No. 774/RESSPO/QC/TPIA, Dated ...10/06/2026

Important Points for Applicants Constructing Electrical Infrastructure after Paying Supervision Charges

Dear Applicant,

The construction of the electrical system is being done by you after depositing the supervision charges. Please note that you are fully responsible for the quality of materials used and the work performed in this task. If the quality of work or materials is poor, there will be frequent outages in the electrical system. These problems will ultimately affect your own work. Therefore, it is extremely important to ensure quality while executing the work.

The advisory regarding some major points to note in this regard is as follows:

1. **Points to keep in mind while selecting the contractor for electrical work:**

   (1) Select a contractor who is a valid **Class-A, Licensed Electrical Contractor**. Ensure that the contractor has sufficient skilled manpower to perform the work. Skilled manpower refers to those labourers or technicians who possess the necessary technical knowledge, training, and practical experience to perform electrical work safely and accurately. They should possess a **Recognition of Prior Learning (RPL)** certificate or an **ITI certificate** recognized by NCVT/SCVT in the electrical trade, and a wireman permit (issued by Directorate of Electrical Safety). To verify the contractor's manpower, you can ask the contractor for the employed personnel's **EPFO numbers**. The contractor should have sufficient experience in this type of work, and no departmental action should have been taken in the past or be pending against him. Also ensure that the contractor has the necessary equipment for electrical work and personnel safety, such as crimping tools, safety belts, helmets, earthing rods, earthing chains etc.

   (2) You are spending a large sum of money on this work. In some cases, this amount can be in lakhs or crores. Even after spending such a large sum, if your contractor does not employ an experienced engineer for technical supervision of the work, it will not be possible to ensure quality in the work. Therefore, ensure that the work is supervised by your contractor through an experienced electrical engineer. You should also engage an experienced /knowledgeable engineer yourself, to ensure future operational stability and avoidance of supply disruptions like trippings.

2. **Points to keep in mind for the quality of materials used:**

   (1) Keep the original purchase receipts (**Tax Invoices**) of all materials used in the construction of the electrical system safe and furnish them when requested by the department.

   (2) Transformers should be purchased from the manufacturers who are supplying transformers in the Discom and according to the approved **GTP (Guaranteed Technical Particulars)** only. You can obtain the list of accepted manufacturers from the Discom. To get the GTP approved, you must obtain the GTP of the specific material from the supplier firm and present it to the **Superintending Engineer (Material Management)** of the Discom for approval.

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(3) According to the departmental norms, only those transformers are installed whose manufacturers have a valid **Type Test Certificate** for a transformer of similar design. Type tests are conducted by transformer manufacturers in the labs of the **Central Power Research Institute (CPRI)** or **Electrical Research and Development Association (ERDA)**, and the validity of this certificate is five years from the date of issuance. Therefore, please ensure that a certificate of passing the type test on a transformer of similar design to the one being purchased, which is not older than 5 years, is obtained and presented to the department. It is clarified again here that **it is not necessary for the type test to have been conducted on the particular transformer that you are purchasing; rather, it is necessary that a successful type test has been conducted on a transformer of similar design to the one you are purchasing.**

(4) Place the order for the transformer with the supplier only **after your provided GTP has been approved**. When the transformer is ready for delivery, inform the **Quality Cell** of the Discom. It is mandatory that the inspection of the transformer used in the electrical system construction be done at the manufacturer's premises only through a team formed by the **Discom Quality Cell (D.Q.C.)**. Do not take delivery of the transformer without conducting a successful inspection.

(5) If the value of any of the following materials—Conductor, Cable (HT/LT), VCB, and Pole—exceeds **2.00 lakh** according to the estimate, inspection must be conducted at the manufacturer works facility. Do not take delivery of these materials without a successful inspection.

(6) Other materials are inspected locally by a team formed by the concerned **Superintending Engineer (Distribution)**. This inspection is done at your local store/site where the work is to take place. For this inspection, you should inform the local Superintending Engineer (Distribution).

(7) The guarantee period of all the materials should also be the same as in the department. The guarantee periods prevalent in the department for various materials (updated till May 2026) are as follows:

S No.	Material	Guarantee Period
1	Power Transformer (1MVA and above)	15 Years and extendable by 1 more year if damaged within 15 years
2	Distribution Transformer (250kVA to 630 kVA)	10 Years and extendable by 1 more year if damaged within 10 years
3	Distribution Transformer (Up to and including 100 kVA)	8 Years and extendable by 2 more years if damaged within 5 years
4	Aerial Bunched Cables	3 Years
5	ACSR Conductors	2 Years
6	XLPE Cables (HT/LT)	2 Years
7	VCB	5 Years
8	Poles	2 Years
9	Insulators	2 Years
10	Any other material	2 Years

3. **Points to keep in mind for workmanship during the execution of work:**

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(1) Technical points such as proper grouting of poles and thorough earthing of transformers/poles are extremely important during construction. Such major technical

points have been compiled in **Annexure-A**. Please ensure compliance of all points. Standards for underground works are compiled in **Annexure-B**.

(2) Please get the inspections done by departmental officers and **TPIA (Third Party Inspecting Agency)** while the work is being carried out. For these inspections, contact the local Superintending Engineer and the Discom Quality Cell. Email IDs and contact details of all departmental officers are available on the official web pages of the Discoms:

a) PuVVNL- https://puvvnl.in/en/page/officers-staff
b) MVVNL- https://mvvnl.in/post/en/directory?cd=NQA2AA%3d%3d
c) DVVNL- https://dvvnl.org/uploadfiles/Officer%20List%20Final.pdf
d) PVVNL- https://www.pvvnl.org/en/24/65/Who-Is-Who
e) KESCo- https://kesco.org.in/EmployeeDirectory

4. Points to keep in mind for regular energization after completion of work:

(1) After completion of work:

a) Conduct a physical inspection of the newly constructed system through the contractor's technical supervisor. If tree branches are seen in contact with the line, get them sufficiently pruned.
b) Measure the value of **earth resistance** to verify if the earthing of the transformer/pole has been done properly. Detailed technical points regarding earthing are given in **Annexure-A**.
c) Check whether the pole grouting has been done properly. Lack of pole grouting leads to the danger of poles tilting or falling, which can cause loss of life and property. Major standard technical points related to this are in **Annexure-A**.
d) After all standards are found correct, request the department for post-work inspection and energization.

(2) Obtain a **No Objection Certificate (NOC)** after inspection from the **Directorate of Electrical Safety** as per rules (if applicable).

(3) Carry out energization upon completion and observe the sustainability and reliability of the system. If deficiencies like tripping, incorrect voltage, or hot-spots are found, bring the system into regular use only after their rectification.

(4) Payment should be made to the engaged agency only after the electrical system is properly energized through the mentioned process. Some portion of the payment, or security in another form, should be held for the next three years for repairs. All these conditions should be settled with the agency before the work starts.

5. What not to do:

(1) Do not use any construction material without conducting a departmental inspection. If any departmental officer delays the inspection, you can register a complaint through:

a) **1912 Helpline**
b) The concerned **Superintending/Chief Engineer**
c) **Managing Director** on following email IDs:

i. **PuVVNL:** md@puvvnl.in
ii. **MVVNL:** md@mvvnl.org
iii. **DVVNL:** md@dvvnl.org
iv. **PVVNL:** md@pvvnl.org

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v. **KESCo:** mdkesco@kesco.org.in

(2) The system should not be energized without an inspection from the **Directorate of Electrical Safety**.
(3) Construct the system only according to the **approved estimate**; do not deviate from it.
(4) Do not use any medium other than a **Class-A, Licensed Electrical Contractor**.
(5) Do not wait for the completion of the work to request supervision and inspection by departmental officers/TPIA. Keep getting inspections done during the work and rectify the **Non-Conformities (NCs)** found. Also, keep a record of these inspections.
(6) Do not use stolen material or unauthorized material issued from a store under any temptation. Report such unscrupulous elements to higher authorities. A line constructed with stolen material will not be energized, and legal action will be taken. Ensure all material is purchased by the applicant and does not have the name of any departmental scheme engraved on it.
(7) Do not store electrical material in the open or where there is a fear of fire.

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Advisory for Departmental Officers

6. (a) What to do:

(1) If an applicant seeks your advice while selecting a contractor for electrical work, provide every possible assistance in choosing the right option. Provide the applicant with full information regarding contractors against whom departmental action is ongoing due to failure to meet standards or irregularities, and recommend against such contractor's selection.

(2) The Superintending Engineer (Material Management) of the Discom should publish the list of prevalent manufacturers for major materials used in the department and the latest previously approved GTPs on the Discom website so they are easily accessible to all current and future applicants.

(3) When an applicant obtains a GTP from a supplier firm and presents it for approval before purchasing any material, the Superintending Engineer (Material Management) of the Discom must decide on the approval or rejection of the GTP based on its merits within three working days and inform the applicant of the decision with reasons.

(4) Before approving the GTP of a transformer, thoroughly inspect the supplier's type test pass certificate. This will be the responsibility of the Superintending Engineer (Material Management) of the Discom.

(5) The Superintending Engineer (Material Management) of the Discom must ensure that the guarantee period for all materials used in the construction of the electrical system is the same as the guarantee period prevalent in the department. The guarantee periods currently prevalent in the department for various materials are described in point number 2 (7) of this advisory.

(6) For materials that require pre-supply inspection at the manufacturer's premises, ensure the inspection is completed within one week from the date on which the applicant informs that the material is ready for inspection. This will be the responsibility of the Chief/Superintending Engineer (Quality Cell) of the Discom.

(7) For materials to be inspected at the local level by a team formed by the concerned Superintending Engineer (Distribution), the inspection must also be completed within one week from the date the applicant notifies that the materials are ready.

(8) Inspect the work through departmental officers and TPIA (Third Party Inspecting Agency) while the work is being carried out. Technical points during the construction of the electrical system, such as proper grouting of poles and thorough earthing of transformers/poles, are extremely important. Major technical points of this nature have been compiled in **Annexure-A**. Please ensure compliance with all points. Get the deficiencies (NCs - Non-Conformities) found during the work rectified timely. Keep a record of this as well. This will be the responsibility of the Chief/Superintending Engineer (Distribution) of the Discom.

(9) Ensure that all material has been purchased by the applicant themselves and that the name of any departmental scheme, etc., is not engraved on the material. The responsibility for this will lie with the officer designated for inspection, as well as the regional Junior Engineer/Sub-Divisional Officer/Executive Engineer.

(10) Conduct a rigorous inspection of the electrical system after the work is completed. If deficiencies are found, such as earth resistance values not meeting standards, improper pole grouting, tilted poles, incorrect line sag, etc., energize the system only after all standards are corrected. This will be the responsibility of the regional Junior Engineer/Sub-Divisional Officer/Executive Engineer.

(11) Always speak to the applicant in a respectful and sensitive manner.

(12) Keep the email IDs and contact details of all departmental officers updated and published on the official web pages of the Discoms and also inform the applicant.

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(b) What not to do:

(1) Never behave impolitely with the applicant. If any work is not possible within the scope of departmental rules, inform the applicant patiently and politely.
(2) Do not energize the electrical system without conducting an inspection through the Directorate of Electrical Safety.
(3) Do not energize a line constructed with stolen material.
(4) Do not delay the inspection of materials used in the construction of the electrical system. In case of delay, take action against the guilty personnel.

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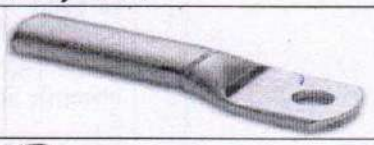
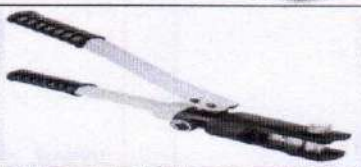
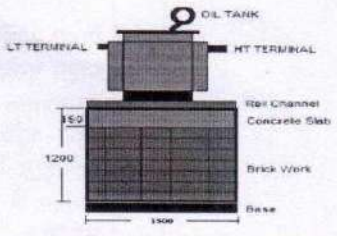
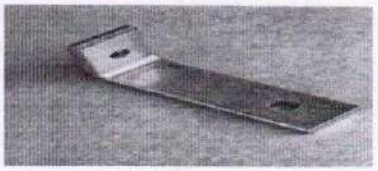
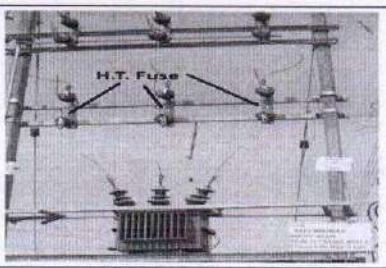
Annexure-A

परिवर्तक (ट्रांसफार्मर) कार्य		
1	ट्रांसफार्मर से लाइन को जोड़ने के लिए Lugs का उपयोग किया जाए।	
2	Lug को crimping tool माध्यम से ठीक से क्रिम्प किया जाये। Lugs के अच्छी प्रकार से क्रिम्प न होने पर स्पार्किंग होती है, जिससे ट्रांसफार्मर तथा केबल, दोनों के क्षतिग्रस्त होने की सम्भावना होती है।	
3	ट्रांसफार्मर के नीचे उसे बेस एंगल से कसे जाने हेतु स्लॉट दिया जाता है। डबल पोल पर स्थापित ट्रांसफार्मर को नट और बोल्ट के माध्यम से ही बेस एंगल पर कसा किया जाये।	
4	प्लिंथ निर्माण के समय ही यह सुनिश्चित किया जाये कि निर्माण सामग्री मानक के अनुरूप हो। प्लिंथ निर्माण में चैनल के नीचे 150mm कंक्रीट स्लैब होना चाहिए। इसके नीचे ईंट (ब्रिक वर्क) होना चाहिए। प्लिंथ की कुल लम्बाई(हाइट) 1200mm होनी चाहिए। सभी विन्यास इस प्रकार से हैं - 1500mm*1500mm*1200mm।	
5	Jumpering के लिए PG clamp का उपयोग किया जाए।	
6	ट्रांसफार्मर के LT bushings पर Copper L clamp का उपयोग किया जाए। इससे ट्रांसफार्मर बुशिंग्स पर मैकेनिकल लोड नहीं पड़ता एवं टर्मिनल्स तथा LT केबल का लग बिलकुल फ्लैट जॉइंट हो जाता है जिससे loose/uneven कनेक्शन नहीं होता।	
7	Transformer HT में fuse wire का उपयोग किया जाए।विभिन्न ट्रांसफार्मर पर लगाए जाने वाले फ्यूज वायर की रेटिंग निम्नवत है : 25kVA-40SWG 63kVA-38SWG 100kVA-33SWG 250kVA-26SWG 400kVA-23 SWG	
8	ट्रांसफार्मर के LT पर प्रत्येक सर्किट पर लोड के अनुसार फ्यूज वायर लगाया जाये : 140-170Amp-12SWG 100-140Amp-14SWG 70-100Amp-16SWG 50-70Amp-18SWG Below 50 Amp-20 SWG	

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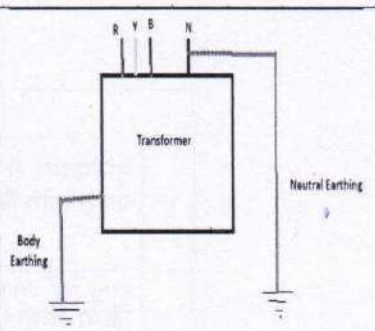
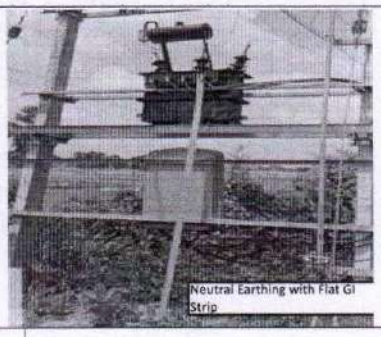
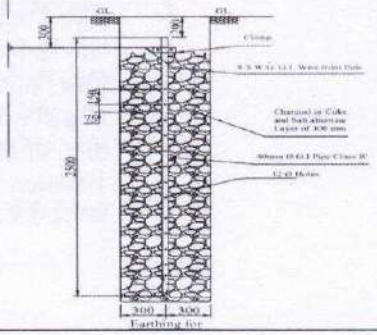
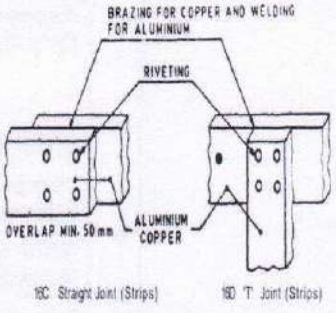
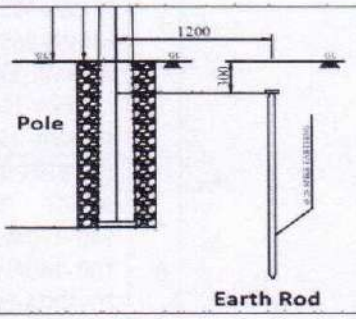
9	ट्रांसफार्मर पर neutral तथा body earthing earthing अलग-अलग की जानी चाहिए। ट्रांसफार्मर की न्यूट्रल अर्थिंग करने से आउटपुट वोल्टेज स्थिर होता है तथा बॉडी अर्थिंग से ट्रांसफार्मर से करंट लगने का खतरा कम होता है।	
10	100kVA क्षमता तक के परिवर्तक की बॉडी अर्थिंग तथा न्यूट्रल अर्थिंग हेतु 25*3 mm galvanised iron GI फ्लैट्स का प्रयोग किया जाये। 100kVA से अधिक क्षमताके परिवर्तक की बॉडी अर्थिंग तथा न्यूट्रल अर्थिंग हेतु 50*3 mm galvanised iron GI फ्लैट्स का प्रयोग किया जाये।	
11	पाइप अर्थिंग करते समय यह सुनिश्चित करें कि पाइप इलेक्ट्रोड का गहरा वाला सिरा भूमि में 2700mm नीचे तक जाये एवं इसका ऊपरी सिरा भूमि के 200mm नीचे रहे। पाइप इलेक्ट्रोड के 2500mm गहराई के 300mm radius में कोयले तथा नमक का मिश्रण होना चाहिए।	
12	अर्थिंग स्ट्रिप में यथासंभव जोड़ कम से कम होने चाहिए। जहाँ जोड़ लगाया जाये वहां कम से कम 50mm ओवरलैपिंग की वेल्डिंग की जाये। यदि कंडक्टर जोड़ना हो तो फ्लैट वॉशर के साथ लग लगा कर नट-बोल्ट से टाइट किया जाये।	

लाइन कार्य

1	पोल को भली-भांति अर्थ करने की लिए अर्थ-रॉड को भूमि के अंदर इस प्रकार से गाड़ें, की उसका ऊपरी सिरा भूमि सतह से 300mm नीचे रहे। अर्थ-रोड की पोल से दूरी 1200mm होनी चाहिए। अर्थ-रॉड को पोल से जोड़ने वाली GI वायर टूटी नहीं होनी चाहिए।	

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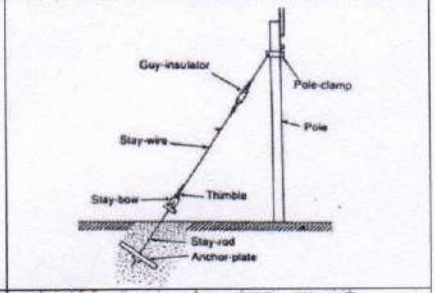
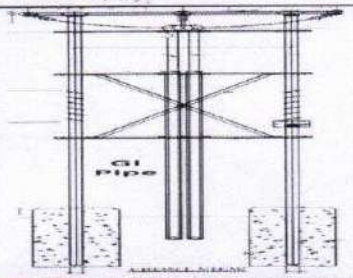
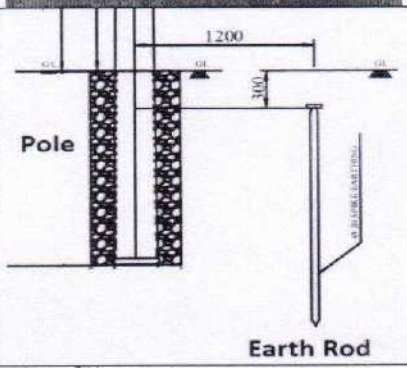
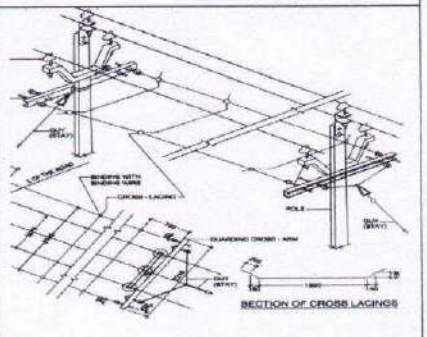
2	एस0टी0पी0(Steel Tubular Pole) muffing, ग्राउटिंग से भिन्न है | ग्राउटिंग जमीन के नीचे होती है | muffing जमीन की सतह से 300mm ऊपर तक की जाती है तथा उसके ऊपरी सिरे में ढलान रखी जाती है, जिससे एसटीपी के पास पानी न जमा हो |	
3	स्टे-सेट में Guy insulator लगाया जाये | Guy insulator स्टे वायर के निचले हिस्से को इलेक्ट्रिकली isolate करने के लिए लगाया जाता है | इसे अवश्य लगाना चाहिए जिससे स्टे-वायर में करंट आने की दुर्घटनाऐं रोकी जा सकें |	
4	11 केवी केबल की Hoisting GI पाइप के अंदर से की जाए | यह भी सुनिश्चित किया जाये की GI पाइप का नीचे वाला सिरा भूमि की सतह के अंदर गड़ा हो | यह केबल को सुरक्षित रखता है |	
5	किसी भी पोल की ग्राउटिंग उस पोल की लम्बाई के 1/6th पार्ट की करी जानी चाहिए | ग्राउटिंग करते समय सीमेंट:रेत:गिट्टी का अनुपात 1:4:8 का होना चाहिए |	
6	HT XLPE केबिल को spike earth rod के माध्यम से अर्थ किया जाये | Earth rod को भूमि के अंदर इस प्रकार से गाड़ें, की उसका ऊपरी सिरा भूमि सतह से 300mm नीचे रहे |	
7	HT लाइन की रोड क्रासिंग एवं अन्य संवेदनशील स्थानों पर गार्डिंग अवश्य की जाये | इसका विंग स्पान 2150mm होना चाहिए तथा हर 2000mm की लाइन की लम्बाई पर क्रॉस लेसिंग की जाये |	

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Annexure – B

UPPCL

GUIDELINES FOR LAYING UNDERGROUND CABLE IN POWER DISTRIBUTION

10.6.2024

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U/G Cable Laying & Installation-

Selection of the route: The cable route selection shall be done by the concerned Junior Engineer/Supervising engineer by first conducting joint route survey with contractor keeping the following points in mind-

i. The side of road, which presents the least obstacles and the fewest roadways crossings.

ii. The future consumers and existing cables

iii. Railway, NHAI road crossings, PWD, Road pertaining to Municipal area/other government department.

iv. Plans for future building projects.

v. Identification of routes for laying cable(s) for alternative/double supply and feasible locations for installing associated RMUs.

The cable route shall be as far as possible away from parallel running gas, water pipes and telephone/telecommunication cables. Location with least damage conditions for cable joints and end terminations should be selected as required.

The contractor shall follow the routes indicated on the approved specification drawings as accurately as possible. Deviations from the routes laid down shall not be made without the authorized officers' approval. The final position of cable relative to kerbs, boundaries, and other services shall, where necessary, be indicated to the contractor by the engineer on site and must be strictly adhered to. In general, where obstacles not provided for in the specification drawings are encountered, cables shall circumvent such obstacles by being laid in as smooth a path as possible around the obstacles and by retaining maximum separation between cables.

Network Planning-

i. UG network shall be planned in such a manner that reliable supply can be ensured by allowing quick restoration of supply through alternative source/circuit in case supply from main source/circuit gets disrupted.

ii. For ensuring supply reliability of HT network installation of RMUs may be included in the network plan. Similarly, for reliability of supply in LT Network Auxiliary Distribution Boxes may be included in the planned network.

iii. Discom shall identify appropriate locations to install RMUs/Distribution Boxes at the time of survey only so that seamless switching is made possible in the network.

iv. RMUs will have at least two sources. Similarly, the auxiliary distribution boxes will have to be provided with supply from two or more Distribution Transformers.

v. HRC fuses for outgoing and Fuse links for incoming may be used in Distribution Boxes. Discom may use additional protection as per requirement.

vi. Auxiliary Distribution Boxes / Distribution Pillar Boxes can be customised as per site conditions like No visible hinges when Box closed, Locking system, CRCA sheet etc.

vii. Parallel HT cable should run for same HT network in a single Cable Trench shall be avoided.

viii. Cable raisers/exposures to connect HT overhead / HT network shall be avoided. Even if Discom requires to include them in the network, they shall be provided after continuous underground cable lengths of 1 KM or more.

ix. The switchgear shall comply with relevant Indian/International standards IS 61439/62271.

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Clearance

The desired minimum clearances are as follows –

i) Power cable to power cable – A minimum clearance equal to diameter shall be maintained. Trench drawings shall be referred for guidance.

ii) Power Cable to control cables – 0.2 mtr.

iii) Power cable to communication cable – 0.3 mtr.

iv) Power cable to gas/water main – 0.3 mtr.

Depth of Cable Laying

Minimum depth of laying from ground surface to the top of cable as per IS is

i) Low voltage (1.1 kV) and Control cable - 0.75 mtr.

ii) 3.3 kV to 11 kV Cables - 0.90 mtr.

iii) 22 kV to 33 kV Cables - 1.05 mtr.

iv) Cables at Road crossing - 1.00 mtr.

v) Cables at railway level crossings (measured from bottom of sleepers to the top of Pipe) - 1.00 mtr.

Note-The depth may be increased but not more than 1.6 M.

Whenever there is any obstacle at the laying depth, the cable should be lowered/ raised to cross the obstacle. However, variation in the depth must be approved by competent authority of Discom. The Contractor shall provide the same in deviation report.

Width of Cable-The width and depth of Cable Trenches shall depend upon number of circuits and Voltage Grade. Drawings of this specification are shown in the document itself.

Bending Radius Of Cables- While pulling of the Cable from the drum or during laying following minimum bending radius shall be maintained so that the cable, in particular the insulation does not get damaged. Minimum permissible bending radii for cables must be as below-

i) Single Core Cables (PVC & XLPE)

a) Up to 11KV grade – 15 x D

b) Above 11KV grade - 20 x D

ii) Multi Core Cables (PVC & XLPE)

a) Up to 1.1KV grade - 12 x D

b) Above 1.1KV grade – 15 x D

Where 'D' is overall diameter of the cable

Maximum Permissible Tensile Strength For Cables

i) For cables pulled with Stocking

a) PVC and XLPE insulated armoured cables $P = 9\ D^2$

b) PVC and XLPE insulated unarmoured cables $P = 5\ D^2$

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Where P= pulling force in Kgm, D= Diameter of Cable in mm

ii) For cables pulled by Pulling eye- The maximum permissible tensile stress must be as below-

a) Aluminium conductor – 30 $N/mm^2 \approx 3$ Kgf/sq. mm

b) Copper conductors – 50 $N/mm^2 \approx 5$ Kgf/sq. mm

Permissible force is calculated by multiplying the above values by cross sectional area (CSA) of conductor of each core and then number of cores.

Methods of Laying

i) Cables shall be laid in direct in ground, in trenches excavated therein and shall be protected with covers as given in the drawing. Cables shall also be drawn into pipes of ducts or laid in the formed trenches or troughs or on racks or supported in trays or cleats as required by the site exigencies. Where the cables are laid in the formed trenches, the installation shall include removal and replacement of the trench covers and the provision of temporary protective covers on the trenches where they cross the access ways.

ii) HDPE (160/200 mm) pipes shall be used where cables cross roads and railways tracks. Spare ducts for future extensions should be provided. Spare duct should be sealed off. Buried ducts or ducting blocks shall project into footpath or up to the edge of road, where there is no footpath, to permit smooth entry of cable without un-due bending. The diameter of the cable conduit or pipe or duct should be at least 1.5 times the outer diameter of the cable. Angular alignment of the duct across road crossings shall be predetermined to maintain safe bending radius when direction of cable trench changes before or after the road.

iii) The contractor shall lay cable in unavoidable circumstances by horizontal direct drilling (HDD) in main roads and highway with heavy traffic, passage to public property where excavation is not possible. Contractor shall take approval for laying of cable by means of HDD wherever required from the competent authority of Discom. The cable laid by HDD shall be minimized so that it doesn't exceed by 12% of total route length. This is to avoid De-rating of Cables.

iv) Unless approved by Discom, the contractor shall lay the cables, direct in ground, in single layer. The cables shall be laid with the pre-determined and approved cable route.

v) Spacing shall be maintained uniformly between the cables all along the length including the bends, as approved by Discom. To maintain the spacing, suitable non-metallic spacers shall be placed uniformly at intervals not exceeding 5 meters. Every bend shall have at least one spacer.

vi) 75 mm of the sand bed shall be placed at the bottom of cable trench.

vii) After the cables have been laid the trench shall be filled with the sand and shall be well rammed to a level not less than 75 mm above the top of the cables all throughout the route.

viii) To protect the cables against external mechanical damage, which may be caused by other agencies, the cable shall be protected by suitable RCC cover (for dimensions of RCC cable cover refer cable laying drawing)

The type of the covers shall be as under

a) 1.1KV Cables – Single layer of brick thickness not less than 75 mm (3 inch)

b) 11KV Cables – sand stone of thickness not less than 75mm (3 inch).

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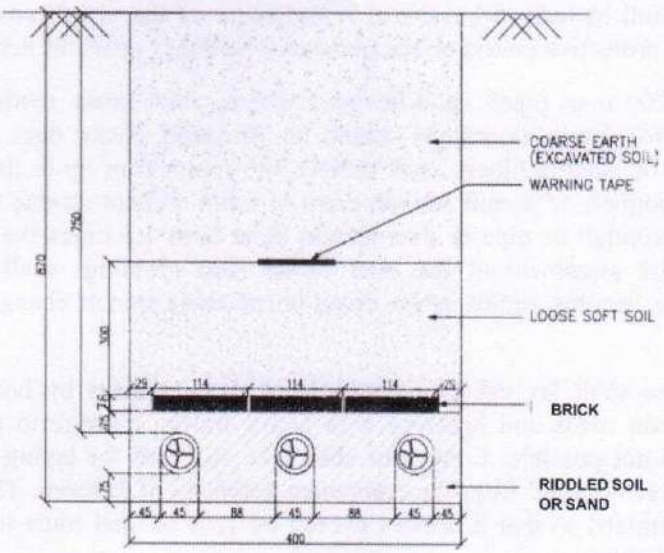
c) 33KV Cables shall be protected by reinforced concrete cover of width 300 mm as per attached drawing with thickness not less than 50mm.

The RCC cable cover shall be embossed as "Discom name 33 or 11 KV or LT CABLE" whichever is applicable.

ix) The warning tape shall be installed continuously. Tape shall be yellow in colour with Black / Red lettering of minimum 20mm height. The approved warning message shall be written in English and Hindi. The minimum thickness and width of the tape should be 300 microns and 150 mm respectively.

x) The trench shall be filled-up by soft soil (300mm) and Excavated soil as indicated in drawings.



Drawing 3.1 – 1.1kV, 150sqmm Buried Cable

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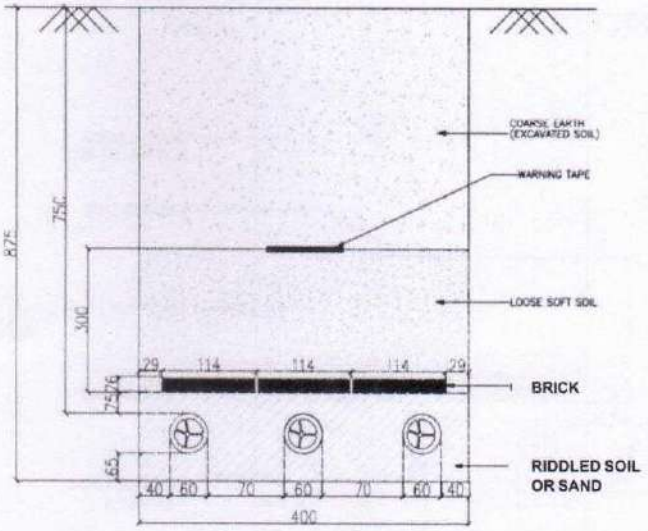
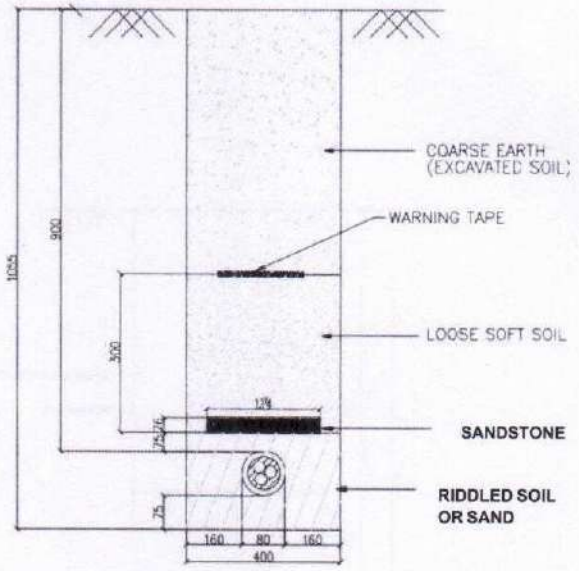


Drawing 3.2 – 1.1kV, 300sqmm Buried Cable



Drawing 3.3 – 11kV Buried Cable for Single Circuit

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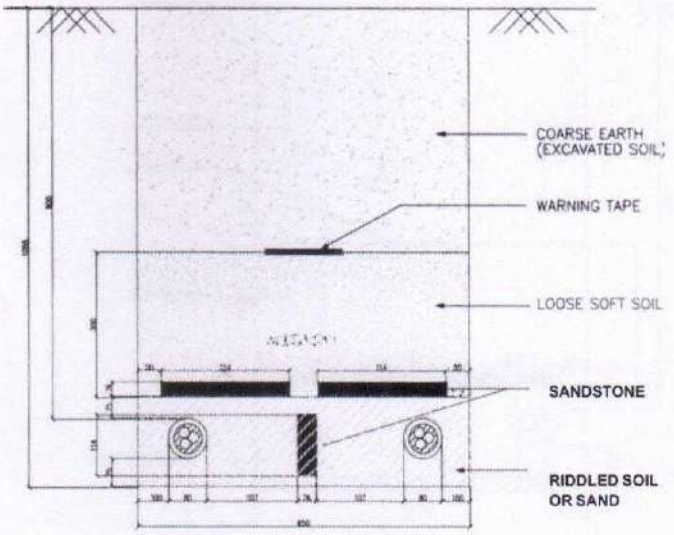
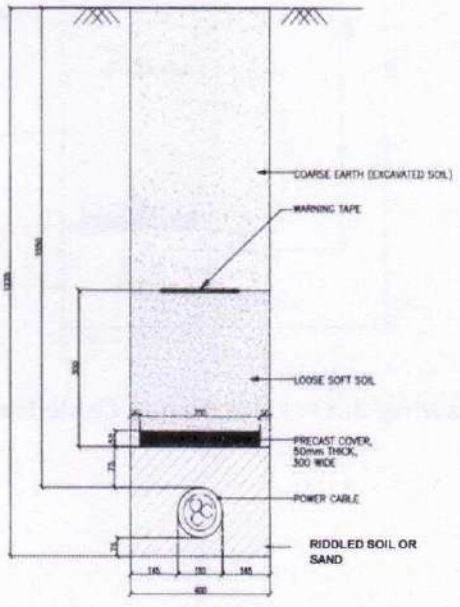


Drawing 3.4 – 11kV Buried Cable for Double Circuit



Drawing 3.5 – 33kV Buried Cable for Single Circuit

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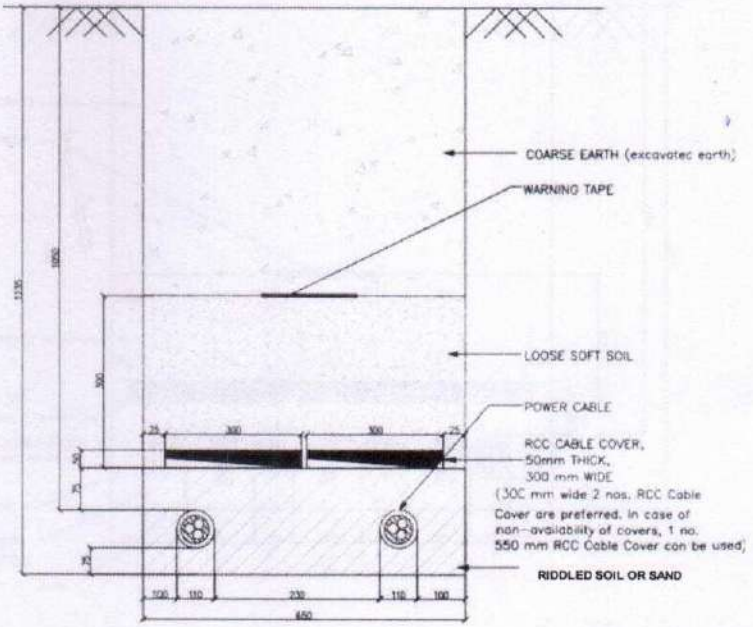
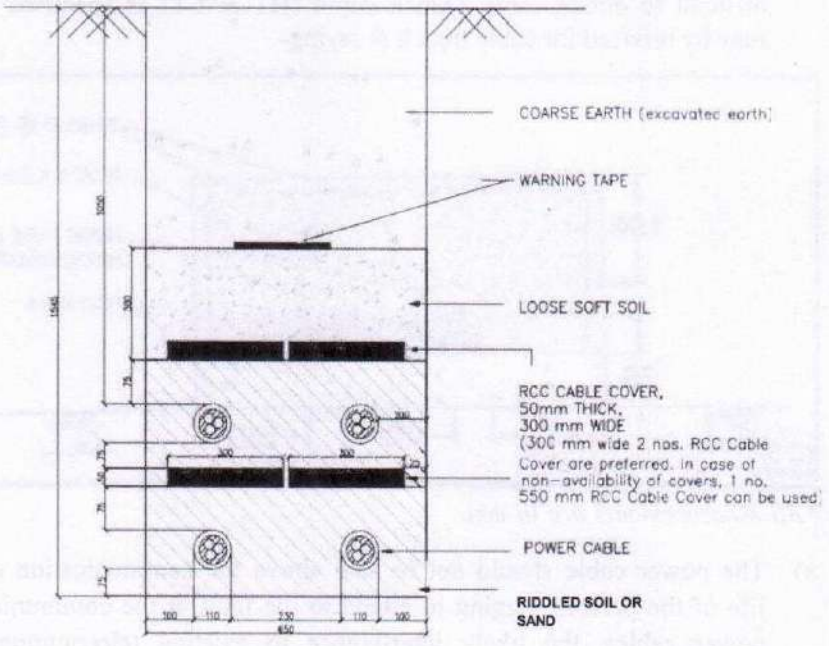


Drawing 3.6 – 33kV Buried Cable for Double Circuit



Drawing 3.7 – 33kV Buried Cable Option-1 for Four Circuits (Permissible In very acute conditions)

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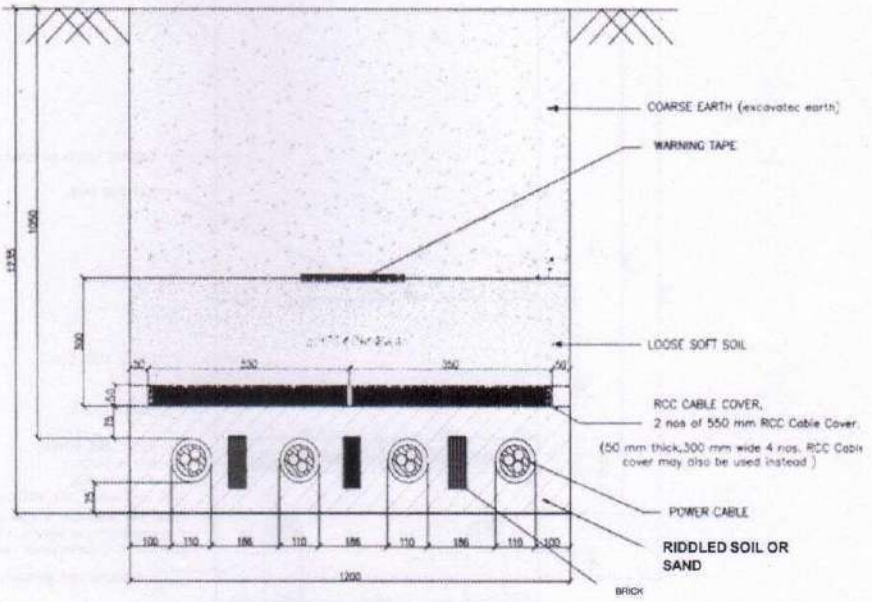
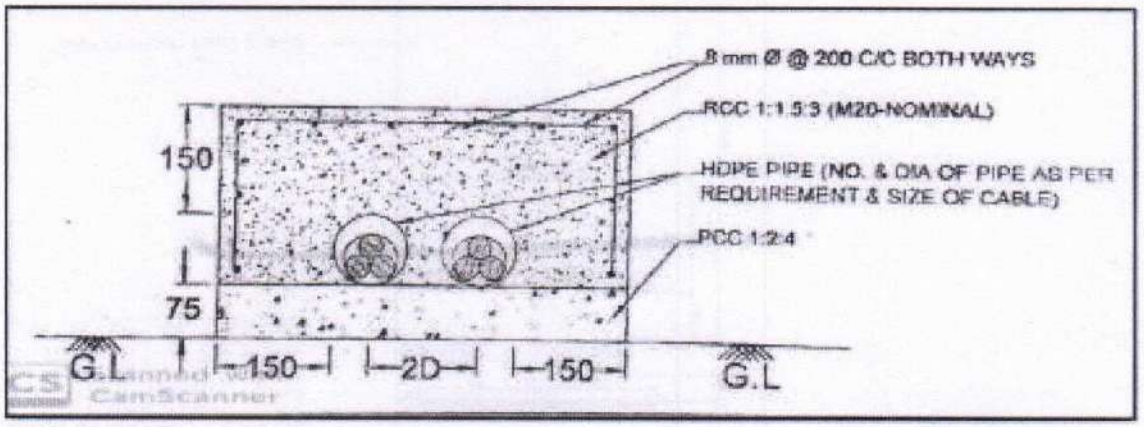


Drawing 3.8 – 33kV Buried Cable Option-2 for Four Circuits

**All Measurements are in mm*

xi) <u>For cable laying at depth less than specified in the specifications</u> – Areas where it is difficult to obtain cable Trench depth (HT & LT) as specified above, following drawing may by referred for cable trench & laying-



**All Measurements are in mm.*

x) The power cable should not be laid above the communication cables, to avoid danger to life of the person, digging to attend to the fault in the communication cable. While laying power cables, the likely interference to existing telecommunication cables should be avoided by referring to and co-ordinating with the communication authorities.

xi) Based on the site condition, if still an exception arises for cable depth from these guidelines/approved technical specifications a deviation report along with details and picture of the precautionary measure need to be prepared. The site engineer must ensure that precautionary measure should prevent any damage to the cable under adverse conditions.

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xii) Apart from the methods of laying cable direct in ground and in ducts detailed above, there are other methods of cable laying mentioned below-

a) **Laying on racks in air-** This method is employed for laying cable inside buildings, industrial plants, generating stations, substations and tunnels. In this method, cables are generally installed on racks fixed to the walls or supported from ceiling where racks may be ladder or perforated type and may be either fabricated at the site or pre-fabricated.

b) **Laying on racks inside a cable tunnel-** The difference between cable laying on racks in air and that inside a tunnel is with respect to heat dissipation. Here heat dissipation takes place through walls of tunnel hence, there is an increase in the temperature of the cables installed in the tunnel so a proper de-rating has to be applied to the current carrying capacity of the cables installed in the tunnel accordingly.

c) **Laying along buildings or structures-** Cables can be routed inside the building along with structural elements or with trenches under floor ducts or tunnels. The route of proposed cable should be such that intersection with other cables will be minimum The route should not subject these cables to any vibrations, damage due to heat or other mechanical causes, otherwise adequate precautions should be taken.

In IS 1255 the merits, demerits including application of these methods is given under Appendix-B. It may be referred for selection of suitable method of cable laying as per requirements for eg; Cable laying on racks in air is suitable for power stations, sub-stations etc., laying on racks inside cable tunnel is suitable for power stations, switchyard, control room.

Cable over Bridges-

On Bridges the cables are generally supported on HDPE cleats and clamped on steel supports at regular intervals. Approval from appropriate authorities (PWD/railways) as applicable shall be taken by contractor. the cable laid in bridges shall be provided with sun-shields for protection against direct heating by sun rays as advised in IS 1255.

Earthing of Cables

i) Single point bonded earthing shall be employed to prevent flow of induced circulating current in the armour & screen and consequential de-rating of cables for **single core cables** having length less than 2.0 KM. For all other cases cross bonding shall be provided.

ii) Earthing and Bonding should be done in accordance with IS 3043.

General Guidelines for Laying Cables

i. Laying of the cables and handling of the same shall be undertaken, at all times, by adequate staff suitably trained and supplied with all the necessary plant, equipment and tools.

ii. The contractor shall be responsible for all the route survey, establishment of the position of the joints as per the site requirement and the drum lengths of cables to be laid. While carrying out the route survey the contractor shall take into account the obstacles on the route whether above or below ground. The cable shall be planned to be laid in an orderly formation, free from unnecessary bends and crossings

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iii. The contractor shall submit a drawing for the complete scheme showing the entire route, road crossings, location of joints and also the arrangement of cables to be laid. In case due to site exigencies, cables have to cross over within the trench, the same shall be shown in the drawing. For each and every job, this drawing shall be approved by Discom, prior to commencement of work.

iv. Contractor shall arrange for all the material and manpower required for jointing and end termination. The Contractor shall provide pit, carry out excavation for creation of working space required for jointing by the jointer. The contractor shall carry out all civil works, structural work, clamping and earthing, so that the cables and accessories perform satisfactorily during the entire lifetime.

v. The entry and exit of the cables into the building shall be through RCC or GI pipe except for single core cables, which shall be properly sealed and shall be duly supported as per the method and technique approved by PVVNL, so that the outer sheath of the cable does not get damaged at the entry and exit points. The sealing should be of adequate length so that it minimizes the risk of spreading of fire or ingress of water.

Procedure of Laying

i) The ground over which the drum is positioned at site should be properly consolidated and jacks placed on both sizes of the drum to make the pay-out arrangement stable. Suitable arrangement be made to stop the drum rotation, during cable laying preferably by square wooden poles kept temporarily pivoted over cable roller under the flanges which when required can be applied on the flange as a brake by personnel manning the drum.

ii) The cable should always be paid-out from the top of the drum. The drum must be positioned in such a way that the arrow on the drum points opposite to the direction of rotation marked on the drum.

iii) It must be ensured that the cable is not dragged over sharp object or on the road surface, so as to avoid damage to the outer sheath of the cable.

iv) The pulling method to be used shall be approved by Discom. Cable supplier's recommended maximum pulling tension shall not be exceeded.

v) Rollers shall be placed at intervals and the cable shall be pulled over the rollers. The rollers shall be kept lubricated so that they rotate freely, minimize friction to the cable in motion. Rollers shall be positioned at the bends to minimize sidewall friction. The contractor shall ensure that PVC/HDPE sheath of cable is free from damage due to abrasion.

vi) The cable should not be pulled out from the drum by lifting of the coil while the drum is lying flat on the flange. This leads to twisting of the armour and cores resulting in permanent damage to the cable.

vii) To avoid ingress of moisture, it must be observed that the end capping of the cables is not damaged. Cut pieces of the cables must be capped immediately, before laying of the same is taken-up.

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Excavation of the Trenches

i) The excavation of the trenches shall be commenced, with proper approvals from various authorities well in time.

ii) Before opening of the section of the trench, the contractor shall satisfy himself that the line of the trench is clear of underground obstructions, by taking out trial pits on the line of the trench.

iii) The exact location of each trench shall be approved on site by Discom. The trenches shall be kept as straight as possible and each trench shall be excavated to approved formation and dimensions. If necessary, the trenches shall be adequate shored by wooden planks and bracing to avoid trench cave-ins which would cause injury to the persons and also damage the cables laid.

iv) The bottom of each trench shall be firm and of smooth contour. The contractor shall take reasonable precautions to prevent damage to the highway or ground surface from a slip or breaking away of the sides of the trench.

v) The trench excavation and filling in shall be so executed that all walls, roads, sewers, drains, pipes, cables, structures, places and things shall be reasonably secured against risk of subsidence or injury and shall be carried out to the satisfaction of the authorities concerned. Should, however, a damage to an existing or other services be made, the Contractor will arrange and pay for any necessary repair, to make good the damages.

vi) Where trenches pass from a footway to a roadway or at other positions where a change of level is necessary, the bottom of the trench shall rise or fall gradually. The rate of rise or fall shall be approved by Discom.

vii) Contractor shall ensure that during excavation and until restoration has been completed, for reasonable access of persons and vehicles to property or places adjacent to the route.

viii) When the excavation of the trenches has been accurately executed, the contractor shall inform Discom for approval. Laying of cables or building of structure shall not be started until the contractor has been advised by Discom to proceed with the work.

Excavated Material

i) The materials excavated from each trench shall be placed so as to prevent nuisance or damage to adjacent ditches, drains fences, gateways and other property or things. Excavated material shall be stacked so as to avoid undue interference with traffic.

ii) Where, owing to traffic or for reasons of safety or other considerations, this is not permissible, the excavated material shall be removed from the site and returned for refilling the trench on completion of laying; surplus material shall be disposed off by the contractor at his own cost.

Pipes and Ducts

i) Care shall be taken to make the bend of the pipes or duct lines as easy as practicable and in no case of radius less than 3 meters. Where approved, split pipes may be used on bends, the pipes being fitted round the cable after laying.

ii) All road crossings shall be ducted. This applies to present and future roads as indicated on the route plans. The pipes and the ducts shall be laid in an approved manner and shall be surrounded by 150 mm of PCC (1:2:4)

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iii) Ducts under the road shall be provided by the contractor, by non-disruptive method, if road cutting is not permitted by the concerned authorities Cable laying shall be done by Horizontal Direct drilling method (HDD).

iv) The cables shall be suitably protected at entry and exit from the pipes, so that the outer sheath does not come in contact with the edges of the pipes / ducts. The pipes and ducts shall have slope so that the seepage water can drain through the small opening provided on the lower side of the pipe sealing.

v) The pipes and ducts shall be secured to the base at both ends and at regular interval, throughout the length, so that at no point the ducts or pipes get suspended over the threaded cable, and damage the same, thus defeating the very purpose of providing the pipe / duct.

vi) At all road crossings at least one spare duct / pipe shall be provided for future use. The pipe shall be thoroughly cleaned of obstructions. A draw wire or rope shall be left in each pipe to facilitate the drawing in of the cables. The duct end shall be sealed temporarily to prevent the entry of foreign matter. End caps and permanent markers shall be placed flush with footpath / roadways at both the ends. The pipes and ducts shall be cleaned again immediately before the cables are drawn in.

vii) The internal diameter of the pipe / duct should be such that the cables occupy about 45% of the area of the pipe / duct to avoid de-rating.

Jointing of cables

3.16.1 Types of Joints-

i) Straight Through / Transition Joints - These Joints are used for connecting two cables in the run.

ii) Termination or sealing end – This is generally used to connect a cable to switchgear terminals, H.T. pillars, transformer boxes and OH lines etc. GIS End termination should be used wherever required.

Requirements of Cable Joints

i) Resistance of the jointed conductor should be equal to or less than resistance of the conductor of the same length.

ii) Connector & lug should have a mechanical strength should be comparable to that of the conductor.

iii) Thickness of built up insulation should be equal to or more than thickness of insulation of cable.

iv) The Joint should provide proper mechanical protection to the insulated cores against damage by impact.

v) The joints should ensure the continuity of metallic sheath or armour.

vi) Proper stress control shall be provided to eliminate occurrences of high electrical stresses at screen cut points and over crimped connector.

vii) The Joints shall be provided with an outermost layer resistant to corrosion by chemical effect.

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Besides the above requirement, cable joints should be simple and compact. It should require minimum time for jointing. It should be mechanically strong to withstand dynamic stresses due to short circuit current and impacts. The joints should further be resistant to corrosion and other chemical effects.

Preparation before Jointing

i) A proper joint position should be selected for jointing. The joint pit should be of sufficient dimensions as to allow jointers to work. Sides of the pit should be well covered with tarpaulin sheets to prevent loose earth from falling.

ii) When jointing cables in water logged ground or under monsoon conditions, sump hole should be excavated at one end of the joint pit in such a position so that the accumulating water can be pumped out or bailed out without causing interference to the jointing operation.

iii) The jointing as far as possible is to be carried out inside a tent. Before proceeding for jointing, on the existing cable, it is very essential to identify the cable to be jointed.

iv) For jointing of high tension cables, the cable should be made dead and earthed before commencement of the jointing. This should be confirmed by spiking method.

v) Cleanliness is the most important factor in all jointing work. All tools should be clean and dry at the time of the jointing process. Cleanliness while handling the insulation is very important. Any contamination of the insulation by dust or moisture is detrimental to the joint.

vi) In case of paper cables, the cable seals should be examined for any damage or puncture. The paper insulation should then be tested for the presence of moisture. This is done by dipping the insulation paper in hot G-38 compound (110 Deg - 120 deg.C). Care should be taken not to touch the paper with hand. Paper should be held with a plier which should be slightly warm. If moisture is present in the sample, it will be detected easily by a bubbling or crackling sound. In case of faulty cable, if on test moisture is detected, then further test would have to be carried out to arrest moisture. The cables to be jointed should then be meggered to check the condition of the insulation and a further check of further continuity of cables and tracing out cables to be jointed is necessary. While attending fault in paper cable after cutting the cable at jointing point, both sides of the cable shall again be tested for further faults. Number on cores represents the phases. But these should never be taken for granted. Crossing of the core should be avoided in a joint.

Process of jointing

The process of jointing mainly consists of-

i) Connecting conductors together

ii) Replacing the machine applied insulation

iii) Providing earth continuity

iv) Providing mechanical protection

Conductor joints should satisfy the following basic requirements-

i) Ensure conductivity of the conductor by proper crimping.

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ii) Leave a reasonably smooth finish and profile on the conductor joint so as to avoid under stress concentration.

Back Filling Trenches and Temporary Reinstatement

i) Filling in of trenches shall not be commenced until Discom has inspected and approved the cables and accessories at site. The inspection should be done on daily basis so that the trenches do not remain open unnecessarily, to avoid inconvenience to public.

ii) Where cables routes are in public highways, footpaths, gardens etc., the method of reinstatement will be subject to approval by concerned department. All costs incurred will be at the contractor's expenses.

iii) The contractor shall be responsible for proper permanent reinstatement of the upper levels, which shall be carried out to the satisfaction of Discom and the concerned department./MCD authorities concerned.

iv) Before finally leaving site, permanent reinstatement shall be executed by the contractor to the approval of concerned department./MCD and the property owners and all costs incurred shall be to the contractor's account.

Permanent reinstatement of Public Road, footpath & ground in private property

i) In public roads and footways the surfaces and foundations shall be temporarily reinstated by the contractor. After settlement, temporary reinstatement material shall be removed as necessary and the permanent reinstatement shall be carried out to the approval of the appropriate concerned authority/MCD. Stone and pre-cast concrete paving kerbs and channels shall also be finally reinstated by the contractor.

ii) Temporary reinstatement shall be maintained by the contractor until commencement of final reinstatement to ensure that the surface is always safe for the passage of pedestrians and vehicular traffic.

Cable Route Marker

i) Route Indicators must be provided at every 200 meters or less and also at turning points of the power cable route wherever practicable. These indicators must have information like name of utility, cable operating voltage engraved on them along-with danger sign marked on them. Contact details must also be marked on these markers so that the concerned may be informed in case of accidents/excavation by other utility.

ii) Concrete/RCC route markers shall preferably be used. It must be permanent and durable.

iii) The route markers shall be of approved design. Additional markers shall be provided at joint locations with approved markings.

Cable supports / clamps

i) The contractor shall supply and install all the supports, racks, trays, cleats, saddles, clips and other parts required to carry and secure the cables, without risk

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so that there is no undue mechanical load or stress due to weight of the cable at each end. Cleats, saddles and clips shall be of the design as approved by Discom. No cable shall be laid on the trench floor. They shall be run in a neat and orderly manner and the crossing of cables within the trench shall be avoided as far as possible. Where cable runs unavoidably cross, a suitable supporting arrangement shall be provided to maintain an adequate gap between the cables.

ii) Every cable shall be supported at a point not more than 500 mm from its termination.

Installation of cables in tunnels / basement / below the panels

i) The design of cable support for cables installed in air in cable tunnels, basements etc. shall consist of vertical steel members spaced at approved interval and secured to the walls, floors and ceilings as necessary by means of bolts either cemented in position or expanded into cored holes. Each vertical support shall have bolted to it a number of steel brackets spaced at the intervals and designed to support and retain trays constructed of galvanized sheet steel of adequate section to carry the weight of the cables, plus space for an additional quantity of future cables at least 25% by weight and dimensions in excess of the cables installed under the contract and an additional load of 100 kg at the extremity without distortion. The trays shall be designed with raised edges to retain the cables and shall incorporate an interlocking feature so as to prevent movement between supports.

ii) The design and construction of all cable cleating and supporting arrangements shall suit the cable system design. The spacing of cable supports shall be approved by Discom.

iii) Cable run on trays shall be neatly dressed and where not provided with cleats shall be secured by heavy gauge, type approved metal reinforced, clips or saddles. Not more than six cables shall be embraced by one clip.

iv) Mild steel of appropriate sections, duly painted in an approved manner, shall be used for fabrication of cable supports. The steel shall be free from blisters, scales, laminations or other defects. Before final painting, the steel sections shall be provided with double coat of red primer.

Cable protection at overhead towers or poles

Where the cables terminate on overhead line poles or towers located outside substation compounds the contractor shall provide suitable cable supporting galvanized steel work attached to the pole or tower and comprising backboard, runners, sheet, steel cover of not less than 3.0mm thickness, stays, cable cleats, anti-climbing guard and all incidental items to provide secure protection for the cables. Isolators and Lightning arrestor. The erection and steel structure required shall also be in scope of the contractor.

Sun shades

All cables shall be protected from direct solar radiation by ventilated sun shields as approved by Discom.

Route plan

i) Contractor should get updated the GIS map of Discom of route along with joints and other obstructions.

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ii) During the progress of the contract works the contractor shall record on a set of route plans and cross section drawings of an approved form, these details so that the same can be transferred on the GPS maps. Such particulars will allow an accurate reference to be made in the case of any fault or projected modification. These records shall show, amongst other data, both indoors and outdoors the exact position of every joint, cable end termination and also the particulars of the depth of the trench, the arrangement of the cables, with cable numbers and the position of all obstructions revealed during the course of excavations. These completed records shall be submitted to Discom within 15 days of completion of any particular route/feeder.

Site facilities to be maintained by the contractor

i) The contractor shall arrange for all the tools and tackles required for cable laying, jointing testing and commissioning as per this specification.

ii) The contractor shall arrange illumination and Power supply so that the work can be carried out round the clock.

iii) The contractor shall maintain functional dewatering pumping facility with suitable power supply so as to protect the cables and the joints from ingress of water due to rain or otherwise

iv) The contractor shall make arrangement to provide suitable scaffolding arrangement to carry out the termination work

v) The contractor shall carry out proper barricading of the dug cable route and the joint bays and shall take all necessary precautions to avoid any public hazard.

Testing

Following tests are to be carried out during and after completion of Cable Laying:

i) Testing of cable before jointing Cable shall be tested for Insulation Resistance prior to laying by opening the end and resealing end properly.

ii) Testing on complete Cable Installation –

a. Insulation resistance of each core shall be measured against all the other cores and the metal screen connected to earth.

b. The resistance of the conductor shall be measured.

c. High voltage – Very Low frequency (VLF) kit shall be used for high voltage testing of cables. Testing voltage and duration shall be as per IEEE 400.2 standards.

d. Charging of Cable at No-Load at Nominal working voltage for 24 Hours.

e. After laying and before termination of cable a sheath test shall be conducted for 33KV Single core Cable as under: -

At both ends the cable shall be raised from ground. From the end graphite coat applied over the outer PVC jacket shall be removed with a piece of glass for a length of 300mm. A spiked steel rod with an eye for attaching a wire shall be driven into the ground and connected to a nearby water or hydrant pipe. Insulation resistance of PVC jacket shall be measured between the aluminum wire armour and the spike with a 500/1000V insulation tester. Measured resistance shall not be less than 2.5 mega ohm / KM. Thereafter 10KV DC shall be applied for one minute in the same way. After the test the armour shall be kept earthed to the steel spike for 15 minutes for discharging residual charge.

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f. Any other testing required to complete the job shall be performed as per IEC/Indian standards.

Barricading and Safety requirement

i) Dimensions of barricading- Height- 2 mtr, Length- 1.5 mtr.

ii) There shall not have any gap in between two barricades.

iii) LED Beacon light shall be placed at 1st and every 4th barricade

iv) Name, painting, color, cleanliness etc. shall be done on regular basis.

v) Vendor to ensure that traffic management shall not be excuse of work execution. The contactor shall not undertake loading and unloading at carriageways obstructing the free flow of vehicular traffic and encroachment of existing roads by the contactor applying the excuse of work execution.

vi) Full height fence, barriers, barricades etc. shall be erected around the site in order to prevent the working area from the risk of accidents due to speedy vehicular movement. In same way barricades shall protect the road users from the danger due to construction equipment and temporary structures.

vii) The structure dimensions of the barricades , material and composition, its color scheme, PVVNL logo and details shall be in accordance with specification and drawing laid down in the tender documents.

viii) All the barricades shall be erected as per the design requirements of employer, numbered painted and shall be maintained in good condition. Barricading In-charge shall maintain barricade register at site.

ix) All barricades shall be easily seen in the dark/night time by the road users so that no vehicle hits the barricades. Night vision shall be ensured by affixing retro reflective strips of required size and shape at appropriate angle at bottom and middle portion of the barricades at a minimum gap of 1000 mm. In addition minimum one red light /red blinker and red beacon light shall be placed at the top of each barricade.

x) No dust deposit is permitted at the front side of barricades.

xi) Cable drum shall be returnable and vendor shall take it back (by buy back process or as per PO agreement) from site at their own risk and cost.

xii) Once cable lying complete of a drum, within two days empty drum shall be removed from site by buy back process.

xiii) Trained traffic marshal with all PPE and traffic control light (Red and Green) shall be placed at site for 24x7.

xiv) No excuse of theft (beyond 6 hrs. of FIR) shall be acceptable.

xv) During execution of job, any damage to other agency's properties shall be counted in vendor account and necessary action shall be taken by vendor to recover, repair etc.

xvi) Excess earth shall be removed from site after back filling. Site to be cleared to avoid flowing of dust. Barricades to be removed from site within 24 hrs after completion of job.

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xvii) During non working hrs vendor to ensure presence of supervisor for controlling any event from locals.

xviii) PPEs

a) Helmets

b) Mask

c) Jacket

d) Safety Shoes, Gloves & Glasses

e) First Aid Box etc.

xix) Above mentioned PPEs shall be available at site 24x7. Zero tolerance on absence of PPEs to the working personnel. No excuse shall be acceptable in this regards.

xx) EPR/Scanning shall be done by vendor of whole the route and same shall be submitted to Discom. This work shall be done by vendor before execution of job.

xxi) Lifting of cable drums with hydraulic machine, pulling of cable from top end of drum with pulling machine (hydraulic winch) is mandatory.

xxii) Violation on barricading guideline and safety norms, a fine of Rs.5000 /day shall be imposed. Discom inspector/engineer in-charge shall be empowered to impose the above penalty.

xxiii) Artwork & Text to be printed on barricading sheet shall be approved by Discom prior to start of work

2. *Key Points Regarding Operation of U/G Power Distribution System:*

1. The underground power line should be kept in charged and healthy condition.
2. It is to be ensured that all cables in the circuit are connected to the system and are charged.
3. Alternative/Spare cable circuit should be kept in healthy condition and charged.
4. In case of availability of alternative power supply then it must be kept in a state such that supply can be restored and there is minimum possible interruption in supply.
5. In districts where underground cabling work has been carried out, at least 2 no. Fault Locator Machines of appropriate rating (like for 33 kV cable, fault locator capable of impressing voltages up to 75 kV, for LT & 11 kV minimum voltage rating must be 16 kV) are to be made mandatorily available with regular adequate staff for operation/testing.
6. It is also to be ensured that sufficient number of gangs are present for patrolling and attending breakdown as per the capacity of substation, no. of feeders and length of line.
7. The Technical Feasibility Report (TFR) for UG work shall be prepared/approved considering site conditions and maintenance/repair work feasibility. In case UG cable installation/maintenance/repair work is not found to be feasible, then overhead line on Aerial Bunched Cable may be preferred to UG cable.
8. Availability of spare accessories (jointing kit, end terminations/lugs) tools etc. in the store must be ensured by the concerned officers.

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Annexure C

UPPCL	Underground (UG) Cable checklist			
	Document Name	Checklist – Cable receipt and Storage	Document No.	UPPCL/UG/01
			Rev. No.	1.0
	Department		Date	

Sl. No	Characteristics/ Items	Type of check	Instrum-ents	Class	Quantum of Check Contractor/PQCC	Quantum of Check TPIA/REC/NQM	Reference document & Acceptance Standard	Format of Records	Remarks
1	2	3	4	5	6	7	8	9	10
1.Receipt & Storage									
1.1	Receiving inspection (Completeness of documents, test certificates, etc.)	V	-	B	100%	Random	Delivery Challan	MRC	
1.2	Unloading	V	-	B	100%	Random	Instruction manual	MRC	
1.3	Visual examination	V	-	B	100%	Random	Packing list/ Instruction Manual	-	
1.4	Proper storage	V	-	B	100%	Random	Instruction Manual/ IS:1255	-	
1.5	End Sealing (Cable ends are sealed with PVC caps to avoid ingress of moisture)	V	-	B	100%	Random	IS:1255	Site Record	

Contractor Signature	:	Name of Engineer In charge (EIC)	:
Legends	: A – Critical B – Major C - Minor	Signature	:
	TC – Test Certificate	Date	:
	EIC – Engineer in Charge	Place	:

UPPCL	Underground (UG) Cable checklist			
	Document Name	Checklist – Cable Pre-Installation	Document No.	UPPCL/UG/02
			Rev. No.	1.0
	Department		Date	

Sl. No	Characteristics/ Items	Type of check	Instrum-ents	Class	Quantum of Check Contractor/PQCC	Quantum of Check TPIA/REC/NQM	Reference document & Acceptance Standard	Format of Records	Remar
1	2	3	4	5	6	7	8	9	10
2.Pre-Installation									
2.1	Unloading of Drums								
A	Check for drum mounting - Cable wheel/Jack	V	-	B	100%	Random	IS:1255	Site Record	
B	Check for cable unwinding - Cable wheel/Jack	V	-	B	100%	Random	IS:1255	Site Record	
C	Check for proper unrolling - Cable wheel/Jack	V	-	B	100%	Random	IS:1255	Site Record	
D	Check for cable end sealing	V	-	B	100%	Random	IS:1255	Site Record	
2.2	Availability of bricks at site for buried cables	V	-	C	100%	Random		Site Record	

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1	2	3	4	5	6	7	8	9	10
2.3	Excavation of trench for U/G cable laying	V	-	C	100%	Random	Utility specification or as per Acceptance norms	Site Record	
2.4	Sand cushioning for buried cables	V	-	C	100%	Random		Site Record	
2.5	Ascertaining cable route and length	V	-	B	100%	10%	Cable route	Site Record	
2.6	Conformity with cable schedule	V	-	B	100%	Random	Cable schedule	Site Record	
2.7	Insulation resistance checking - Megger (500 V for LT , 1000 V for cables up to 11 KV and 5000 V for cables above 11KV up to 33 KV)	Electrical	Megger	A	100%	Random	IS:1255	Site Record	
2.8	Proper route maintaining during cable laying	V	-	B	100%	Random	Cable route	Site Record	

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1	2	3	4	5	6	7	8	9	10
2.9	Identification and dressing of cables	V	-	B	100%	Random	Standard Practice	Site Record	
2.10	Use of trefoil clamps for single core cables	V	-	B	100%	Random	Standard Practice	Site Record	
2.11	Proper verticality of multicore cables	V	-	B	100%	Random	Standard Practice	Site Record	

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UPPCL	Underground (UG) Cable checklist			
	Document Name	Checklist – Cable installation	Document No.	UPPCL/UG/03
			Rev. No.	1.0
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Sl. No	Characteristics/ Items	Type of check	Instrum-ents	Class	Quantum of Check Contractor/ PQCC	Quantum of Check TPIA/REC/ NQM	Reference document & Acceptance Standard	Format of Records	Remarks
1	2	3	4	5	6	7	8	9	10
3.Installation									
3.1	Removal of wooden planks from cable	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.2	Check cable is not dragged in hard grounds	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.3	Check size of cable and cutting of cable length	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.4	Check the separation between different types of cables laid nearby	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.5	Check the laying of cable as per cable schedule	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.6	Check the cable tray are earthed as per the drawing	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	

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Legends : A – Critical B – Major C - Minor	Signature :
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1	2	3	4	5	6	7	8	9	1
3.7	Check the cable glands, lugs, ferrules, cable tag/marker are provided as per requirement	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.8	Check the cable drum/cable to be laid for any external damage	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.9	Check the availability and functionality of the rollers	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.10	Check there are no damage/twisting of cable during laying	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.11	Checks the cables are protected from the sharp bends while laying	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	

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1	2	3	4	5	6	7	8	9	1
3.12	Check the power cables are separated from the control cables	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.13	Check the phase matching at both end after each joint	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.14	Check cable tags are provided at required interval/required places and both endas per cable schedule	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.15	Check the cables are dressed, clamped and supported properly as per the drawing	V	-	B	100%	Random	Utility specification or as per Acceptance norms	-	
3.16	Insulation resistance check	Electrical	Megger	B	100%	Random	Utility specification or as per Acceptance norms	Site Record	

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1	2	3	4	5	6	7	8	9	1
3.17	Check whether some extra length (1.5 mtrs.) is kept in each cable run for future use	Physical	-	B	100%	Random	Utility specification or as per Acceptance norms	Site Record	
3.18	Check that all wall opening/pipes/sleeves are sealed to avoid seepage of water	Physical	-	B	100%	Random	Utility specification or as per Acceptance norms	Site Record	
3.19	Check that burried cables are covered with sand layers and by protective bricks	Physical	-	B	100%	Random	Utility specification or as per Acceptance norms	Site Record	
3.20	Ensure that the location of underground cable joints are identified	Physical	-	B	100%	Random	Utility specification or as per Acceptance norms	Site Record	

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