DOCUMENT CONTROL

Document Number	**TPDF02-DIS01-OCP-018**	
Title of Document	**ERECTION OF POLE MOUNTED SUBSTATION**	
Document owner:	General Manager (HV Cell)	
Prepared by / Modified by	Mr. Amit Magdum Manager HV Cell	07.11.2021
Reviewed by	Mr. Shilajit Ray Mr. Satish Shah Assistant General Manager HV Cell	22.11.2021
Approved by	Mr. Snehal Shah Mr. Abdulrashid Shaikh General Manager HV Cell	30.11.2021
Last Reviewed on		01.12.2022

Amendment Details:

Sr.	Issue No.	Rev. No.	Date	Amendment Details	Reviewed by	Approved by
1	1	0	01.12.2021	First Issue	Shilajit Ray Satish Shah	Snehal Shah Abdulrashid Shaikh
2	1	0	01.12.2022	First Review Done (No Changes)	Shilajit Ray Satish Shah	Ankit Saha Abdulrashid Shaikh

1. PURPOSE

1.1. Erection of Pole Mounted Substation

2. SCOPE OF DOCUMENT

2.1. The scope of this document is to define a structured activity-level flow for Erection of Pole Mounted Substation

2.2. The process document aims to define the guidelines to ensure the process effectiveness as required by the Integrated Management System whenever implemented.

3. FIELD OF APPLICATION

3.1. This procedure is used for Erection of Pole Mounted Substation in TPL-D's Franchisee areas of Bhiwandi & SMK.

4. FREQUENCY

4.1. As and when required

5. AUTHORITIES AND RESPONSIBILITY

5.1. The Head of Distribution is responsible for implementation of this procedure for effectiveness.

5.2. The Head of HT O&M/Projects at respective locations are responsible for execution of this procedure for effectiveness.

6. REFERENCES

6.1. MERC Regulations (with its latest amendments)

6.2. Central Electricity Authority (Measures Relating to Safety & Electric Supply) Regulations 2010 (with its latest amendments)

6.3. OCP # TPDF02-STO01-OCP-006 (Operational Control Procedure for Handling, Collection, Storage and Management of Hazardous Waste)

7. SPECIFIC COMPETENCY REQUIREMENTS

7.1. Technician/GET/Jr.Exe/Exe/AM/M should have Knowledge of

(1) Operation of Feeders, Distribution Transformers, Switchgears, Switching & Sub-station equipment

(2) Safe working practices and use of PPE

7.2. Technician/GET/Jr.Exe/Exe/AM/M having valid authorization from General Manager Distribution shall have authority for electrical isolation and issue of Permit to Work (PTW).

7.3. As per competency profile and assessment.

8. INTERFACE WITH OTHER DEPARTMENTS/SECTIONS

8.1. Control Room during network isolation

8.2. Store for material issue and return

9. TOOLS AND TACKLES

9.1. Tool kit

9.2. Excavation tools, Masonry Tools

9.3. Measure tape

9.4. Live Line Detector

9.5. Earth Discharge Rod

9.6. Shorting links

9.7. Wooden/FRP Ladder

10. PERSONAL PROTECTIVE EQUIPMENTS / SAFETY TOOLS

Following PPEs shall be used to carry out work at site.

10.1. Safety shoes/ Gum Boot

10.2. Safety Helmets

10.3. Safety Gloves (If Applicable)

10.4. Full Body Harness with Lanyard

10.5. Reflective jacket

10.6. Barricading tape (if required)

10.7. Caution board / “Men at work” sign board (if required)

10.8. Barricading cone (if required)

11. SIGNIFICANT RISK PARAMETRS

11.1. Quality Management System: Low

11.2. Impact on Environment: High

11.3. Health and Safety Risk: High

11.4. Energy Management: Low

11.5. Asset Management Risk: Medium

12. PROCEDURE

12.1. JOB PREPARATION

(1) Visit the site location for prelims for necessary tools, manpower and material requirement.

(2) Identify reason for installation New Pole Mounted Substation, Shifting Request

(3) Seek the Approval wherever required from concern authorities in verbal /written /

or any other electronic mode

(4) During excavation to ensure no existence of other utilities at identified location

(5) Ensure contractor /technician gang has skilled manpower to carry out the job and all the persons to work at site should have valid I-Card issued by HR department, TPL.

(6) Transport manpower, materials, tools and tackles to site.

12.2. **PRECAUTIONS**

(1) Barricading the working area by barricading tape with appropriate sign board.

(2) Aware all persons for nearby live switchyard equipment/bus/conductors and maintain safe clearance and safety while working.

(3) Use required PPEs during execution of the job.

(4) Ensure and provide for adequate access, working space, illumination

(5) Following steps to be followed for working at height.

(a) Person who has to climb on the pole must use full body harness with lanyard which is be hooked & locked properly on pole at convenient height where the person has to perform the job.

(b) Ladder is to be erected in safe working condition and its top end is to be tied with pole by means of rope.

(c) All the materials should be lifted or lowered by means of hand line only and nothing should be thrown up by the ground helper or thrown down by the lineman. As there is tendency, many times on the part of the work man to throw smaller items such as spanner, bolts, nuts etc. from the ground to the top or from the top to the ground to save the labour and time which may lead to an accident hence it is should be strictly avoided.

12.3. **ISOLATIONS (If required)**

(1) If isolation of near-by network / equipment required from the system follows the procedure as per OCP No: TPDF02-DIS01-OCP-005 for Distribution Network Isolation and Normalisation as per the switching requirement.

(2) Authorized person issue “Permit to Work” as applicable to competent person after required isolation and local earthing

12.4. **WORK PROCEDURE**

(1) Erection of Pole Mounted Substation (Two/Four Poles Structure)

(a) Excavate pit for pole as per the standard design of two/four pole structure considering site locations.

(b) Erection of poles.

I. Pit work

i. Pit size is normally 4ft X 2ft X 6ft (Length X Width X Depth). Normally the depth of pit should be 1/6th height of the pole to

be erected in that pit & Pit dimensions may very as per site situation as well as length of pole.

ii. After marking of the pole location with pegs excavation can be started. Excavation work is generally done by pickaxes, crowbars, shovels and earth augers etc. The picks should be excavator's depth up-to 5 to 6 feet sloping manner in the direction of the line as this will give greater lateral stability.

iii. The pit should be completely cleaned of debris. The bottom of the pit should be properly levelled. A RCC slab (Stay Block) may be provided where soil is very soft. This would evenly distribute the pressure due to weight of pole on the soil.

II. Prelims for pole to be erected

i. Required cross arm/pole fitting/Stay clamp etc should be assembled to the pole at required distance as per the requirement and should be tightened. This will facilitate the erection of the pole as well as remove the difficulty of fixing these items after erection of pole.

ii. If pole to be erected is Rail/ steel pole the portion which will remain in ground should be painted to protect it from corrosion

iii. When the pit is ready the pole should be brought near the pit by hydra and erection to be done.

(c) Erection of Fittings for skid Base arrangement (if required)

I. For Skid base of Pole Mounted Transformer.

i. Two Nos. of Box channels / channels to be erected one each on opposite two sides of the four-pole structure at @ 10 feet height from the ground. Holes are to be provided on poles accordingly so that proper horizontal alignment of box channels / channels can be ensured with respect to ground. The box channels / channels are to be fitted with poles with required size of bolts, nuts & washers.

ii. On top of the above Box channel / channels fittings the two box channels / channels are to be erected on remaining two opposite sides of four pole structure and right angle to above channels. Holes are to be provided on poles accordingly so that proper horizontal alignment of box channels / channels can be ensured with respect to ground. The box channels / channels are to be fitted with poles with required size of bolts, nuts & washers.

iii. On above four Nos. of box channels / channels frame structure, the transformer is to be erected for which two Nos. of box channels / channels are to be erected on above fittings. Mark the position of above box channels / channels in such a way

that the transformer can be positioned in the centre of the structure & all four holes of skid base arrangement of the transformer will be matched with the four slot holes of above two box channels / channels which are to be fitted on above frame structure with proper size of bolts, nuts & washers. While erection of transformer position of HT/LT DB should be as per the site requirement.

II. For Skid base of Outdoor RMU.

i. Two Nos. of box channels / channels to be erected one each on opposite two sides of the four-pole structure at @ 4 feet height from the ground. Holes are to be provided on poles accordingly so that proper horizontal alignment of box channels / channels can be ensured with respect to ground. The box channels / channels are to be fitted with poles with required size of bolts, nuts & washers.

ii. On top of the above Box channel / channels fittings the two box channels / channels are to be erected on the remaining two opposite sides of four pole structure and right angle to above channels. Holes are to be provided on poles accordingly so that proper horizontal alignment of box channels / channels can be ensured with respect to ground. The box channels / channels are to be fitted with poles with required size of bolts, nuts & washers.

iii. On above four Nos. of box channels / channels frame structure, the outdoor RMU is to be erected for which two Nos. of box channels / channels are to be erected on above fittings. Mark the position of above box channels / channels in such a way that the RMU can be positioned in the centre of the structure & all four holes of skid base arrangement of the RMU to be erected will be matched with the four holes of above two box channels / channels which are to be fitted on above fittings with proper size of bolts, nuts & washers. While erecting RMU, the operating mechanism should be positioned in front of the gate which is to be provided in cage (fencing) of the structure.

(d) After completion of erection of all required electrical equipment on the structure

I. Platform is to be made as per the standard design for operating switchgear.

II. Cage (fencing) is to be provided for the safety of public as well as equipment erected on the structure as per the standard design. The cage (fencing) shall be fabricated on site after completion of structure and then equipment erection.

(e) Earthing of Two/Four pole structure.

I. For earthing of four pole structure, follow the process as per OCP No. TPDF02-DIS01-OCP-012 for earthing of electrical equipment of

distribution network.

i. Transformer earthing

ii. Switchgear earthing.

iii. FSP earthing.

iv. Pole earthing.

(f) Paint pole as per standardised procedure.

I. Painting of pole is required.

i. Clean the pole with mop and remove the dust. Use sandpaper to clean the superficial rusting thoroughly before application of red oxide.

ii. Apply the two coats of red oxide oil paints on its entire surface. Allow some time to dry the applied paints.

iii. Apply the two coats of Aluminium oil paints on its entire surface. Allow some time to dry the applied paints.

(2) Site housekeeping

(a) Remove all packing, waste material and dump, Collect & submit to stores.

(b) Remove barricades, temporary stakes etc.

(c) Clean the area of dirt, loose soil etc.

(d) Ensure the backfilled areas are level with ground surface.

(e) Remove caution boards, traffic bollards (plastic cones).

12.5. **RESTORATION**

(1) If isolation of the system is taken then, after completion of pole erection take clearance from concerned person and Cancel “Permit to Work”

(2) Shift all the manpower and tools and tackles from the site.

(3) Remove excess material & scrap from the job area.

(4) For normalisation of above switching follow the procedure as per OCP No: TPDF02-DIS01-OCP-005 for Distribution Network Isolation and Normalisation.

(5) Inform Control room regarding normalisation of section.

(6) Remove the temporary switching from the control room giving all relevant details.

12.6. **WORK CHECKLIST**

(1) Update entries in Standard Format as mentioned in List of attachment.

12.7. **UPDATION**

(1) Upload site photographs of allocated job on respective order in SAP or Field Force

Application

(2) Update in GIS / SAP, if applicable.

(3) Inform GIS regarding new/modified Pole Mounted Substation.

(4) Material reconciliation is to be done.

13. IMPACT ANALYSIS OF SIGNIFICANT RISKS

13.1. QUALITY MANAGEMENT SYSTEM

(1) Details of Quality Issues involved

(a) Incompetent manpower (Rework)

(2) Details of Quality Assurance plan

(a) Ensure Effective supervision

(b) Penalty mechanism

13.2. HEALTH AND SAFETY

(1) Details of Health and Safety Hazard involved

(a) Contact with Live terminal/ cable/ wire/ busbar

(b) Flash Over during switching operation

(c) Hit by handles/tools due to slippage/ mishandling

(d) Contact with sharp edges

(e) Accident due to improper isolation

(f) Person working at site without TPL supervision

(g) working/travelling in extreme weather condition

(h) Electric shock due to improper earthing of welding / Other electrical tools

(i) Animal/ insect bite

(j) Negligence of use of safety PPEs / Non usage of PPEs/ Use of faulty PPEs

(k) Working in bending position / Awkward Posture

(l) injury due to welding work

(m) Slips, trips and Falls of Persons

(n) Working in unhygienic area

(o) Fall of external object

(p) Use of faulty Tools

(q) Working in congested area

(r) Fall of person from Height

(s) Skin contact with oil

(t) Consumer aggression

(u) Fire in distribution Transformer

(v) Contact with Partially charged capacitor

(w) Poor illumination

(2) Health and Safety Precautions required

(a) Ensure use of PPEs

(b) Ensure no unauthorised person should at work

(c) Follow OCP

13.3. **ENVIRONMENT**

(1) Details of Environmental impact

(a) Land Contamination

(b) Resource Depletion

(c) Land pollution

(d) Air pollution

(2) Precautions to minimize Environmental impact

(a) Material consumption Monitoring

(b) Material Reconciliation

(c) Ensure that all type of generated waste including hazardous waste should be collected and submitted to stores as per OCP no: TPDF02-STO01-OCP-006.

13.4. **ENERGY MANAGEMENT**

(1) Details of energy use involved

(a) Fuel consumption in transportation/ material movement

(2) Precautions to minimise energy use

(a) Ensure Optimum Usage & Turn off the engine when not in use

13.5. **ASSET MANAGEMENT**

(1) Details of Asset related Risks -

(a) Loss of Equipments

(b) Frequent Small Duration Forced Outages

(c) Sustained Forced Outage requiring Major Repair

(d) Frequent Planned Outages

(e) Overloading of equipment

(f) Mishandling by handling equipment

(2) Mitigation plan for asset related risks

(a) Ensure Work as per OCP and checklist

(b) Ensure Training to workforce

(c) Authorisation

14. LIST OF ATTACHMENTS

Sr	Document /Record Description	Reference No.
1	Permit to Work (PTW)	TPDF02-SAQ02-OCP-005-F02
2	HV Cell Activity Checklist	TPDF02-DIS01-CHK-001-F05
3	Height work permit	TPDF02-SAQ02-OCP-007-F01
4	Deviation Format	TPDF02-DIS00-FOR-001

***** End of Procedure *****