent reptiles, birds, crows coming near the RMUs.
- ix.** The protective relays of RMUs shall be periodically checked for its performance.
- x.** The operating mechanism of the RMUs shall be maintained in good condition for easy operation and withdrawing the breaker for maintanance and to avail line clears.

6.4. Distribution Transformer Centers:

6.4.1. DTC Structure:

- a) The name, code number, location, 11 kV power sources & capacity of DTC, date of periodical maintenance carried out shall be exhibited.
- b) Danger boards and Anti-Climbing devices shall be provided to caution & prevent un-authorized persons climbing the DTC structure
- c) The DTC structure, handles / operating rods of GOS, L.T. Distribution box and all other structural parts shall be located in such way, that they shall not cause hindrance to movement of the public and likely to cause harm to them.
- d) An adequate clearance of 650 mm between phase to phase, 600 mm between phases to ground of all H.T. bare conductors in the DTC structure shall be maintained.
- e) The H.T & L.T Connections in the structure and to the lines shall be provided by using P.G / Wedge type Clamps and not by simply twisting
- f) All the non-conducting metallic parts of the DTC shall be connected effectively with two distinct earth connections to one earth electrode by adequate size earth wires
- g) The metallic parts of the structure shall be painted with anticorrosive paint to prevent rusting.

6.4.2. Transformer Fencing:

Earthed fencing shall be provided to all platform mounted DTCs.

6.4.3. Guys / Stay wires:

- a) Each stay wire shall be invariably provided with 15 kV break insulators and the position of the break insulator shall be at a height not less than 3.0 meters from the ground level.
- b) The Guy shall be provided at 45° to 60° degrees to the ground to make them more effective.
- c) The guys shall be in a tightened condition to hold the DTC structure straight without leaning.

6.4.4. 11 kV Isolator /GOS (Group operating switch):

- a) The GOS contacts shall be in good condition without arcing / deterioration
- b) The three blades of GOS shall be properly aligned so as to close or open simultaneously during operation.
- c) There should not be any loose connections in GOS causing sparks.

- d) The position of operating rods shall not protrude and cause hindrance public movement and the operating handles shall be at a height of not less than 2.0 Mtrs from ground.
- e) The mounting plot farm of the GOS shall not be rusted, deteriorated and shall be painted with anticorrosive paint.
- f) The insulators of the GOS shall not be broken / chipped / flashed over, but in good condition.
- g) All non-conducting metallic parts of GOS & mounting plot farm of the GOS including GOS handle shall be perfectly earthed.

6.4.5. Protection to Transformer:

The following effective Protection on H.T. & L.T side shall be provided as per CEA regulations:

a) H.T. 11 KV Primary side

- i. Fuse protection --- H.G Fuse/ DOLO Fuse / HRC fuses.
- OR
- ii. Breaker protection ---- VCB/SF6 circuit breakers with protective relays.

b) L.T. 400 Volts secondary side

- i. L.T. Distribution box with MCCB preferably with earth leakage relay shall be provided to all the Transformers of 100 KVA & above capacity.
- ii. Fuse protection: Kit Kat fuses / Horn gap fuses (L.T protection kit) for Transformers below 100 KVA capacities

c) Fuse protection on the 11 kV primary of the Transformer:

The fuse wires as shown in the Table shall be provided to H.G.Fuse or DOLO units on the 11 kV primary of the Transformer for effective protection:

SI No	Transformer Capacity in KVA	Full load current in Amps at 11 kV	Fuse wire Size in SWG
1	25	1.31	38
2	63	3.31	35
3	100	5.25	33
4	250	13.12	23
5	500	26.24	20

6.4.6. Lightning protection

- a) The 9.0. kV, 10 KA Lightning arrestors shall be provided on primary side of the Transformer.
- b) The Lightning arrestors shall be provided with two distinct earth connections to one earth electrode with an adequate size earth leads.

6.4.7. Earthing:

- a) There shall be minimum of 3 earth electrodes for each DTC which are to be connected as follows :
 - i. **1st electrode:** Two distinct earth leads from the neutral of the transformer
 - ii. **2nd electrode:** Two distinct earth leads from transformer body, non conducting metallic structural parts, GOS handles, L.T. Distribution box, fencing if any etc,
 - iii. **3rd Electrode ;** Two distinct earth leads from the LAs
- b) The earth electrodes shall be as per **IS:3043**.
- c) The minimum distance of 2.5 Mtrs shall be maintained between the earth electrodes.
- d) **The earth resistance of earth electrodes shall be within 5 Ω**
- e) The earth electrodes shall be completely buried in the ground (**not to be projected above ground level**) to prevent any hindrance to public.

6.4.8. Distribution Transformer:

- a) There should not be any leakage of transformer oil. The neoprene gaskets to be used to prevent leakage of oil. The gaskets shall be replaced on deterioration.
- b) The oil level in the Transformer shall be up to the mark indicated on the oil gauge provided to the conservator tank / transformer body. The oil shall be topped up to the required level.
- c) The Transformer tank shall be in a good condition without any damage and painted to prevent rusting.
- d) The H.T. & L.T bushings of the Transformer shall not be broken/chipped/flushed over and to be in a good condition.
- e) The Transformer HT & L.T terminals shall be in a good condition and not deteriorated due to arcing / melting etc.
- f) The neutral of the transformer shall be provided with two distinct earth connections to one Earth electrode using adequate size earth leads.

- g) The Transformer body shall be provided with two distinct earth connections to one earth electrode by adequate size earth leads
- h) The silica jell of the transformer shall be kept in a good condition with light blue color.

(The silica jell will attain pink color by absorbing moisture while breathing action which should be fried on the hot pan to restore light blue color by evaporating the stored moisture in it, failing which the moisture will enter the DTC and contaminate transformer oil)

- i) It shall be ensured that, the air vent provided in the breather is free without plugging.

(The air vent will be generally plugged during storage & transportation and this plug shall be removed at the time of commissioning).

- j) The minimum ground & sectional clearance of 3.1. Mtr shall be maintained from the H.T & L.T. terminals of Transformer
- k) The H.T & L.T terminal connections shall be made by using crimped lugs, Bolt & Nuts and not by simply twisting with wires.
- l) The H.T & L.T terminal of transformer after connections shall be suitably insulated by two layers of cambric tape & two layers of adhesive PVC tape. The alternate layers of insulation tape shall be wound in a reverse direction.

6.4.9. Loading of the Transformer:

- a) The loading on each phase of the Transformer shall be within the rated ampere capacity.
- b) There shall be a balanced loading on all the three phases and unbalanced load shall be limited to 10.0 % during peak time.
- c) The current in the neutral of the Transformer shall be within permissible limits of 10 % of Phase currents during peak time.

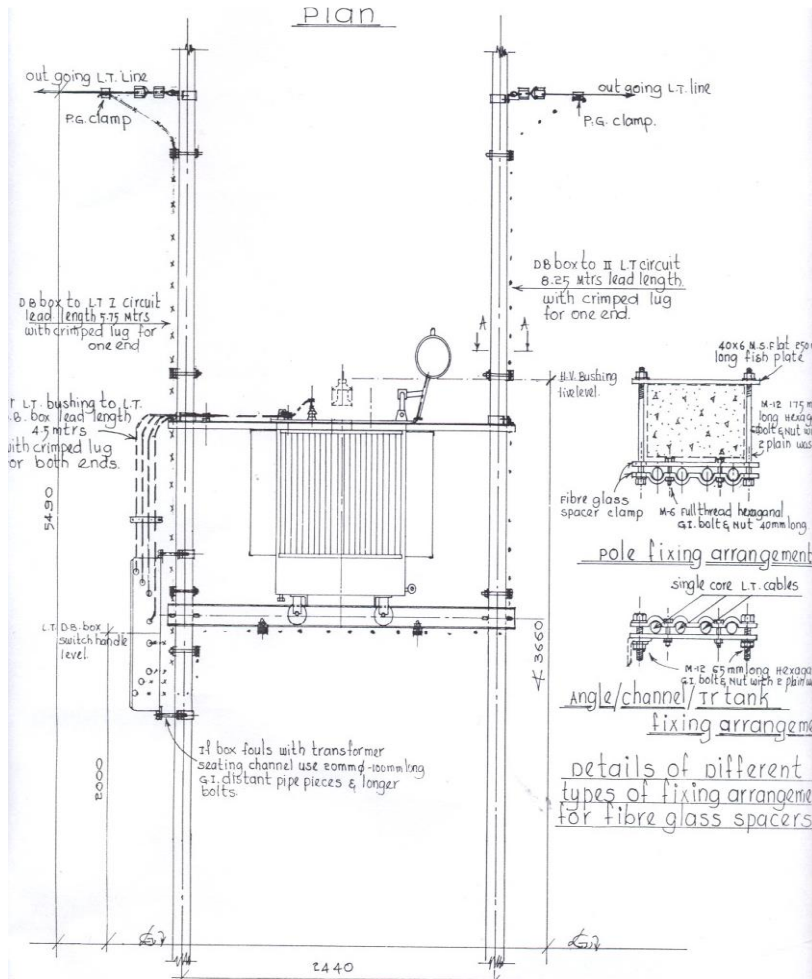
6.4.10. Number of L.T. circuits and size of L.T. PVC Insulated leads from DTC to L.T. Lines:

- a) The minimum number of L.T. Circuits and size of L.T. Insulated leads to L.T. Lines are shown in the below Table:

Sl No	Transformer Capacity in KVA	Full load current in Amps at 400 Volts	Minimum Number of circuits	Minimum size of the L.T. Aluminum Insulated leads in sq mm
1	25	36	One	35
2	63	91	One	95

3	100	144	Two	95
4	250	361	Three	240
5	500	722	Four	240

- b) The L.T. Leads shall be connected to L.T. Lines by using P.G. / Wedge type clamps and not by simply twisting by wires
- c) PVC insulated L.T. leads shall not be accessible to public and they should be neatly laid using spacers and rigidly fastened to the cross arm fixed to the DTC structure as shown in the sketch below:



6.4.11. L.T. Distribution box:

- a) The body of the L.T. Distribution box including door hinges shall be in good condition and not rusted or deteriorated.
- b) The painting of metallic body shall be in good condition to prevent rusting
- c) The metallic body shall be provided with two separate & distinct earth connections to one earth electrode with adequate size earth leads.

- d) The wooden / PVC bushings at the entry & exit points of L.T. insulated Lead wires to & from L.T. distribution boxes shall be provided to prevent reptiles entering and for protection to PVC insulation.
- e) The Live bus bars of the L.T. Distribution box etc., are to be made inaccessible to public and hence shall ensure that their covers and doors are kept closed and locked and are so provided that they can be opened only by means of a key or special key or special appliance.
- f) The location of L.T. Distribution box shall be in such a position at a minimum height of **2.0 mtrs** from ground and which shall not cause hindrance to public movement.
- g) The louvers of L.T.D. box shall be made vermin proof to prevent entry of reptiles.
- h) The MCCBs in the Distribution Box shall be in the circuit as a protection. It shall be replaced in case of failure but shall not be by passed.
- i) The L.T. wires connections to MCCBs & Bus bars in the Box shall be provided with crimped lugs and not by simply twisting.
- j) The ETV meter shall be provided and in working condition in the L.T. Distribution box with appropriate capacity of CTs.

6.5. L.T. Over head distribution system

6.5.1. Over head Line supports /Poles:

- a) The condition of the poles / line supports shall be good and not damaged / broken.
- b) The poles shall be vertical and the verticality of poles shall be maintained within limits of **2°** tolerances and they should not be leaning.
- c) The verticality of poles shall be maintained by taking following precautions at the time of construction and also by setting right the defects during periodical maintenance:
 - i. Minimum of $1/5^{\text{th}}$ (20%) of the length of the pole shall be buried in the ground and earth around buried portion of the pole to be consolidated.
 - ii. Cement concrete foundation to be provided to the pole in case of **black cotton/loose soils & water logged areas**.
 - iii. There shall be equal tension on either side of the pole while stringing of conductor.
 - iv. The Guys /stud poles shall be provided to equalise the tension on the poles.
 - v. The storm Guys shall be provided where ever necessary.

- d) Metallic and RCC / PCC poles / line supports of over head Lines and metallic fitting attached thereto, shall be **either permanently and efficiently earthed by providing a continuous earth wire** and securely fastened to each pole and connecting with earth ordinarily at three points in every km with spacing between the points being as nearly equidistant as possible

OR

Each line support (pole) and the metallic fitting attached thereto shall be efficiently earthed by solenoid / coil earthing.

Solenoid / Coil Earthing : It shall be made of 10 Mtrs length of NO-8 SWG, G.I. wire compressed in to a coil of 1.0 Mtr length and diameter of 75 to 100 mm and buried 1.5 Mtr deep minimum

- e) Earthed guardings shall be provided at all road crossings

6.5.2. Cross arms:

- a) The cross arms shall be not be rusted, deteriorated and to be provided with anti corrosive paint to prevent rusting.
- b) The cross arms shall be in horizontal position and not tilted.

6.5.3. Guys /Stay wires:

- a) The Guy shall be provided at an angle of 45° to 60° degrees to the ground to make them more effective
- b) Each stay wire shall be invariably provided with 8 kV break insulators, and the position of the break insulator shall be located at a height not less than 3.0 meters from the ground level.
- c) **The guy rods shall be concreted in black cotton /loose soils / water logged areas**
- d) The guys shall be in a tightened condition to hold the line supports straight without leaning.

6.5.4. Insulators:

- a) The angle of deviation of the line using pin insulators shall be limited 5° and a Guy to be provided at opposite direction of angle of deviation.
- b) The 8 kV strain insulators shall be used at all angle points of more than 5° for terminating the conductors to poles.
- c) The 1.1 kV pin insulators to be used for intermediate supports of less than 5° deviation
- d) The pin and strain insulators shall not be broken / chipped / flashed over, but in good condition.

- e) Two layers of flat aluminum armor tape shall be wrapped in opposite direction over the conductor for a length of about 6 times the diameter of the conductor on either side of the insulator for binding to pin insulator as shown in the sketch vide Para 6.1.4 (e).

6.5.5. Over head line Conductors:

- a) The following adequate ground clearance, vertical & horizontal clearances from the buildings / structures shall be maintained for L.T over head lines :

SI No	L.T. overhead lines < 650 Volts	Mtrs
1	Minimum height of any conductor of an overhead line across any street.	5.8
2	Minimum height of any conductor of an overhead line along any street.	5.5
3	Minimum height of any conductor of an overhead line erected elsewhere.	4.6
4	Minimum vertical clearance of overhead conductor from buildings & structures.	2.5
5	Minimum Horizontal clearance of overhead conductor from the buildings , structures & tree branches	1.2

- b) A minimum horizontal clearance of **300 mm** between the “R”, “Y” & “B” phase conductors shall be maintained .
- c) The condition of the conductor shall be good and not deteriorated. There should not be arcing in any portion of the conductor strands due to short circuits etc. Any section of the conductor should not cause danger and susceptible for snapping.
- d) The jointing of conductors shall be made by using jointing sleeves and twisting wrenches or by compressed joints and not by simply twisting two ends of the wire.
- e) The jumper connections shall be made by using P.G.Clamps or wedge type clamps only and not by simply twisting by wires.
- f) There should not be more than one conductor joint per phase in one span.
- g) There should not be loose spans which causes short circuit or flash over during wind and storm. The restringing of conductors or requirement of an intermediate pole to be examined.
- h) Earthed guardings to be provided at all the road crossings of L.T.Line.

6.5.6. L.T.Under ground Cable system:

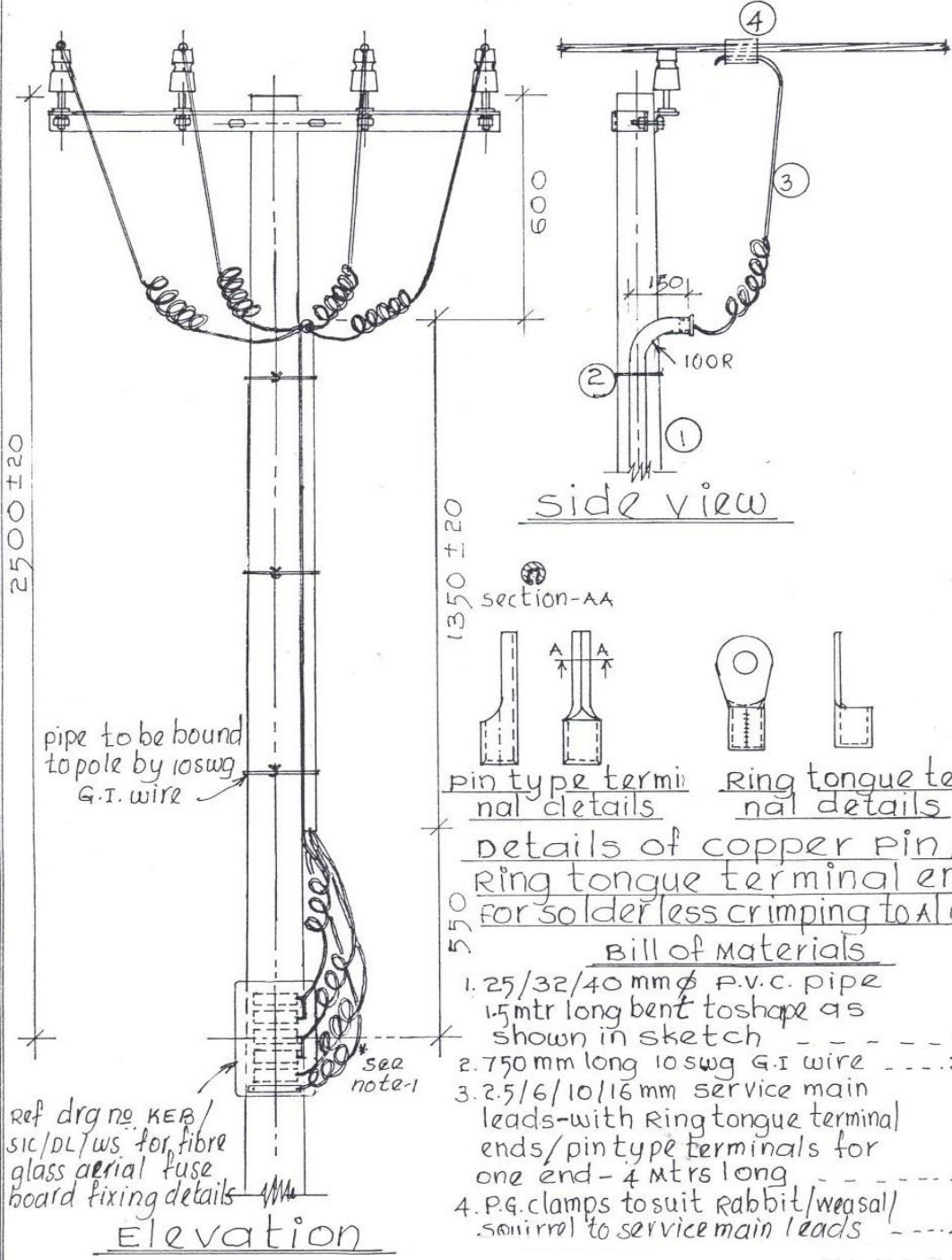
L.T.Feeder pillar boxes:

- i. The name / number of L.T.F.P. Box, incoming and outgoing sources of Cable details shall be exhibited on the box.
- ii. The body of the L.T.F.P box including door hinges shall be in a good condition with out deterioration & rusting.
- iii. **Alternately fibre type or SMC boxes may be used to prevent rusting.**
- iv. The painting of metallic body shall be in a good condition to prevent rusting
- v. Pipe earth electrode as per I.S -3043 shall be provided and the metallic body of the L.T.F.P box shall be connected with two distinct earth connections of adequate size to the pipe earth electrode. **The earth resistance of the pipe earth electrodes shall be with in 5 Ω .**
- vi. The louvers of the L.T.feeder pillar box and all other entry points shall be made vermine proof to prevent entry of reptiles
- vii. The MCCBs / Three pole isolators shall be provided to incoming & out going main L.T. UG Cables from the Box.
- viii. The incoming and out going L.T. UG Cable to feeder pillar box and service main cables from ground level to L.T.F.B shall be enclosed in a PVC pipe to prevent the damage to insulation of the cable.
- ix. The incoming & out going U.G. cables and service main cables of the L.T.F.P box shall not get over-heated due to over loading **or** loose contacts causing deterioration of cable insulation. This shall be prevented by selecting the appropriate cable size and proper tightening of connections.
- x. The wodden / PVC bushings at the entry and exit points of UG cable to & from LT Feeder pillar boxes shall be provided to prevent entry of reptiles , rain water and protection to PVC insulation of cable.
- xi. The Live bus bars / live parts of the L.T.F.P box etc., are to be made inaccessible to public and hence shall ensure that their covers and doors are kept closed and locked and are so provided that they can be opened only by means of a key or special key or special appliance.
- xii. The fuse cut outs / MCBs to each service connection shall be provided in the L.T.F.B. The R.R.Number / Consumer code number shall be marked for each of the MCB /Fuse cutouts for easy identification.

xiii. In general the L.T.F.P.Box which are placed in public places shall be made safe to lives and property of public.

6.5.7. L.T. over head Service mains of consumer installations:

- a) The condition of service mains shall be good without any deterioration of insulation.
- b) A minimum ground clearance of 4.6 Mtr of over head service mains shall be maintained
- c) Only single core PVC insulated wires shall be used for service mains. Each core of S-Ph or 3-Ph insulated service mains with additional neutral core shall be separated by using porcelain / PVC reel insulators to prevent touching each other and a G.I. messenger wire shall be drawn along with over head insulated service mains to take care of tensile loads.
- d) Consumer service mains shall be provided with Fibre fuse boards at the L.T.Pole and the lead wires from Phase & Neutral conductors to the fibre board are to be enclosed in PVC conduit pipe which shall be rigidly fixed to pole as shown in the drawing below.
- e) The service mains shall be connected only to the fibre fuse boards and should not be directly connected to the L.T.lines
- f) The Fuses & fuse board shall be in good condition with out any breakages



pipe to be bound to pole by 10swg G.I. wire

ref drg no. KEB/SIC/DL/ws for fibre glass aerial fuse board fixing details

Elevation

side view

section-AA



details of copper pin/ ring tongue terminal ends for solderless crimping to Al cond

Bill of materials

1. 25/32/40 mm ϕ P.V.C. pipe 1.5 mtr long bent to shape as shown in sketch - - - - 1 no.
2. 750 mm long 10swg G.I. wire - - - - 3 nos
3. 2.5/6/10/16 mm service main leads-with ring tongue terminal ends/pin type terminals for one end - 4 mtrs long - - - - 4 no.
4. P.G. clamps to suit rabbit/weasal/squirrel to service main leads - - - - 4 nos

Notes

1. * Always ring type terminal ends to be used for neutral wire service main.

6.5.8. UG Cable service mains from L.T. Over head lines:

- a) The wooden or PVC bushings shall be provided at the entry / exit of UG Cable service mains wires to / from the pot heads provided to terminate UG cable service mains at poles to protect the PVC insulation of the service main cable.
- b) The UG cable service main pot heads / terminations shall be rigidly fixed to a earthed metallic cross arm of the pole.
- c) The UG cable service main taken down along the pole shall be enclosed in a earthed metal / PVC conduit up to 2.0 mtrs from ground and shall be fastened properly to the pole to prevent them hanging.
- d) The U.G.Cable consumer service mains shall be provided with Fibre fuse boards at the L.T.Pole and the lead wires from Phase & neutral conductors to the fibre board are to be enclosed in PVC conduit pipe which shall be rigidly fixed to pole. The U.G.Cable service mains shall be connected only to the fibre fuse boards and should not be directly connected to the L.T.lines as shown in the sketch vide Para No-6.5.7 (d).
- e) There shall not be any temporary over head service mains drawn due to UG Cable service main fault. Such faults in U.G.Cable service mains shall be rectified immediately atleast with in 3 days.

6.5.9. Street light control switch cum metering boxes:

- a) The street light control switch cum metering boxes shall be made of metallic / fibre material.
- b) The street light control switch cum metering boxes shall be in a good condition with out any breakages and doors intact.
- c) They shall be placed at an height of not less tha 2.0 mtrs from the ground level.
- d) The non conducting metallic parts of the boxes shall be connected to the earth electrode with two seperate / distict earth connections by adequate size earth wire.
- e) The insulated wires from L.T.Line phase conductor to the street light control switch cum metering boxes and from boxes to the street light control phase shall be enclosed in PVC conduit pipe which shall be rigidly fixed to the pole by using suitable clamps
- f) 1.1 kV insulated wires of adequate size shall be used in the street light boxes for connections from supply to street light control phase through energy meter and control switch. All the joints shall made by using suitable clamps & connectors and

the joints shall be suitably insulated by two layers of cambric tape & two layers of adhesive PVC tape. The alternate layers of insulation tape shall be wound in a reverse direction to ensure that no live wire is exposed.

- g)** The Live parts of box are to be made inaccessible to public. Hence it shall be ensured that their covers and doors are kept closed and locked so that they can be opened only by means of a key or special key or special appliance.

6.5.10. Street lighting with UG Cable system:

The PVC insulated L.T. Street light UG cable is laid under ground along the path of the street light poles. The power supply to street lights of the poles are provided from this UG cable. The power supply connection to street lights shall be made as follows:

- a)** A metallic or fibre box either be embedded in the coping portion at the bottom of the pole **or** fixed to the pole at a minimum height of 2.0 Mtrs from ground.
- b)** A fuse unit to be provided in the box for street light phase wire. The street light phase & neutral to be tapped from Under Ground Cable using 1.1 kV class PVC Insulated wires or L.T. PVC insulated cable enclosed in a PVC pipe to the fuse unit box. The joints at the UG cable tapping point in the ground shall be properly insulated by using two layers of cambric tape & two layers of adhesive PVC tape, the alternate layers to be wound in reverse direction and covered around joint by insulated rubberised compound.
- c)** The live wires in the fuse unit box shall be made inaccessible to public by providing lockable doors so that they can be opened only by means of a key or special key or special appliance.
- d)** The metallic fuse box if provided shall be effectively earthed.
- e)** The street light Phase and Neutral wires from fuse box to the street light on pole shall be enclosed on PVC conduit rigidly fastened to the pole or taken inside the pole, if the pole is of hollow type.
- f)** All the joints shall be suitably insulated by two layers of cambric tape & two layers of adhesive PVC tape. The alternate layers of insulation tape shall be wound in a reverse direction to ensure that no live wire is exposed.
- g)** The Live parts of box are to be made inaccessible to public and hence shall ensure that their covers and doors are kept closed & locked so that they can be opened only by means of a key or special key or special appliance.

7. Periodicity of conducting safety Audit:

- a)** The periodicity of conducting Safety / Technical audit of all the elements of the distribution system shall be **at least once in a year** or whenever required by the distribution utilities within one year
- b)** It shall be preferably carried out by:
 - i.** A group assigned only the task of conducting Safety / Technical audit
 - or**
 - ii.** Outsourcing through an external agency

8. Rectification of Technical deficiencies in the distribution system:

8.1. Identification and listing of technical deficiencies:

All the technical deficiencies /defects in the primary & secondary distribution system elements shall be listed out as follows:

- a)** Feeder wise 11 kV overhead lines.
- b)** Feeder wise 11 kV main UG Cables.
- c)** Feeder wise 11 kV Loop cables.
- d)** Feeder wise 11 kV R.M.Us
- e)** Feeder wise DTCs.
- f)** Feeder wise, DTC wise L.T. Overhead Lines with street light control boxes:
 - i.** L.T.Line circuit wise overhead service mains.
 - ii.** L.T.Line circuit wise U.G.Cable service mains.
- g)** Feeder wise, DTC wise L.T. U.G.Cables lines:
 - i.** L.T. Line circuit wise Feeder pillar boxes.
 - ii.** L.T.Line circuit wise service mains.
 - iii.** L.T.Line circuit wise street light circuits.

8.2. Bill of Quantities and cost estimates:

- a)** The 11 kV feeder wise B.O.Q comprising all the materials required for rectification of technical deficiencies / defects observed during the Safety/Technical audit & listed as per Para-8.1 shall be prepared.
- b)** The 11 kV feeder wise cost estimates shall be prepared using current schedule of rates.

8.3. Rectification of defects:

The 11 kV feeder wise technical deficiencies / defects observed during the Safety/Technical audit & listed as per Para-8.1 shall be rectified immediately without any lapse of time either departmentally or by external agency through outsourcing, to make the distribution system **safe and efficient**.

9. Inspection of rectification works:

- a)** The Engineer in charge of the area to inspect all (100%) the maintenance works carried out departmentally or by contractor (through outsourcing) to ensure that the maintenance works have been carried out satisfactorily by rectifying all the Technical deficiencies to bring the system safe for lives & property of public and more efficient.
- b)** A random check of such rectified maintenance works shall be carried out by:
 - i.** The Assistant Executive Engineer of Subdivision – 25.0 %.
 - ii.** The Executive Engineer of Division – 10.0 %.
 - iii.** The Superintending Engineer of Circle – 5.0 % .
 - iv.** The Zonal Chief Engineer – 2.0 %.

10. Inspection of new works executed:

The engineer in charge of the area shall inspect all (100%) new works, modification or expansion of distribution network either departmentally or through contract agency, after execution before energization to ensure that the quality of work, scope of the work, all technical parameters, clearances, and safety as per specification have been adhered to while execution. A random check of all such works are to be carried out by following officials and take appropriate action for noncompliance of standards:

- a)** The Assistant Executive Engineer of Subdivision – 25.0 %.
- b)** The Executive Engineer of Division – 10.0 %.
- c)** The Superintending Engineer of Circle – 5.0 %.
- d)** The Zonal Chief Engineer– 2.0 %.

Annexure-1		11 kV Network Safety / Technical Audit	
1	Date of Inspection	.... .. 2016	Time hrs
2	Location	_____ Sub-Division	_____ Division
3	Name of Substation		
4	Name of 11 kV feeder		
5	Pole No	:	
6	Type of support	:	<input type="checkbox"/> RCC <input type="checkbox"/> PCC <input type="checkbox"/> Rail <input type="checkbox"/> STP <input type="checkbox"/> PSCC <input type="checkbox"/> Others
7	Height of pole (Mts)		<input type="checkbox"/> 7.5 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> Above 9
8	No of circuits		<input type="checkbox"/> HT <input type="checkbox"/> HT/LT <input type="checkbox"/> HT/LT/LT <input type="checkbox"/> HT/HT <input type="checkbox"/> HT/HT/LT/LT
9	No of wires		<input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6
10	Support (pole) condition		
a)	Physical condition	:	<input type="checkbox"/> OK <input type="checkbox"/> Broken <input type="checkbox"/> Bent <input type="checkbox"/> Rusted <input type="checkbox"/> To be replaced <input type="checkbox"/> Repaired
b)	Verticality of the support		<input type="checkbox"/> O.K <input type="checkbox"/> Leaning
c)	If leaning the reasons		<input type="checkbox"/> uneven tension <input type="checkbox"/> Loose soil <input type="checkbox"/> Guys loose <input type="checkbox"/> Any other <input type="checkbox"/> In adequate length (1/5 th) of pole buried in the ground
d)	Pole earthing including non-conducting metallic parts		<input type="checkbox"/> Done <input type="checkbox"/> Not done
e)	Coping to the pole		<input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> Not required
f)	Muffing to the pole		<input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> Not required
g)	Danger board		<input type="checkbox"/> Provided <input type="checkbox"/> Not provided
h)	A.C devices		<input type="checkbox"/> Provided <input type="checkbox"/> Not provided
11	Cross arms and single top supports		
a)	Top cleat condition		<input type="checkbox"/> Vertical <input type="checkbox"/> Bent / Tilting <input type="checkbox"/> Rusted / to be painted
b)	Cross arm condition	:	<input type="checkbox"/> OK <input type="checkbox"/> Tilting <input type="checkbox"/> Rusted / to be painted <input type="checkbox"/> to be replaced
c)	Earth connection of non conducting metallic parts		<input type="checkbox"/> Connected <input type="checkbox"/> Not connected

12	Location		
a)	Straight or deviation	:	<input type="checkbox"/> Straight <input type="checkbox"/> Cut point <input type="checkbox"/> Tap <input type="checkbox"/> Dead End
b)	If deviation is more than 5°, type of insulator provided		<input type="checkbox"/> 11kV Pin insulator <input type="checkbox"/> 15 kN Strain <input type="checkbox"/> 11 kV Disc insulator <input type="checkbox"/> 45 KN composite polymer <input type="checkbox"/> 11kV Ceramic Pin Insulator

13	Guys / Stay wires	
a)	No of stays / guys	<input type="checkbox"/> Nil <input type="checkbox"/> Specify the number
b)	Whether guys are provided with 15 kV Break / Strain insulators	<input type="checkbox"/> Yes <input type="checkbox"/> No
c)	Whether guy insulators are more than 3.0 Mtrs from ground	<input type="checkbox"/> Yes <input type="checkbox"/> No
d)	Condition of guy	<input type="checkbox"/> Good <input type="checkbox"/> To be rectified <input type="checkbox"/> To be replaced <input type="checkbox"/> To be tightened
e)	Whether Guy rods concreted	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> To be concreted <input type="checkbox"/> Not required
14	Insulators	
a)	Type of insulator	<input type="checkbox"/> 11 kV Pin <input type="checkbox"/> 15 kV strain <input type="checkbox"/> 11 kV disc <input type="checkbox"/> 45KN composite polymer <input type="checkbox"/> 11kV Ceramic Pin Insulator .
b)	Number of insulators	<input type="checkbox"/> 11 kV Pin <input type="checkbox"/> 15 kV strain <input type="checkbox"/> 11 kV disc <input type="checkbox"/> 45KN composite polymer <input type="checkbox"/> 11kV Ceramic Pin Insulator .
c)	Condition of insulators	<input type="checkbox"/> OK <input type="checkbox"/> Chipped / flashed over/damaged <input type="checkbox"/> To be replaced
d)	Whether aluminum armour tape is wrapped over the conductor for binding on Pin insulator	<input type="checkbox"/> Provided <input type="checkbox"/> Not provided
15	Conductor	
a)	Condition of Conductor	<input type="checkbox"/> OK <input type="checkbox"/> Damaged to be replaced
b)	Condition of stringing	<input type="checkbox"/> OK <input type="checkbox"/> Loosely strung to be rectified
c)	Number of conductor joints in the span	<input type="checkbox"/> One <input type="checkbox"/> Two <input type="checkbox"/> Three <input type="checkbox"/> Four
d)	More than one joint per phase in the span	<input type="checkbox"/> No <input type="checkbox"/> Yes the conductor to be replaced
e)	Method of conductor joints	<input type="checkbox"/> Simply twisted by wires <input type="checkbox"/> Jointing sleeves <input type="checkbox"/> Compressed joints
f)	Jump connections	<input type="checkbox"/> OK <input type="checkbox"/> PG clamps <input type="checkbox"/> wedge type clamps <input type="checkbox"/> simply Twisting
16	Ground clearance	: <input type="checkbox"/> OK <input type="checkbox"/> To be increased / rectified
17	Clearance to buildings	<input type="checkbox"/> OK <input type="checkbox"/> To be increased / rectified
18	Clearance to tree branches	<input type="checkbox"/> OK <input type="checkbox"/> To be trimmed

19	Phase to phase conductor clearance	<input type="checkbox"/> OK	<input type="checkbox"/> To be increased
20	Earth Guard stirrups (required only within Towns and village limits)	<input type="checkbox"/> Provided	<input type="checkbox"/> Not provided <input type="checkbox"/> Not required
21	Earthed guarding at road crossings	<input type="checkbox"/> Provided	<input type="checkbox"/> Not provided <input type="checkbox"/> Not required

22	11 kV GOS		
a)	Whether provided	<input type="checkbox"/> Provided	<input type="checkbox"/> Not provided
b)	GOS insulators -condition	<input type="checkbox"/> OK	<input type="checkbox"/> Chipped / flashed over/damaged <input type="checkbox"/> To be replaced
c)	Alignment of 3 blades	<input type="checkbox"/> OK	<input type="checkbox"/> To be realigned
d)	Position of Operating rod & handle	<input type="checkbox"/> OK	<input type="checkbox"/> Hindrance to public <input type="checkbox"/> To be shifted /realigned
e)	Condition of metallic plot form	<input type="checkbox"/> OK	<input type="checkbox"/> rusted / to be painted <input type="checkbox"/> to be replaced
f)	Whether non conducting metallic parts and handle earthed	<input type="checkbox"/> Earthed	<input type="checkbox"/> Not Earthed
23	Whether the H.T Pole and previous span is safe to lives & property	<input type="checkbox"/> Yes	<input type="checkbox"/> NO

Annexure-2:

DTC Safety / Technical Audit

1.	Date of Inspection	.....	...	2016	Time	hrs
2.	Location	_____ Sub-Division _____ Division				
3.	11 kV feeder Name	:				
4.	Code number of transformer structure					
5.	Code number of distribution Transformer					
6.	Transformer particulars	Make <input type="text"/> Serial No <input type="text"/> Capacity <input type="text"/>				
		Year of Manufacture <input type="text"/> Tap changer <input type="text"/> Available <input type="text"/> No <input type="text"/>				
		LV Amps <input type="text"/> H.V. Amps <input type="text"/> L.V Voltage <input type="text"/>				
		% Impedance <input type="text"/> Iron losses <input type="text"/> Copper losses <input type="text"/>				
7.	DTC Structure					
	a) Structure	<input type="text"/> S- Pole <input type="text"/> D - Pole <input type="text"/> T-Pole <input type="text"/> F-Pole <input type="text"/> Plot Form				
	b) Type of Poles /support	:	<input type="checkbox"/> RCC <input type="checkbox"/> Spun pole <input type="checkbox"/> Rail <input type="checkbox"/> STP <input type="checkbox"/> Others			
	c) Height of Support (Mts)	<input type="checkbox"/> 7.5 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 11				
	d) Condition of painting	<input type="text"/> Satisfactory <input type="text"/> Bad <input type="text"/> Not required <input type="text"/> To be repainted				
	e) Coping to the pole	<input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> Not required				
	f) Muffing to the pole	<input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> Not required				
	g) Danger Board	<input type="text"/> Provided <input type="text"/> Not provided				
	h) A.C.Devices	<input type="text"/> Provided <input type="text"/> Not provided				
	i) Number of guys	<input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 3 <input type="text"/> 4 <input type="text"/> Nil				
	j) Break insulators provided to guys	<input type="text"/> Yes <input type="text"/> NO				
	k) Whether break insulators are at height more than 3.0 mtrs from ground level	<input type="text"/> Yes <input type="text"/> NO				

	l) Condition of guys	<input type="checkbox"/> Good <input type="checkbox"/> To be rectified <input type="checkbox"/> To be replaced
	m) Whether Guy rods concreted	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> To be concreted <input type="checkbox"/> Not required
	n) Whether the Guys to be re tightened and structure is vertical without tilting	<input type="checkbox"/> Yes <input type="checkbox"/> No
	o) Whether the DTC location is hindrance to public movement	<input type="checkbox"/> Yes <input type="checkbox"/> No
	p) Whether Phase to phase H.T. conductor clearance of 650 mm is maintained	<input type="checkbox"/> OK <input type="checkbox"/> To be increased
	q) Condition of Jump connections	<input type="checkbox"/> OK <input type="checkbox"/> PG clamps <input type="checkbox"/> wedge type clamps <input type="checkbox"/> simply Twisting
	r) Condition of painting of metallic parts of structure	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Bad <input type="checkbox"/> To be repainted
8	Distribution Transformer	
	a) Condition of painting	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Bad <input type="checkbox"/> To be repainted
	b) Oil level	<input type="text" value="OK"/> <input type="text" value="Low level, Oil to be topped"/>
	c) Any oil leakage	<input type="text" value="Yes"/> <input type="text" value="NO"/>
	d) Breather condition	<input type="text" value="Satisfactory"/> <input type="text" value="Requires replacement"/>
	e) Condition of silica jell in the breather	<input type="text" value="Satisfactory – Light blue"/> <input type="text" value="Pink colour Requires reconditioning"/>
	f) Whether the breather inlet plug (oil vent) opened or closed	<input type="text" value="Opened"/> <input type="text" value="Closed / To be removed"/>
	g) Condition of Bushings	<input type="text" value="OK"/> <input type="text" value="Chipped"/> <input type="text" value="Flashed over"/>
	h) Condition of HT & L.T Terminals	<input type="text" value="OK"/> <input type="text" value="Deteriorated / Arc over"/>
	i) H.T.Terminal connections	<input type="text" value="Lugs duly Crimped"/> <input type="text" value="Simply twisted by wires"/>
	j) L.T.Terminal connections	<input type="text" value="Lugs duly Crimped"/> <input type="text" value="Simply twisted by wires"/>
	k) Whether HT & L.T terminal connections are provided by insulation Tape	<input type="text" value="Yes"/> <input type="text" value="NO"/>

l)	Condition of conservator tank		OK	Requires replacement	Not provided
m)	Body of the Transformer connected to earth electrode by two separate & distinct connections to earth by adequate size wire electrode		Yes	NO	
n)	Neutral of the Transformer connected to earth electrode by two separate & distinct connections by adequate size wire to earth electrode		Yes	NO	
o)	Whether the H.T & L.T terminal are 3.1 Mtrs above the ground		Yes	NO	
p)	Condition of Transformer Tank including conservator Tank		Good	Damaged	
9	Protection H.T.Side				
a)	H.T.Side	H.G.Fuse	Standard	UN standard	NA
b)	H.T.Side	DOLO	Good	Bad	NA
c)	H.T.Side	Breaker	Good	Bad	NA
d)	Capacity of HT fuse		Correct size fuse	Higher size /ACSR conductor strand	
10	Protection L.T.Side				
a)	L.T.Side	L.T.P.Kit	Good	Bad	Not Provided (NA)
b)	L.T.Side	Kit Kat fuse unit	Good	Bad	NA
c)	L.T. Distribution Box with MCCB capacity -----		Good	Bad / Bye passed	NA
d)	Capacity of LT fuse		Correct size fuse	Higher size /ACSR conductor strand	
e)	DTC Meter		<input type="checkbox"/> Provided working <input type="checkbox"/> Not working <input type="checkbox"/> Not provided		
f)	If provided & working - meter Reading				
g)	Meter constant				

11	11 KV GOS		<input type="checkbox"/> Provided	<input type="checkbox"/> Not provided		
a)	Type		<input type="checkbox"/> Horizontal	<input type="checkbox"/> Vertical		
b)	Alignment of three GOS blades		<input type="checkbox"/> OK	<input type="checkbox"/> To be re aligned		
c)	Condition of GOS Contacts		<input type="checkbox"/> Good	<input type="checkbox"/> Deteriorated		
d)	GOS insulators -condition		<input type="checkbox"/> OK <input type="checkbox"/> Chipped / flashed over/damaged <input type="checkbox"/> To be replaced			
e)	Any arcing symptoms at jump connections of GOS		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
f)	Type of jump connections to GOS		<input type="checkbox"/> Lugs /Clamps duly Crimped	<input type="checkbox"/> Simply twisted by wires		
g)	Whether GOS blades properly aligned so as to close and open all three blades simultaneously		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
h)	Whether the GOS mounting plot farm in good condition without deterioration		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
i)	Whether the non-conducting metal parts of GOS and operating handles are earthed		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
12	L.T.Wiring					
a)	Number of L.T.Circuits		<input type="checkbox"/> One	<input type="checkbox"/> Two	<input type="checkbox"/> Three	<input type="checkbox"/> Four
b)	Size of Insulated wires for each circuit					
c)	Whether the L.T.Insulated cables are of adequate size		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
d)	Method of connecting L.T.Leads to L.T.Line		<input type="checkbox"/> Using P.G.Clamps / Wedge clamps	<input type="checkbox"/> Simply twisted by wires		
13	Lightning Arrestors					
a)	Number of Lightning Arrestor		<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> nil
b)	Properly connected to H.T Line		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
c)	Are they connected from both sides by two separate & distinct connections by adequate size wire to earth electrode		<input type="checkbox"/> Yes	<input type="checkbox"/> NO		
d)	Mounted on		<input type="checkbox"/> Structure	<input type="checkbox"/> Directly on Transformer		

e)	Whether the LAs are earthed by two distinct earth connections	<input type="checkbox"/> Yes	<input type="checkbox"/> No
14	Earthing		
a)	Number of Earth electrodes	<input type="checkbox"/> 1	<input type="checkbox"/> 2
b)	Condition of earth electrodes	<input type="checkbox"/> Good	<input type="checkbox"/> Deteriorated
c)	Earth resistance of each electrode after disconnecting from all connections in Ω	<input type="text"/>	<input type="text"/>
d)	Distance between earth electrodes	<input type="checkbox"/> More than 2.5 Mtrs	<input type="checkbox"/> Less than 2.5 Mtrs
e)	Whether the earth electrode pipes are projected above the ground level and causing hindrance to public movement	<input type="checkbox"/> Yes	<input type="checkbox"/> No
15	Loading on Transformer		
a)	Load on each phase during peak time in Amps	<input type="text"/>	<input type="text"/>
b)	Load in Neutral in Amps during peak time	<input type="text"/>	
c)	Voltage between phases during peak	R & Y <input type="text"/>	Y & B <input type="text"/>
d)	Voltage between Ph & Neutral during peak	R & N <input type="text"/>	Y & N <input type="text"/>
e)	Voltage between Neutral & Ground during peak	<input type="text"/>	
16	General condition of DTC		
a)	Whether the DTC hindrance to Public movement	<input type="checkbox"/> Yes	<input type="checkbox"/> NO -Hindercane
b)	Whether the GOS operating handles hindrance to public movement	<input type="checkbox"/> Yes	<input type="checkbox"/> NO - Hindercane
c)	Whether Adequate (minimum) 3.1 Mtrs ground clearance of H.T & L.T. terminals of Transformer from ground is maintained or not	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
d)	Whether the L.T. insulated leads made inaccessible to public and neatly laid using spacers and rigidly fastened to the cross arm fixed to the transformer structure	<input type="checkbox"/> Yes	<input type="checkbox"/> NO

e)	Whether the bottom of L.T.Distribution box: Is 2,0 Mtr above ground level	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
f)	Whether the covers and doors of the LT DB is kept closed and locked and are so provided that they can be opened only by means of a key or special key or special appliance	<input type="checkbox"/> Yes	<input type="checkbox"/> NO	
g)	Whether the LT DB is effectively connected to earth electrode by two distinct earth connections of adequate size wire to Earth Electrode	<input type="checkbox"/> Yes	<input type="checkbox"/> NO	
h)	Whether wooden / PVC bushings are provided at entry & exit of L.T.Leads	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
i)	Condition of L.TDistribution box like painting /rusting/deterioration	<input type="checkbox"/> OK	<input type="checkbox"/> Requires painting	<input type="checkbox"/> Requires replacement
j)	Whether the louvers of the L.T.D.B are made vermin proof	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
k)	Whether the earthed fencing is provided to plot form mounted DTC	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
l)	Whether the DTC is safe to lives and property	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Annexure-3: LV Network – Safety / Technical Audit

1.	Date of Inspection	..... 2016	Time hrs
2.	Location	_____ Sub-Division	_____ Division
3.	Name of the section	:	
4.	Name of 11 kV feeder	:	
5.	Transformer location name	:	
6.	Transformer location No	:	
7.	Pole No.	:	
8.	Type of support	<input type="checkbox"/> RCC <input type="checkbox"/> PCC <input type="checkbox"/> PSCC <input type="checkbox"/> Rail <input type="checkbox"/> STP <input type="checkbox"/> Others	

a)	Height of pole (mts)		<input type="checkbox"/> 7.5 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> Above 9
b)	No of circuits on the pole		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
c)	a) No of wires		<input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 7 <input type="checkbox"/> 8
9	Line support		
a)	Support condition	:	<input type="checkbox"/> OK <input type="checkbox"/> leaning <input type="checkbox"/> Broken <input type="checkbox"/> Bent <input type="checkbox"/> Rusted
b)	Location	:	<input type="checkbox"/> Straight <input type="checkbox"/> Cut point <input type="checkbox"/> Tap <input type="checkbox"/> Dead End
10	Earthing of pole		
a)	Pole earthing		<input type="checkbox"/> Done <input type="checkbox"/> Not done
b)	Type of pole earthing		<input type="checkbox"/> Solenoid type earthing <input type="checkbox"/> Efficiently Earthed
c)	If not earthed whether C.E (continuous Earth) wire provided		<input type="checkbox"/> Provided <input type="checkbox"/> Not provided
11	Cross arm condition	:	<input type="checkbox"/> OK <input type="checkbox"/> Tilting <input type="checkbox"/> Rusted
12	Guys /Stay wires		
a)	No of stays / guys	:	<input type="checkbox"/> Nil <input type="checkbox"/> Specify No
b)	Whether guys are provided with guy / break insulators.		<input type="checkbox"/> Yes <input type="checkbox"/> No
c)	Whether guy insulators are more than 3.0 Mtrs from ground		<input type="checkbox"/> Yes <input type="checkbox"/> No
d)	Condition of guy		<input type="checkbox"/> Good <input type="checkbox"/> To be rectified <input type="checkbox"/> To be replaced
e)	Whether guys rods concreted		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not required <input type="checkbox"/> To be concreted
13	Insulators		
a)	Pin insulators		<input type="checkbox"/> OK <input type="checkbox"/> Broken /Chipped <input type="checkbox"/> Flashed over
b)	Shackel /Disc insulators		<input type="checkbox"/> OK <input type="checkbox"/> Broken /Chipped <input type="checkbox"/> Flashed over
c)	Whether the pin insulators are used at the angle of deviation of more than 5°		<input type="checkbox"/> Yes <input type="checkbox"/> No
14	Conductors		
a)	Condition of stringing of conductors		<input type="checkbox"/> Properly strung <input type="checkbox"/> loosely strung
b)	Condition of conductor		<input type="checkbox"/> Good <input type="checkbox"/> Damaged
c)	No of joints in the span for each phase		<input type="checkbox"/> Nil <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4

d)	Method of jointing of wires	<input type="checkbox"/> Using jointing sleeve <input type="checkbox"/> simply twisted
e)	Condition of Joint	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Bad <input type="checkbox"/> To be redone using jointing sleeve
f)	Condition of jump connection	<input type="checkbox"/> OK using PG / wedge clamps <input type="checkbox"/> simply twisted / To be rectified
g)	Whether the flat armoured aluminum tape wrapped over the conductor for binding the conductor to pin insulator	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> To be done
15	Safety clearances	
a)	Ground clearance	<input type="checkbox"/> Normal <input type="checkbox"/> Low
b)	Clearance between each circuit	: <input type="checkbox"/> One circuit only <input type="checkbox"/> OK <input type="checkbox"/> To be increased
c)	Vertical clearance to buildings	: <input type="checkbox"/> OK <input type="checkbox"/> To be increased / rectified
d)	Horizontal clearance to buildings	<input type="checkbox"/> OK <input type="checkbox"/> To be increased / rectified
e)	Clearance to tree branches	<input type="checkbox"/> OK <input type="checkbox"/> To be trimmed
f)	Phase to phase conductor clearance	<input type="checkbox"/> OK <input type="checkbox"/> To be increased
16	Guardings	
a)	Guarding condition (between HT & L.T)	<input type="checkbox"/> No guarding <input type="checkbox"/> OK <input type="checkbox"/> To be provided
b)	Earthing of guarding	<input type="checkbox"/> No guarding <input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> To be provided
c)	Provision of guarding at road crossing, telephone crossing etc	<input type="checkbox"/> No crossing <input type="checkbox"/> Existing <input type="checkbox"/> Not existing <input type="checkbox"/> To be provided
d)	Road Guarding condition	<input type="checkbox"/> No guarding <input type="checkbox"/> OK <input type="checkbox"/> To be rectified
e)	Whether Road guarding is earthed	<input type="checkbox"/> Done <input type="checkbox"/> Not done
17	Coping to the pole	<input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> Not required
18	Muffling to the pole	<input type="checkbox"/> Done <input type="checkbox"/> Not done <input type="checkbox"/> Not required
19	Whether the L.T Pole and previous span is safe to lives and property	<input type="checkbox"/> Yes <input type="checkbox"/> NO
20	Service Mains of the Consumers	
a)	Number of service mains	<input type="checkbox"/> Number of S-Phase <input type="checkbox"/> Number of 3-Phase
b)	Whether Fiber fuse boards provided	<input type="checkbox"/> Provided <input type="checkbox"/> Not provided
c)	Whether the lead wires from Phase & neutral conductors to the fibre board are to be enclosed in PVC conduit pipe	<input type="checkbox"/> Enclosed <input type="checkbox"/> Not enclosed

d)	Whether the PVC conduit pipes are rigidly fixed to the Pole using clamps	<input type="checkbox"/> Fixed <input type="checkbox"/> Not fixed
e)	Type of service mains	<input type="checkbox"/> over Head insulated wire <input type="checkbox"/> Under Ground Cable
21	U.G.Cable service mains from over head lines	
a)	Whether wooden or PVC bushings provided at the entry / exit of UG Cable lead wires from the pot head provided to termination of UG cable service mains.	<input type="checkbox"/> Provided <input type="checkbox"/> Not provided
b)	Whether the service main pot heads are earthed or not	<input type="checkbox"/> Earthed <input type="checkbox"/> Not earthed
c)	Whether UG cable service main pot heads/ terminations are rigidly fixed to a earthed metallic cross arm of the pole or not.	<input type="checkbox"/> Fixed <input type="checkbox"/> Not Fixed
d)	Whether the temporary over head service mains drawn in case of Fault in UG cable service mains	<input type="checkbox"/> Yes <input type="checkbox"/> NO
22	Over head service mains	
a)	The condition of insulation of over head insulated service mains	<input type="checkbox"/> OK <input type="checkbox"/> Deteriarated
b)	Adequacy of ground clearance of service mains	<input type="checkbox"/> Adequate <input type="checkbox"/> Not adequate
c)	Whether single core PVC insulated wires are used for service mains	<input type="checkbox"/> Yes <input type="checkbox"/> NO
d)	Whether the G.I.Messenger wire is used along with porcelain /PVC reel insulators for service mains	<input type="checkbox"/> Yes <input type="checkbox"/> NO
23	Street Light circuits from over head line	
a)	Type of street light circuit	<input type="checkbox"/> Over Head line <input type="checkbox"/> UG Cable
b)	Whether street light circuit control cum metering box fixed or not	<input type="checkbox"/> Provided <input type="checkbox"/> not provided
c)	If provided whether it is at an height of 2.0 mtr from ground level	<input type="checkbox"/> Yes <input type="checkbox"/> NO

d)	Whether metallic portions of the street light control cum metering box is earthed or not	<input type="checkbox"/> Yes earthed	<input type="checkbox"/> Not earthed
e)	Whether the insulated wires from over head line street light phase to control box is enclosed in PVC pipe or not	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
f)	Whether the in insulated wires joints are insulated by two layers of cambric tape & two layers of adhesive PVC tape	<input type="checkbox"/> Yes insulated	<input type="checkbox"/> Not insulated / Live parts exposed
g)	Whether street light control box is inaccessible to public and their covers and doors are kept closed and locked and they can be opened only by means of a key or special key or special appliance.	<input type="checkbox"/> Yes Door locked	<input type="checkbox"/> No Not locked
24	Street Light circuits from UG cable control		
a)	Whether the connection / tap point between the UG Cable street light control cable and the pole street light circuit is embedded in a box	<input type="checkbox"/> Embedded in the coping of the pole	<input type="checkbox"/> Fixed to the pole
b)	If embedded whether the metallic portions of the box is earthed	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
c)	Whether the joints between the street light control UG cable and wires taken to street light is properly insulated or not	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
d)	If it is fixed to the pole Whether such box is fixed at 2.0 mtrs above ground level	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
e)	Whether such box is inaccessible to public and their covers and doors are kept closed and locked and they can be opened only by means of a key or special key or special appliance.	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
f)	Whether metallic portions of such box is connected to earth electrode by two distinct earth connection with adequate size wires	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
g)	Whether the PVC insulated wires from the street light control cum metering box to street light of the poles is enclosed in PVC pipe or not	<input type="checkbox"/> Yes	<input type="checkbox"/> NO
h)	Whether the live wires in the box are properly insulated or not	<input type="checkbox"/> Yes	<input type="checkbox"/> NO

25	Whether the L.T. line support is safe to lives and property in all aspects.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
----	---	------------------------------	-----------------------------

Annexure-4: 11kV RMU / UG cable Safety / Technical Audit

1.	Date of Inspection	.... .. 2016 Time hrs
2.	Location	_____ Sub-Division _____ Division
3.	Name of Substation	
4.	Name of 11 kV feeder	
5.	RMU Name & Number	:
6.	Type of RMU	<input type="checkbox"/> Air insulated <input type="checkbox"/> SF-6 Gas filled <input type="checkbox"/> DAS RMU
7.	Type of Breakers	<input type="checkbox"/> Vacuum <input type="checkbox"/> Oil <input type="checkbox"/> SF-6
8.	Whether the location is hindrance to public movement	<input type="checkbox"/> Yes <input type="checkbox"/> No
9.	Condition of outer cover	<input type="checkbox"/> OK <input type="checkbox"/> Rusted <input type="checkbox"/> Deteriorated
10.	Condition of painting	<input type="checkbox"/> OK <input type="checkbox"/> To be repainted
11.	Whether the wodden / PVC bushings at the entry & exit points of UG cable to & from RMUs have been provided	<input type="checkbox"/> Yes <input type="checkbox"/> No
12.	Whether the metallic body earthing has been provided with two distinct earth connections with adequate capacity earth leads to pipe earth electrode.	<input type="checkbox"/> Yes <input type="checkbox"/> No
13.	Whether the covers and doors are kept closed and locked and they can be opened only by means of of a key or special key or special appliance	<input type="checkbox"/> Yes <input type="checkbox"/> No
14.	Whether louvers of the RMU and all other entry points have been made vermine proof to prevent entry of raptiles	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not required
15.	Whether the earthed fencing provided around RMU	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Fencing provided but not earthed
16.	Whether Cable route markings are provided along the 11 kV cable	<input type="checkbox"/> Provided <input type="checkbox"/> Not Provided

16 (a)	Whether the Cable armour is earthed	<input type="checkbox"/> Yes <input type="checkbox"/> No
17	Whether the area around RMU is kept clean & tidy	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> To be cleaned
18	Whether the RMU is safe to lives and property	<input type="checkbox"/> Yes <input type="checkbox"/> No

Annexure-5:		L.T. Feeder Pillar Boxes - Safety / Technical Audit	
1.	Date of Inspection	.... .. 2016	Time hrs
2.	Location	_____ Sub-Division	_____ Division
3.	Name of 11 kV feeder		
4.	Name of DTC		
5.	L.T.F.P.Box Name & Number	:	
6.	Size of main UG Cable	3½ core UG Cable size _____ Sq MM (Copper/Aluminum)	
6.	Type of Breakers for main Cable	<input type="checkbox"/> Air break switch	<input type="checkbox"/> MCCB _____ Amps capacity
7.	Type of control provided to Service mains	<input type="checkbox"/> Fiber Fuses	<input type="checkbox"/> Porcelain cut outs <input type="checkbox"/> MCBs
8.	Whether the location is hindrance to public movement	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9.	Condition of outer cover and doors	<input type="checkbox"/> OK	<input type="checkbox"/> Rusted <input type="checkbox"/> Deteriorated
10.	Condition of painting	<input type="checkbox"/> OK	<input type="checkbox"/> To be repainted
11.	Whether the wooden / PVC bushings at the entry & exit points of UG cable to & from LTFB have been provided	<input type="checkbox"/> Yes	<input type="checkbox"/> No
12.	Whether the metallic body earthing has been provided with two distinct earth connections with adequate capacity earth leads to pipe earth electrode	<input type="checkbox"/> Yes	<input type="checkbox"/> No
13.	Whether the covers and doors are kept closed and locked and they can be opened only by means of a key or special key or special appliance	<input type="checkbox"/> Yes	<input type="checkbox"/> No
14.	Whether the earthed fencing provided around LTFB	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Fencing not earthed <input type="checkbox"/> Fencing not required

15	Whether louvers of the L.T.feeder pillar boxes and all other entry points have been made vermine proof to prevent entry of ruptiles	<input type="checkbox"/> Yes	<input type="checkbox"/> No
16	Whether Cable route markings are provided along the LTUG cable	<input type="checkbox"/> Yes	<input type="checkbox"/> No
17	Whether danger Boad provided	<input type="checkbox"/> Yes	<input type="checkbox"/> No
18	Whether the sources of power supply from either side is painted	<input type="checkbox"/> Yes	<input type="checkbox"/> No
'19	Whether the the live parts of LT FB are accessible to public	<input type="checkbox"/> Yes	<input type="checkbox"/> No
20	Whether the incoming & out going cables & service main cables are enclosed in Pipes from ground level to L.T. F.B	<input type="checkbox"/> Yes	<input type="checkbox"/> No
21	Whether R.R. / Consumer Code numbers are marked on service main cables / MCBs / Fuse units	<input type="checkbox"/> Yes	<input type="checkbox"/> No
22	Whether the area arround L.T.F.P.Box is clean & Tidy	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> To be cleaned
23	Whether the L.T.Main cable and service main cable connections to Bus bars and MCCBs / MCBs are made by using crimped lugs	<input type="checkbox"/> Yes	<input type="checkbox"/> No
24	Whether the L.T.F.P.Box is safe to lives and property	<input type="checkbox"/> Yes	<input type="checkbox"/> No