DOCUMENT CONTROL

Document Number	**TPDF02-DIS01-OCP-016**	
Title of Document	**INSTALLATION & COMMISSIONING OF NEW 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. Commissioning of New Substation

2. SCOPE OF DOCUMENT

2.1. The scope of this document is to define a structured activity-level flow for Commissioning of New 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 Commissioning of New 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. Operating manual of OEM

6.4. Guideline # TPDF02-DIS01-GDL-001_Guideline for HV Network Design

6.5. Guideline # TPDF02-DIS01-GDL-002_Guideline for HV Asset Management

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

6.7. OCP # TPDF02-STO01-OCP-008 Waste Management of Non-Hazardous Waste

7. SPECIFIC COMPETENCY REQUIREMENTS

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

(1) O&M of Substation equipment

(2) Safe working practices and use of PPE

7.2. Technician/GET/Jr.Exe/Exe/AM/M shall have authority for Electrical Isolation and issue of PTW

7.3. As per competency profile and assessment.

8. INTERFACE WITH OTHER DEPARTMENTS/SECTIONS, IF ANY

8.1. Control Room/NPC for Outage Information

8.2. Co-ordination with LV Mains

8.3. Key Accounts

8.4. Store for material issue and return

8.5. MTL team

9. TOOLS AND TACKLES

9.1. Tool bag.

9.2. Measuring Tape if required

9.3. Nylon Ropes and D-Shackle for Lifting as per Equipment/Material to be transported.

9.4. Cotton Ropes

9.5. Crowbar as per site requirement.

9.6. Digital Multi meter.

9.7. Test Lamp

9.8. Shorting link

9.9. Telescopic discharge rod

9.10. Operating Handle of Switchgear of required make.

9.11. Ladder if required

9.12. Fire extinguisher

9.13. DO operating rod

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 /full mask Helmet

10.3. Safety Gloves

10.4. Reflective jacket

10.5. Barricading tape (if required)

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

10.7. 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: High

12. PROCEDURE

12.1. JOB PREPARATION

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

(2) Ensure possession of substation building / land in case of Indoor type S/S or Pad

(3) Co-ordination with LV Mains, Key Accounts for commissioning of new s/s related activities.

(4) Ensure that the crew has necessary manpower to carry out the commissioning work.

(5) Issue necessary materials and transport the same to site.

(6) Check feasibility for unloading of Substation Equipment at substation site.

12.2. PRECAUTIONS

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

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

(3) Barricade the working area by barricading tape and appropriate sign board shall be displayed near the barricaded area.

(4) Working area should be free from slippery material to prevent slipping.

12.3. ISOLATION

(1) For isolation equipment 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) If required, authorized person issue “Permit to Work” as applicable to competent person after required isolation and local earthing.

12.4. WORK PROCEDURE.

(1) Installation of DT Structure/Switchgear / Transformer / FSP.

(a) Select above equipment of required size and type as decided in the scheme.

(b) Give instructions to crew member, work executor and supervisor regarding

site position for transformer loading & unloading.

(c) Loading of the equipment on vehicle from Store and transporting and unloading to respective substation site, refer OCP no. TPDF02-DIS01-OCP-017 for Loading and unloading, transporting material.

(d) Erection of pole mounted sub-station refer OCP no. TPDF02-DIS01-OCP-018.

(2) Masonry Work

(a) Bricks required for masonry shall be thoroughly wetted with clean water for about two hours before use.

(b) Proportion of cement mortar shall be 1:5 or specify for type of brick masonry.

(c) Bricks shall be laid in English bond unless directed otherwise.

(d) Half or cut bricks shall not be used except when necessary to complete to bond. In such cases it is required to cut in required size & to be used near the ends of walls

(e) A layer of mortar shall be spread on full width for suitable length of the lower course.

(f) The wall shall be taken up truly in plumb. All courses shall be laid truly horizontal, and all vertical joints shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of the brick course shall be kept uniform.

(g) The bricks shall be laid with frog upwards.

(h) The surface over which brickwork to be carried out shall be cleaned before laying of mortar.

(i) Thickness of the joint shall not exceed 12mm. The face joints shall be raked out as directed by raking tool daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to be done.

(j) Minimum cement consumption for masonry work shall be 70.00 Kg/ CMt

(k) The consumption of cement shall be as per technical specification or as directed by Engineer-in-Charge.

(3) Plastering Work

(a) Plastering shall be started from the top and worked down towards the floor.

(b) All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down.

(c) Wire mesh (Chicken mesh jali) to be provided along the joint of RCC and Masonry work having width of @ 300mm throughout the length of joint.

(d) To ensure even thickness and a true surface, plaster about 15 × 15 cm shall be first applied, horizontally and vertically, at not more than 2 metres

intervals over the entire surface to serve as gauges.

(e) The surfaces of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall then be laid on the wall, between the gauges with trowel and level Patti.

(f) The cement mortar (1:4) shall be applied in a uniform surface slightly more than the specified thickness. This shall be brought to a true surface, by working a wooden straight edge reaching across the gauges, with small upward and sideways movements at a time.

(g) Finally, the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required.

(h) Excessive Trowelling or over working the float shall be avoided.

(i) All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished.

(j) Rounding or chamfering corners, arises, provision of grooves at junctions etc. where required shall be carried out with proper templates or battens to the sizes required.

(k) When suspending work at the end of the day, the plaster shall be left, cut clean to line both horizontally and vertically.

(l) When recommencing the plastering, the edge of the old work shall be scrapped cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to properly join together.

(m) Plastering work shall be closed at the end of the day on the body of wall and not nearer than 15 cm to any corners or arises. It shall not be closed on the body of the features such as plasters, bands and cornices, nor at the corners of arises.

(n) Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakages.

(o) The plastering and finishing shall be completed within half an hour of adding water to the dry mortar.

(p) Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for a period of at least 7 days.

(q) Minimum cement consumption for plaster work shall be 6.50, 9.50 & 10.00 Kg/ SMt for single coat, double coat and sand faced plaster respectively.

(r) The consumption of cement shall be as per technical specification or as directed by Engineer-in-Charge.

(4) Oil Paint on Metal Surface

(a) The number of coats shall be as stipulated in the item.

(b) Primer Coat: One coat of the approved quality anti-corrosive red-oxide shall

be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.

(c) Top coats of synthetic enamel Paint of desired shade shall be applied after the red-oxide is thoroughly dry.

(d) Additional finishing coats shall be applied if found necessary to ensure. roperly uniform glossy surface.

(5) Fabrication Work

(a) All holes to be drilled shall be marked on members and drilled after proper checking. If necessary, a template shall be made for this.

(b) All welding shall be done with appropriate method considering nature of job.

(c) Welding electrode shall be heavily coated type designed for all position.

(d) The size, type and manufacturer of electrodes shall be subjected to approval of Engineer.

(e) Electrode and welding work shall be as per IS standard.

(f) If desired, test shall have to be carried out for welded joints.

(g) Suitable method should be used for cutting, considering condition of material and section of material using following method.

(h) Using hex saw blade

(i) Using mechanical cutter

(j) Using gas cutter etc.

(k) All the cutting and needed surface shall be properly grinding with electric grinder

(l) Fabricated members shall be joined either by wilding or by rivets or nut and bolt arrangement as specified or shown on drawing or instructed.

(m) One assembles shall be got approved for alignment, riveting, wilding, etc.

(n) For bolted joints necessary washers shall be provided as shown in the drawing or as instructed on site.

(o) Erection of the structure shall be done by approved method.

(p) Contractor shall provide necessary derricks, gantry, scaffolding and staging, inflammable etc. for erection work.

(q) No gas cutting shall be allowed for the widening of holes when it is not matching. It shall be drilled.

(r) Care shall be taken to see that no damage is done to the members during transportation of fabricated/assembled structure.

(s) Paint should be provided to the structure.

(t) Paint to be applied shall be got approved for brand, quality, tint etc.

(u) Fabricated structure shall be given one shop coat of red oxide.

(v) After erection of structure 2 coats of approved oil painting should be provided to the structure

(w) Additional precaution should be taken while cutting of plate. Only profile cutting is allowed in case of Chequered Plate while making Cable Trench Covers.

(6) Chain link/Barbed wire/ Concertina Coil Fixing

(a) Drilling / Welding / Cutting / Painting procedure for supporting angles and flats for chain link /barbed wire / Concertina coil fixing remains same as above Support angle/flats should be grouted in concrete. Grouting should be enough to carry out designed load.

(b) Supports should be in line, level and plumb and of same size and dimensions.

(c) Chain link jail should be fixed using GI bolts with support tightly. Additional flats should be used to fix chain link jail at all four sides of frame.

(d) Joints shall be aligned at the supports and an overlap of minimum 300 mm shall be given where chain link jail ends.

(e) Concertina coil should be stretched as per the specification or direction of officer in charge.

(f) Concertina coil and barbed wire should be fixed with support tightly using GI wire.

(7) Installation of Compact Sub-Station (if required)

(a) Select compact sub-station of required size as decided in the scheme.

(b) Give instructions to crew member, work executor and supervisor regarding site position for Compact sub-station loading & unloading

(c) For loading of the Compact sub-station on vehicle from Store and transporting and unloading to respective substation site, refer OCP no. TPDF02-DIS01-OCP-017 for Loading and unloading, transporting material

(d) Visual Inspection check: Check physical condition of Compact sub-station

(8) Earthing of equipment's

(a) Refer OCP No. TPDF02-DIS01-OCP-012 of distribution substation earthing. Ensure that earthing work at respective substation location with all electrical equipment's have been completed prior to carry out any HT cable looping / connection work with existing HT network.

(9) Pre-commissioning Checks:

(a) Before charging check thoroughly all equipment and connections (i.e. HT or

LT)

I. HT termination. (I.e. Ring & transformer termination.)

II. LT termination. (i.e. Between transformer and LT panel)

III. Switch gear position and the naming of incoming and outgoing cable connection on the respective gear.

IV. Incoming supply from- Name of S/S / pole No from where cable is coming.

V. Outgoing supply: Name of substation from where cable is coming.

VI. Transformer oil level and position.

VII. Switchgear Gas / Oil level and position.

VIII. All earthing pits and connection.

(10) Looping of New Sub-station in existing HT UG systems through RMU if reqd.

(a) For connecting above substation in the HT distribution network as per the scheme HT cable is to be laid

(b) Required straight through joint/joints and HT terminations are to be made. Refer OCP No. TPDF02-DIS01-OCP-004 for Jointing and termination of cable.

(c) For making connection of above with existing system isolation for the same for respective feeder has to be done as per point no. 12.3.

(11) Cleaning

(a) Before charging Sub Station equipment and trench should properly cleaned.

(b) Also Sub Station premises should properly clean.

(12) Charging / Commissioning of New Sub-Station

(a) Before charging of substation

I. Switch off LT Switch / LT breaker from LT panel / FSP

II. Transformer is to be charged on no load first.

(b) Switching is to be carried out for connecting above substation based on system requirement. For any switching follow the procedure as per OCP No: TPDF02-DIS01-OCP-005 as applicable.

(c) Check voltage and phase sequence at DT Meter.

(d) Inform to LV mains department for further action from LV side.

(e) Inform to concern department regarding commissioning of new distribution substation.

(13) Site Housekeeping

(a) After completion of work remove all packing, waste material and dump collect & submit to stores.

(b) Clean the whole area.

(c) Remove barricades, temporary stakes etc.

(d) Ensure the backfield areas are level with ground surface

(e) Ensure proper locking of feeder pillars and Fencing door.

12.5. RESTORATION

(1) Not applicable

12.6. WORK CHECKLIST

(1) Update entries in Standard Format (Field Force Application, SAP or Hard copy)

(2) Update in GIS / SAP / SDB.

12.7. UPDATION

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

(2) Inform GIS regarding Updating of new/modified route of cable in system with SAP Notification.

13. IMPACT ANALYSIS OF SIGNIFICANT RISKS

13.1. QUALITY MANAGEMENT SYSTEM

(1) Details of Quality Issues involved

(a) Incompetent manpower (Improper installation of accessories of equipment's of distribution substation)

(b) Work not done as per OCP

(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) Flash Over during switching operation

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

(c) Contact with sharp edges

(d) Accident due to improper isolation

(e) Person working at site without TPL supervision

(f) working/travelling in extreme weather condition

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

tools

(h) Animal/ insect bite

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

(j) Working in bending position / Awkward Posture

(k) injury due to welding work

(l) Slips, trips and Falls of Persons

(m) Working in unhygienic area

(n) Fall of external object

(o) Use of faulty Tools

(p) Working in congested area

(q) Fall of person from Height

(r) Skin contact with oil

(s) Consumer aggression

(t) Fire in distribution Transformer

(u) Contact with Partially charged capacitor

(v) Poor illumination

(2) Health and Safety Precautions required

(a) Ensure that authorized person should work

(b) Ensure use of proper PPEs

(c) Ensure that zero potential is there at equipment by using detector

(d) Use Ensure work area is properly barricaded and caution board displayed

13.3. ENVIRONMENT

(1) Details of Environmental impact

(a) Resource depletion

(b) Land contamination

(c) Land pollution

(d) Air pollution

(2) Precautions to minimize Environmental impact

(a) Ensure that all persons working at site are aware about the significant environmental impacts

(b) Ensure that there is not any ignition source present near to the site

(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 & 007.

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 Equipment's

(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

(g) Derating

(h) Ageing/ Corrosion/ Rusting

(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	New DT sub-station commissioning checklist format	TPDF02-DIS01-OCP-016-F01
2	Deviation Format	TPDF02-DIS00-FOR-001

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