
	Torrent Power Ltd. – Distribution Franchise	Doc. No.: TPDF02-DIS01-OCP-010
	OCP - ATTENDING BREAKDOWN OF DIST. SUBSTATION EQUIPMENT	Rev. No. /Dt: 00 / 01.12.2021

DOCUMENT CONTROL


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Amendment Details:

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1	1	0	01.12.2021	First Issue	Shilajit Ray Satish Shah	Snehal Shah Abdulrashid Shaikh
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1. PURPOSE

- 1.1. Attending Breakdown of Distribution Substation Equipment

2. SCOPE OF DOCUMENT

- 2.1. The scope of this document is to define for attending breakdown of Dist. Substation Equipment.
- 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 Attending Breakdown of Dist. Substation Equipment in TPL-D's Franchisee areas of Bhiwandi.

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 manuals of OEM
- 6.4. Guideline # TPDF02-DIS01-GDL-001_Guideline for 22/11KV 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)

7. SPECIFIC COMPETENCY REQUIREMENTS

- 7.1. Technician/GET/Jr.Exe/Exe/AM/M should have Knowledge of
 - (1) O&M of 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.

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8. INTERFACE WITH OTHER DEPARTMENTS/SECTIONS, IF ANY

- 8.1. Control Room/NPC for Outage Information
- 8.2. LT O&M, Call centre
- 8.3. Store for material issue and return
- 8.4. HVCS

9. TOOLS AND TACKLES

- 9.1. Tool bag
- 9.2. Digital Multimeter
- 9.3. Live Line Detector
- 9.4. Discharge Rod / Shorting link.
- 9.5. Insulation resistance tester (Megger).
- 9.6. Digital Clamp on meter
- 9.7. Test Lamp
- 9.8. Ladder (If required)
- 9.9. Empty oil drum. (If required)
- 9.10. Oil Drum (If required)
- 9.11. Pump & pipe. (If required)
- 9.12. Operating handle of switchgear.


10. PERSONAL PROTECTIVE EQUIPMENTS / SAFETY TOOLS

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

- 10.1. Safety Shoes.
- 10.2. Safety helmets.
- 10.3. Insulating rubber hand gloves of 22 KV
- 10.4. Safety Belt If Required
- 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

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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) Reference to complaint received from Control room / NPC and message received from other department check following details.
 - (a) Type of complaint received like feeder tripping, SF/MCCB tripping, flashover in sub-station, voltage related problem, Power Failure etc.
 - (b) Check details of feeders, sections, HT switchgear & Transformer viz. make, type, kVA rating etc.
 - (c) For SF unit/MCCB, select the rating appropriate with rating of transformer KVA installed in sub-station.
- (2) Location of affected feeder/section, switchgears, sub-station & feeder name.
- (3) Ensure and provide for illumination including in sub-station if require.
- (4) Prepare shutdown or outage as per standard procedure.

12.2. PRECAUTIONS

- (1) Working area should be free from material which may lead to slipping/tripping
- (2) Use all required PPEs during execution of job.
- (3) Ensure and provide for illumination in sub-station if required.
- (4) Aware all persons for nearby live equipment's and maintain safe clearance and safety while working.
- (5) Instruct to allocated person that do not touch / operate any equipment of substation before getting "Permit to Work" from supervisor
- (6) At each location where isolation has been carried out and in which provision is there for pad locking, provide pad locking having LOTO / Padlock & Put the NTC sticker and mention the details as under.
- (7) Kept the NTC sticker and mention the details as under where there is no provision for pad locking
 - (a) Reason for Isolation.
 - (b) Date and Time of Isolation
 - (c) Isolation carried out by Engineer Name / Sign of Engineer


12.3. ISOLATION

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- (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) Authorised person issue “Permit to work” as applicable to competent person after required isolation and local earthing.

12.4. WORK PROCEDURE


- (1) Ensure that faulty portion is isolated. If not, isolate the same as mentioned above in point 12.3.
- (2) Check the event displayed on relay mounted on Breaker wherever available.
- (3) In case of SF Unit, remove fuse carrier and confirm which phase fuse is blown
- (4) For HT Customer
 - (a) If problem from customer end
 - I. Action to be taken by HV Cell & shall keep HVCS cell in loop. Check relay setting and correct if required. In reference to event displayed on relay on the TPL breaker discuss with responsible person available on site from HT customer end, ask customer to isolate the faulty section from customer end and then switch on the TPL breaker.
 - II. Action to be taken by HVCS Cell - Before giving permission to switch “ON” the consumer side breaker, take necessary testing certificate from that HT consumer if it is required & provide approval to Control Room for restoration.
 - (b) If problem from TPL end
 - I. Check following details
 - i. Check the condition of the supply network viz. OH line, HT cables, relays and their functionality.
 - ii. Check cable from pole to CT PT Unit of the metering cubicle including any intermediary switchgear
 - iii. Check CT PT Unit
 - II. If any of above asset found faulty, attend the same & restore the supply. Confirm the same from the consumer/HVCS/BPS cell.
- (5) For Distribution S/S
 - (a) Check following details
 - I. Check the condition of the supply network viz. OH line, HT cables, relays and their functionality feeding the distribution S/S.
 - II. Check the DTC structure components, distribution transformer & cables
 - III. HT cable from HT OH line or HT breaker outgoing cable Box to HT cable box/HT terminal of transformer
 - IV. Check LT cable from transformer LT bushing to FSP

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- V. If any of above asset found faulty, attend the same or replace & restore supply.
- (b) If problem observed in the APFC Panel or APFC Panel cable than disconnect it and if any of above asset found faulty, attend the same or replace & restore APFC supply.
- (c) Check FSP for any outgoing LT fault, if found faulty then inform to LT Department.
- (d) If problem observed in transformer after testing and needs to be replaced. Refer OCP No: TPDF02-DIS01-OCP-011 for replacement of transformer.
- (e) Replacement of faulty Lightning Arrester (LA)
 - I. Type of LA to be used.
 - i. If LA is to be installed on DTs near to EHV substation from which feeder is being emanated substation class LA to be used.
 - ii. If LA to be installed on DTs at some other location, Line class LA to be used.
 - II. Installation of LA.
 - i. Provide the holes on top double pole channel fittings such that Lightning arrestor can be mounted & clamped properly on the top of above channel fitting.
 - ii. By means of hand lines lift the LA and mount them on top of the top channel fittings.
 - iii. Base of the LA to be given common earth connection by means of running the 40mm X 3mm Hot Dip GI strip and connecting the same with base of LA.
 - iv. For LA to DO Jumper.
 - v. LA to be connected on DO with XLPE insulated 120sq mm /50 sq. mm wire of required length by crimping lug on one end & same is to be connected on LA.
 - vi. The other end of the jumper is to be connected on DO unit by means of crimping lug on both ends i.e. for DO as well as LA side.
 - III. Earthing of LA.
 - i. Follow the procedure as per OCP No: TPDF02-DIS01-OCP-012.
- (f) Attending breakdown in switchgear
 - I. By visual inspection or observation identify location of flashover
 - i. Cable box of HT switch of the RMU (SF6 Gas insulated).
 - ii. Cable Box/HT terminals for transformer / HT consumer.
 - iii. Bus bar flash in switch gear (SF6 Gas insulated / Air Insulated in case of breaker panel).

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- iv. In gas insulated compartment in SF6 RMU / breaker.
- II. If Flash over in the cable Box on circuit side in switchgear (i.e. for Distribution transformer / or for HT consumer).
 - i. Open the front cover of cable box.
 - ii. Open the cable connection from terminal bushings.
 - iii. Check the HT termination lead and healthiness of indoor cable termination.
 - iv. If required check the healthiness of cable by means of pressure test. Follow the procedure as per OCP No: TPDF02-DIS01-OCP-002 for HT Cable Pressure test. If pressure test did not withstand then declare it as cable fault and make the arrangement for replacing/repairing HT cable
 - v. If terminal protector is required to be provided provide the same after re-terminating the cable on the bushings.
 - vi. Check the HT terminal bushing for any crack / flash over / any leakage from oil chamber of HT Switch Fuse Unit / circuit side bushing of breaker housing panel.
 - vii. If the bushing physically found O.K. and no leakage has been observed, then after cleaning the bushing take the megger value. Ensure that megger values of all three phases bushings are in permissible limit (by 1KV / 5KV Insulation tester). Alternatively, with AC pressure test check for any leakage current by applying 28 KV for 1 Minute.
- III. In case of SF6 type switch gear.
 - i. If flash over in cable box of HT SF6 Switch.
 - ii. Open the front cover of cable box.
 - iii. Open the cable connection from terminal bushings.
 - iv. Check the HT termination lead and healthiness of indoor cable termination.
 - a. If required check the healthiness of cable by means of pressure test. Follow the procedure as per OCP No: TPDF02-DIS01-OCP-002 for HT Cable Pressure test. If pressure test does not withstand then declare it as cable fault and make the arrangement for attending the same. Follow the procedure as per OCP No: TPDF02-DIS01-OCP-002 for Cable fault localization with fault locating Van.
 - b. If it is required to be attended or to remake new HT cable termination, then carryout the same. Follow the procedure as per OCP No: TPDF02-DIS01-OCP-004 for HT Cable End Termination and Cable Jointing.

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- c. Provide terminal protector after re-terminating the cable on the bushings.
- v. Check the HT terminals bushing for any crack / flash over / any SF6 Gas leakage from SF6 sealed chamber.
 - a. If the bushing physically found O.K. and no leakage has been observed, then after cleaning the bushing take the Insulation resistance value. Ensure that Insulation resistance value of all three phases bushings are in permissible limit (by 1KV / 5KV Insulation tester). Alternatively, with DC pressure test check for any leakage current by applying 16 KV for 1 Minute.
 - b. If the Insulation resistance value is not within the permissible limit or DC pressure test does not withstand then entire SF6 unit is to be replaced by healthy unit.
- (g) Flashover in HT side/ HT Box of Distribution Transformer.
 - I. Clean HT bushings, metal part and HT box (if available) using CRC. Replace boots if found damaged.
 - II. Replace the transformer in case of HT bushing is broken or metal parts is burnt and not repairable at site. Refer OCP No: TPDF02-DIS01-OCP-011 for Replacement of Transformer
- (h) If problem is not observed in any of above cases, then follow the procedure as under:
 - I. In case of switch type FSPs, Switch “OFF” LT Incoming switch in FSP/FSPs
 - II. In case FSP with L Type bus bar without any LT switch, disconnect LT HRC fuses of all three phases for each outgoing circuit. Also if any power is available on outgoing contacts of any spare circuit in that FSP, ensure that no fuse is to be inserted in that circuit while normalizing and for that tagging is required on that circuit having duplicate power.
 - III. Switch “ON” the breaker in No load condition.
 - IV. Switch “ON” the LT incoming switch in case of switch type FSP.
 - V. In case of “L” Type FSP insert HRC Fuse one by one
 - VI. Check supply on outgoing FSP using Digital Multi meter / test lamp.
 - VII. If Power has been restored inform to concern department and close the shutdown or outage.
 - VIII. If during Switch ON the breaker on load condition again breaker trips or blown out LT HRC fuse in any outgoing LT circuit than inform to control room / respective NPC to forward complaint to LV department for further checking on LV side.
 - IX. Transformer Breaker is to be switched “ON” or transformer HT DO fuse to be re-instated by isolating outgoing faulty LT circuit.

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12.5. RESTORATION

- (1) 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) First transformer will be charged on no load and phase sequence and voltage test are carried out without solid links / fuses for incomer cables in FSP keeping switch OFF LT incoming switch in FSP
- (6) Then after inserting Solid link / HRC fuses for incomer cables / making LT switch “ON” measure voltage of between phase and phase and neutral if required.
- (7) After energisation check the voltage on DT Meter if available
- (8) Inform Control room regarding normalisation of section.
- (9) Remove the temporary switching from the control room giving all relevant details.

12.6. WORK CHECKLIST

- (1) Update entries in shift log-book mentioning the details of breakdown attended

12.7. UPDATION

- (1) Any temporary network changes made during attending the breakdown, should be suitably intimated to Control Room for Updation.
- (2) If applicable give the changes made in the system in the 'Change Notification' so that same can be updated in SDB.
- (3) Inform GIS/concerned department regarding changes made in the system if required.


13. IMPACT ANALYSIS OF SIGNIFICANT RISKS

13.1. QUALITY MANAGEMENT SYSTEM

- (1) Details of Quality Issues involved
 - (a) Incompetent manpower (Wrong / Improper installation)
 - (b) Work not done as per OCP
- (2) Details of Quality Assurance plan
 - (a) Proper entry in shift logbook & reviewed by AM/Manager
 - (b) Effective site supervision
 - (c) Penalty mechanism


13.2. HEALTH AND SAFETY

- (1) Details of Health and Safety Hazard involved

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- (a) Working/travelling in extreme weather condition
- (b) Hit by another vehicle during site visit
- (c) Mob attack
- (d) Working in congested area
- (e) Animal/ insect bite
- (f) Use of faulty Tools
- (g) Negligence of use of safety PPEs / Non usage of PPEs/ Use of faulty PPEs
- (h) Splash of acid on skin contact while handling damaged or spilled batteries
- (i) Working in unhygienic area
- (j) Fall of external object
- (k) Contact with sharp edges
- (l) Fall of person from Height due to negligence
- (m) Slips, trips and Falls of Persons
- (n) Consumer aggression
- (o) Fire in distribution Transformer
- (p) Flash Over during switching operation
- (q) Contact with Live terminal/ cable/ wire/ busbar
- (r) Hit by handles/tools due to slippage/ mishandling
- (s) Noise pollution due to handling equipments like hydra, crane etc
- (t) Accident due to improper isolation
- (u) Person working at site without TPL supervision
- (v) Accident to public due to Working without Area barricading
- (w) Fall of person from Height
- (x) Fall of material /equipment during loading / unloading / shifting/handling
- (y) Travelling in heavy traffic
- (z) Failure of loading / unloading equipment
- (2) Health and Safety Precautions required
 - (a) Obtain safety measures forms
 - (b) Use of proper PPEs
 - (c) Ensure that zero potential is there at equipment by using detector
 - (d) Regular housekeeping practices

13.3. ENVIRONMENT

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- (1) Details of Environmental impact
 - (a) Resource Depletion
 - (b) Air pollution
 - (c) Land pollution
 - (d) Land Contamination
- (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 no ignition source present near to the oil storage area.
 - (c) Used oil to be collected in empty barrels and provide identification tag and submit to the store.
 - (d) Ensure that all type of generated waste including hazardous waste like oil-soaked cotton waste, gaskets, used oil, Empty cans should be collected in containment tray 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
 - (g) Derating
 - (h) Derating / Ageing
 - (i) Overloading of MCCB
 - (j) Ageing/ Corrosion/ Rusting
- (2) Mitigation plan for asset related risks
 - (a) Work as per OCP and checklist

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(b) Training to workforce

14. LIST OF ATTACHMENTS

Sr	Document /Record Description	Reference No.
1	Breakdown notification	SAP Code -IW58
2	Permit to Work (PTW)	TPDF02-SAQ02-OCP-005-F02

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