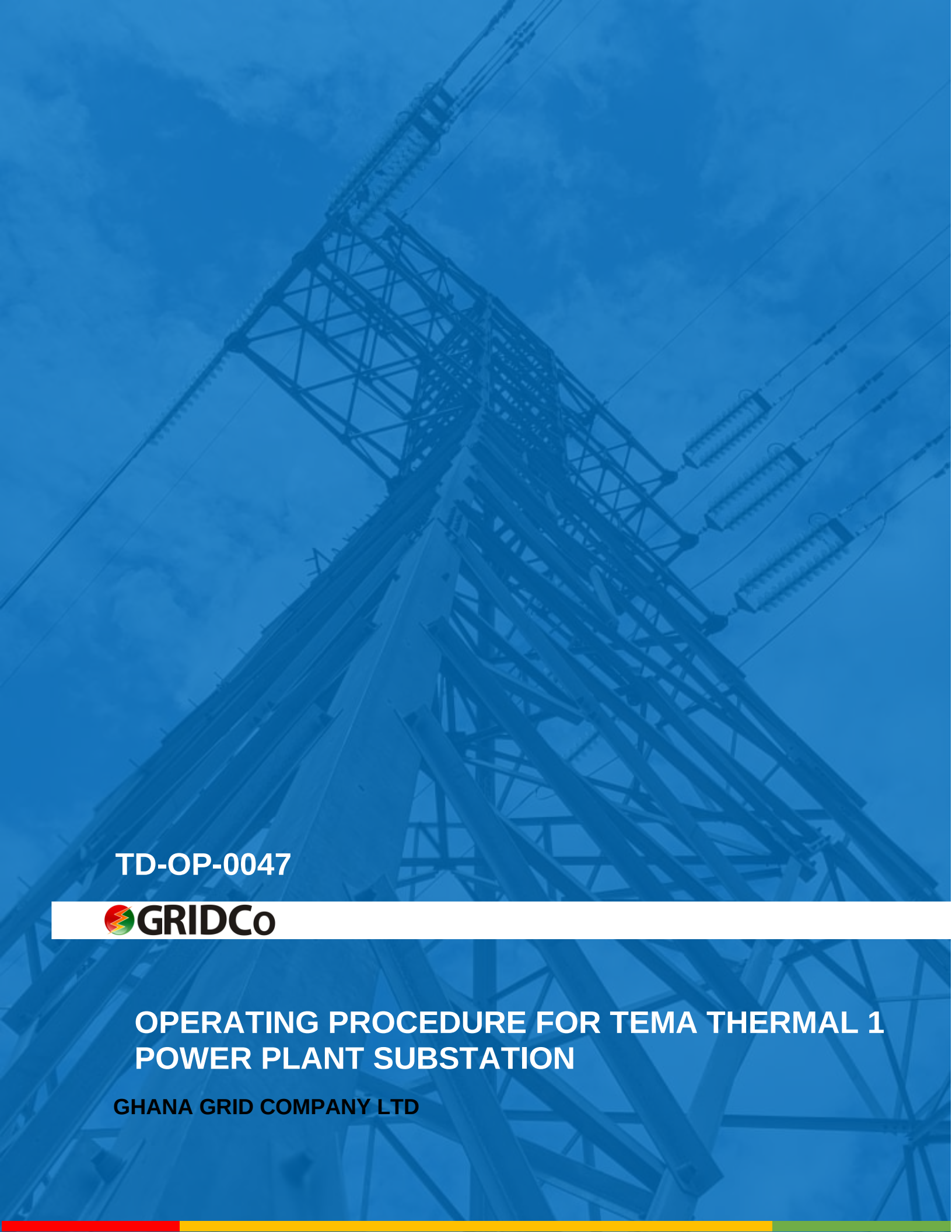

TD-OP-0047

GRIDCo

OPERATING PROCEDURE FOR TEMA THERMAL 1 POWER PLANT SUBSTATION

GHANA GRID COMPANY LTD

OPERATING PROCEDURE FOR TEMA THERMAL POWER PLANT (TP47)		
Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Tema Operating Staff, Tema Area Maintenance Staff, Tema Area Dispatch Staff, SCC	**Number:**	TD-OP-0047
	Subject Area:	Operating
	Issue Date:	Trial
	Origin:	Technical Services
Key Words: Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

CONTENTS

TECHNICAL DIRECTIVES

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at TP47 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Takoradi Operating Area and System Control Center (SCC) for operation of equipment at TP47 Substation.

3. Procedure

3.1. To take E2TP line out of service

SCC shall carry out (or advise the TP47 Operator to carry out) the following:

- Open 47T1A and 47T2A breakers

3.2. To take out, isolate and de-energize E2TP line for work

- TP47 Operator shall request for Station Guarantee from E4

SCC shall carry out (or advise the TP47 Operator to carry out) the following:

- Open Open 47T1A and 47T2A breakers

SCC shall advise the TP47 Operator to carry out the following:

- Open 47T1A-A and 47T2A-A disconnect switches and turn off 125Vdc supply

SCC shall advise the E4 Operator to carry out the following:

- Open 4A2-L2 disconnect switch and turn off 125Vdc supply
- Close 4E2TP-G ground disconnect switch

3.3. To restore E2TP line to service after work

3.3.1. Prepare E2TP line for restoration

TP47 Operator shall

- Advise SCC when work on the line has been completed and permit(s)

surrendered (including all Station Guarantees)

- Check for no potential on E2TP line

SCC shall advise E4 Operator to carry out the following:

- Open 4E2TP-G ground disconnect switch
- Turn on 125Vdc supply and close 4A2-L2 disconnect switch

SCC shall advise TP47 Operator to carry out the following:

- Check opened 47T1A and 47T2A breakers
- Turn on 125Vdc supply and close 47T1A-A and 47T2A-A disconnect switches

3.3.2. Restoration of E2TP line to service:

SCC shall:

- Advise the TP47 and E4 Operators of readiness to restore E2TP line to service
- Close (or advise TP47 operator to close) 47T1A and 47T2A breakers

3.4. To restore E2TP line to service after automatic outage

If E2TP line trips auto due to fault:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall

- Energize (or advise the TP47 Operator to energize) the line **ONCE** by closing 47T1A and 47T2A breakers

TP47 Operator shall:

- Advise the Supervisor/Area Manager of operation above
- Advise maintenance men to patrol the line if the above operation is not successful

3.5. To isolate 47T1 Transformer for work

SCC shall advise TP47 Operator to carry out the following:

- Check open 47G1T1 breaker

SCC shall carry out or advise TP47 operator to carry out the following:

- Open 47T1A breaker
- Check for no potential on 47T1 Bank

SCC shall advise TP47 Operator to carry out the following:

- Open 47G1T1-T1 disconnect switch and turn off its 125Vdc supply
- Open 47T1A-A disconnect switch and turn off its 125Vdc supply
- Open AC control MCB to 47T1 auxiliaries and tag
- Open 125V DC MCB to 47T1 primary and secondary protection and tag with PC13
- Open AC1 Contactor/MCB to take off supply to 47T1 transformer auxiliaries

3.6. To restore 47T1 Bank to service

3.6.1. Prepare 47T1 Bank for service after work

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 47T1 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 47T1A-A disconnect switch
- Turn on 125Vdc supply and close 47G1T1-T1 disconnect switch
- Close AC control MCB to 47T1 auxiliaries and remove tag
- Close 125V DC MCB to 47T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 47T1 Bank to service

3.7. Restoration of 47T1 Bank to service:

- SCC shall close (or advise TP47 Operator to close) 47T1A breaker

SCC shall advise TP47 Operator to carry out the following:

- Close AC1 Contactor/MCB to restore supply to 47T1 transformer auxiliaries

3.8. To restore 47T1 Bank to service after automatic outage

If 47T1 Bank trips auto due to fault:

TP47 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall energize (or advise the TP47 Operator to energize) the bank ONCE by closing 47T1A breaker

TP47 Operator shall:

- Advise the Supervisor/Area Manager and SCC of operation above
- Isolate the Transformer for maintenance men to work on the equipment if operation above is not successful. See explanation

3.9. To isolate 47T2 Transformer for work

SCC shall advise TP47 Operator to carry out the following:

- Check open 47G2T2 breaker

SCC shall carry out or advise TP47 operator to carry out the following:

- Open 47T2A breaker
- Check for no potential on 47T2 Bank

SCC shall advise TP47 Operator to carry out the following:

- Open 47G2T2-T2 disconnect switch and turn off its 125Vdc supply
- Open 47T2A-A disconnect switch and turn off its 125Vdc supply

- Open AC control MCB to 47T2 auxiliaries and tag

- Open 125V DC MCB to 47T2 primary and secondary protection and tag with PC13

- Open AC1 Contactor/MCB to take off supply to 47T2 transformer auxiliaries

3.10. To restore 47T2 Bank to service

3.10.1. Prepare 47T2 Bank for service after work

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 47T2 Bank and temporary grounds removed

- Turn on 125Vdc supply and close 47T2A-A disconnect switch

- Turn on 125Vdc supply and close 47G2T2-T2 disconnect switch

- Close AC control MCB to 47T2 auxiliaries and remove tag

- Close 125V DC MCB to 47T2 primary and secondary protection and remove PC13 tag

- Advise SCC of readiness to restore 47T2 Bank to service

3.11. Restoration of 47T2 Bank to service:

- SCC shall close (or advise TP47 Operator to close) 47T2A breaker

SCC shall advise TP47 Operator to carry out the following:

- Close AC1 Contactor/MCB to restore supply to 47T2 transformer auxiliaries

3.12. To restore 47T2 Bank to service after automatic outage

If 47T2 Bank trips auto due to fault:

TP47 Operator shall:

- Advise SCC about the outage

- Acknowledge all alarms and record relay operation details

- Reset relay targets

- Report relay operation details to SCC

SCC shall energize (or advise the TP47 Operator to energize) the bank ONCE by closing 47T2A breaker

TP47 Operator shall:

- Advise the Supervisor/Area Manager and SCC of operation above

- Isolate the Transformer for maintenance men to work on the equipment if operation above is not successful. See explanation

4. Explanation

Transformer and Bus automatic outages may be caused by the following relay operations:

- Transformer differential lockout relay-86T

- Transformer Bucholtz relay or high temperature lockout relay-86G

- Transformer overcurrent back up relays

a. If 86T operates, the breakers which have opened auto, cannot be reclosed until the lockout relay has been reset or the lockout feature has been by-passed.

   - Carry out thorough inspection of the Transformer and the 34kV and 11kV Structures looking for oil leakage, shattered insulators on the structures and dead birds or reptiles

b. 86T can be reset manually immediately after an automatic outage if the station is attended.

c. 86G cannot be reset unless transformer gas and / or temperature conditions are normal or the MCB to the transformer protective relays is off.

NOTE:

I. If it has been necessary to restore the MCB to the transformer relay in order to reset 86G and restore a healthy bank to service, they shall not be restored until the gas and /or temperature conditions on the faulted bank is rectified.

II. Operation of 86T or 86G lockout relays may be due to major transformer faults hence No attempt should be made to re-energize the bank until Electrical Maintenance staff have inspected and meggered the Transformer.

ISOLATION AND DE-ENERGIZING

1. Open the necessary breaker(s) to take the line off potential.

2. Check all three phases off potential using the Multifunction meter or Analog Voltmeter or for Pole discrepancies on the panel.

3. Open the necessary disconnect switches or MODS to isolate the line from all sources of supply.

4. Close the Grounding Switch.

5. Report completion of the isolation and de-energizing at all assisting stations, to the where the Protection Guarantee is to be issued and to System Control Centre.

6. Issue Work or Work and Test Permit to the workman.

ORDER TO OPERATE

1. An O.TO. (Order-To-Operate) to isolate a line is as follows:

    a. Line Voltage - Check all three phases off potential
    b. Line Breaker - Check Open
    c. Line Disconnect Switches - Open, lock and Tag (MCB to MOD Turn-off)

2. Due to communication difficulties arising when grounds are placed on a line it is necessary to issue a Protection Guarantee on the line before grounds are placed. A work and Test Permit allows for closing and opening permanent grounds switches while the Permit is in effect.

3. If work is to be done a permanent ground switches a PC 14 to close the ground switch is not required.

The station has two 225kV buses. The main 'H' and 'K' buses, configuration provides the normal points of supply to all circuits/equipment such as E2TP line, 47T1 and 47T2 transformers.

5. Approval

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Director, Technical Services