DOCUMENT CONTROL

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Title of Document	**OPERATION OF ISOLATING EQUIPMENT & SWITCHGEAR OPERATION**	
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Amendment Details:

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1. PURPOSE

1.1. Operation of Isolating Equipment & Switchgear Operation

2. SCOPE OF DOCUMENT

2.1. The scope of this document is to define how to operate different kind of Isolating Equipment & Switchgear Operation

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 Operation of Isolating Equipment & Switchgear Operation 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. OEM Manual

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

7. SPECIFIC COMPETENCY REQUIREMENTS

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

(1) Operation of Feeders, Power Transformers, DTCs, Switchgears & Substation/switching 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, IF ANY

8.1. Control Room/NPC for Outage and temporary switching Information

8.2. Safety Department for information of work execution

9. TOOLS AND TACKLES

9.1. Details of temporary switching if any if it is related to the feeder under shutdown.

9.2. HT live line detector, if required

9.3. Switchgear operating handles (of required make) as and when required

9.4. LOTO/Padlock

9.5. Earthing and Shorting devices

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, if required.

11. SIGNIFICANT RISK PARAMETRS

11.1. Quality Management System: Low

11.2. Impact on Environment: Low

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) Confirm the feeder Name and check in SDB to identify the type of switchgear on which operation is to be carried out.

(2) Confirm the purpose of operation.

(3) Control Room to maintain records

12.2. **PRECAUTIONS**

(1) Ensure switchgear gas level before operation. For switchgear having gas level is low, ask Control room to switch-off feeder or isolate far end of source side to operate the switchgear

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

(3) Do not allow any person other than the person who is operating the switchgear inside substation during feeder trial.

(4) Carry out the operation in consultation with Control Room/ NPC of respective zone.

(5) In case of automated switchgear wherein remote operation is possible through SCADA.

(a) Switching is to be carried out by control room.

(b) While doing local operation, Selector switch is to be kept in local position in consultation with control room.

(c) Other than that in normal condition the selector switch is to be kept in Remote mode.

(6) Before/after operation of the switchgear ensure the substation supply status from DT audit meter.

(7) For moving the isolator to earth position always ensure that the cable section is dead from the opposite end of the section

(8) In case of DLs, disconnect all the three links. If any work is to be carried out on isolated section for longer period, then jumpers for the same are required to be disconnected and removed, else it shall be manned without DL operating device to avoid accidental operation

(9) Where the provision of earthing is not available, after making SFU "OFF", the transformer, connected with the above SFU, is to be isolated from its LT side to ensure no back feed of power and local earthing is to be done on LT side of transformer through earth discharge rod/Short Links after confirming "NO Power" on LT terminals through Test lamp.

(10) 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.

(11) Keep the NTC Sticker and mention the details as under

(a) Isolation carried out by Engineer Name/ Sign of Engineer

(b) Reason for Isolation.

(c) Date and Time of Isolation.

(12) After isolation, ensure zero potential on equipment where work is to be carried out using suitable device (like HV line detector)

12.3. **ISOLATION**

(1) Not applicable

12.4. **WORK PROCEDURE**

(1) Confirm the position of respective Isolation device as per the SDB where the switching operation is to be carried out

(2) Check healthiness of the switchgear i.e. gas level of the switchgear

(3) If gas pressure below min. level, then do not carry out operation and inform concerned department and if required carry out entire switching in dead condition only

(4) Verify the mechanical interlock position before operation

(5) Match the number/groove on the handle with the HT Switch/ breaker isolators/DLS position number/groove for the require operation

(6) Switch ON/OFF/EARTH as per planned operation by applying uniform force on the handle in the direction/number marked on the isolators/DL/Breaker

(7) Move the handle to Earth direction for earthing the cable section

(8) For any operation follow the procedure as applicable and as per the type of isolating equipment for Disconnection

(a) In case of 22 KV Isolator (SF6 gas insulated)

I. From “ON” to “OFF” operation: - Switch “OFF” the same from its “ON” condition.

II. From “OFF” to “EARTH” operation: - Confirm that far end is not connected with the system and same is isolated from the system. Switch to “EARTH” from its “OFF” condition.

III. Provide LOTO / Padlock and caution board on it.

IV. From “EARTH” to “OFF” operation: Remove the LOTO / Padlock and caution board from it. Switch “OFF” the same from its “EARTH” condition.

V. From “OFF” to “ON” operation: Confirm that far end of the cable is not earthed. Switch “ON” from its “OFF” condition.

(b) In case of 22 KV breaker panel (SF6 gas insulated/ VCB).

I. From “ON” to “OFF” for Isolation operation: -Operation to be carried through control room to switch “OFF” power from its “ON” condition.

II. Put selector switch from remote to local position. Rack out the breaker trolley from its service position to test position/ or completely disengaged from the housing. In case of outdoor switchgear switch off breaker, open line as well as bus isolator.

III. Provide LOTO / Padlock and caution board on it.

IV. From “OFF” to “ON” operation: Remove the LOTO / Padlock and caution board from it. Confirm that far end of the cable is not earthed. Rack in the breaker trolley to Service position. In case of outdoor switchgear, close line as well as bus isolator. Put selector switch from local to remote position. Operation to be carried through control room to switch “ON” power from its “OFF” condition.

(c) In case of 22 KV SF6 breaker RMU (SF6 RMU breaker with VCB breaker)

I. From “ON” to “OFF” operation: - Switch “OFF” both the breaker (VCB) and then “OFF Load” isolator provided in series with above breaker.

II. From “OFF” to “EARTH” operation: - Confirm that far end is not connected with the system and same is isolated from the system. Switch “ON” the earth switch from its “OFF” condition.

III. Provide LOTO / Padlock and caution board on it.

IV. From “EARTH” to “OFF” operation: Remove the LOTO / Padlock and caution board from it. Switch “OFF” the “EARTH SWITCH” from its “ON” position to “OFF” position.

V. From "OFF" to "ON" operation: Confirm that far end of the cable is not earthed. Switch "ON" first "OFF Load" isolator and then main breaker (VCB) "on" from its "OFF" position.

(d) In case of 22 KV DO

I. From "ON" to "OFF" operation: "Drop Out" the same from its "ON" condition in No load or dead condition by means of DO Operating Rod using 22 KV class rubber insulated gloves. Remove DO carriers from DO units from all three phases.

II. From "OFF" to "ON" operation: Confirm that far end of the cable/ transformer is not earthed. Switch "ON" the DO carries from its "Drop Out" condition by means of DO operating rod using 22 KV class rubber insulated gloves at off load conditions.

(e) In case of 22 KV DL (Dis connector Link Type Switch)

I. From "ON" to "OFF" operation: Switch "OFF" the link type switch of all three phase one by one from its "ON" condition through DO Operating Rod using 22 KV class insulated Rubber Hand Gloves. Above operation is to be carried out either in dead or No-Load condition.

II. In case work is to be carried out on isolated section for longer duration then Jumpers connected between DL contact and the cable termination is to be disconnected, else it has to be manned to avoid accidental operation

For this shutdown of above feeder/section is to be taken.

i. After taking shutdown of the same providing LOTO / Padlock and caution board on all its "OFF" points

ii. After disconnecting and removing the same above cable termination is to be earthed through shorting link.

iii. The upstream power from above "OFF" DL is then to be restored.

III. From "OFF" to "ON" operation: Confirm at far end of the cable/ OH is not earthed. Switch "ON" the link type switch of all three phase one by one from its "OFF" condition through DO operating rod using 22 KV class rubber insulated gloves. Above operation is can be carried out in ON load condition also.

In case of 11 kv Substation to be mentioned

(9) Site housekeeping (If Applicable)

(a) After completion of work 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) Remove caution boards, plastic cones

12.5. **RESTORATION**

(1) Not Applicable

12.6. **WORK CHECKLIST**

(1) Not Applicable

12.7. **UPDATION**

(1) Not Applicable

13. IMPACT ANALYSIS OF SIGNIFICANT RISKS

13.1. **QUALITY MANAGEMENT SYSTEM**

(1) Details of Quality Issues involved

(a) Incompetent manpower (Over Loading of feeders)

(b) Incompetent manpower (Wrong switching operation)

(2) Details of Quality Assurance plan

(a) Follow OCP

(b) Ensure the loading of feeders

(c) Effective supervision

(d) Authorization

13.2. **HEALTH AND SAFETY**

(1) Details of Health and Safety Hazard involved

(a) Working/travelling in extreme weather condition

(b) Poor illumination

(c) Animal/ insect bite

(d) Flash Over during switching operation.

(e) Working in congested area

(f) Use of faulty Tools

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

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

(i) Working in unhygienic area

(j) Consumer aggression

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

(l) Accident due to improper isolation

(2) Health and Safety Precautions required

(a) Follow the OCP

(b) Ensure the PPEs in healthy condition & Use all required PPEs during execution of the job

(c) Ensure the Tools & Tackles in working condition

13.3. **ENVIRONMENT**

(1) Not Applicable

13.4. **ENERGY MANAGEMENT**

(1) Not Applicable

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) OCP & On Job Training

(b) Authorization

14. LIST OF ATTACHMENTS

Sr	Document /Record Description	Reference No.
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***** End of Procedure *****