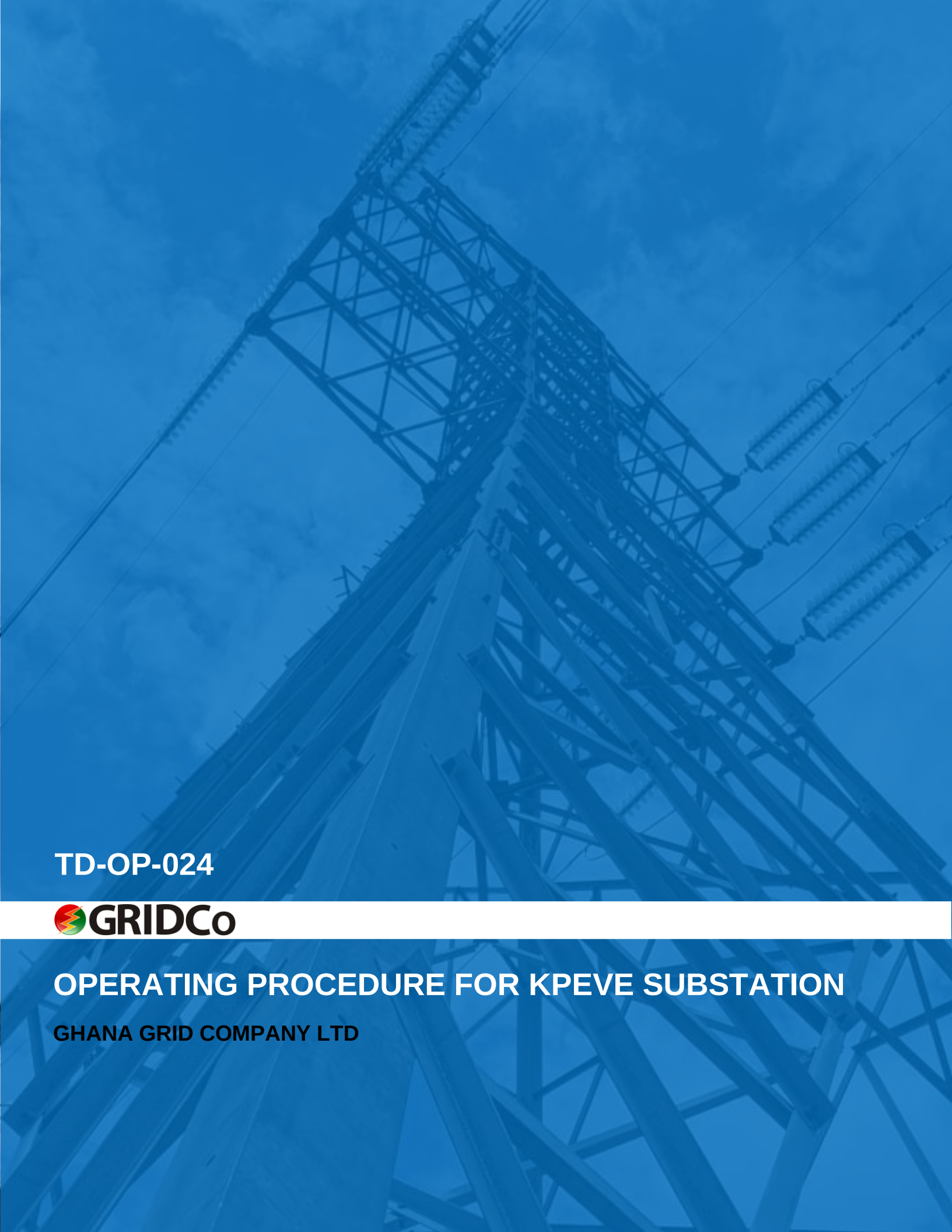

TD-OP-024

GRIDCo

OPERATING PROCEDURE FOR KPEVE SUBSTATION

GHANA GRID COMPANY LTD

TECHNICAL DIRECTIVES

Title:	**OPERATING PROCEDURE FOR KPEVE SUBSTATION (PE24)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Akosombo Operating Staff, Akosombo Area Maintenance Staff, Akosombo Area Dispatch Staff, SCC	**Number:**	TD-OP-0024
		Subject Area:	Operating
		Issue Date:	Trial
		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

TECHNICAL DIRECTIVES

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TECHNICAL DIRECTIVES

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at PE24 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Akosombo Operating Area and System Control Center (SCC) for operation of equipment at PE24 Substation.

3. Procedure

3.1. To take HO2PE line out of service

SCC shall carry out (or advise the HO23 Operator to carry out) the following:

- Verify opened 23HO2PE-S bypass disconnect switch
- Open 23HO2PE breaker

SCC shall carry out (or advise the PE24 Operator to carry out) the following:

- Open 24HO2PE-A disconnect switch and turn off its 125Vdc supply
- Check for no potential on HO2PE line

3.2. To take out, isolate and de-energize HO2PE line for work

- PE24 Operator shall request for Station Guarantee from HO23

SCC shall carry out (or advise HO23 Operator to carry out) the following:

- Check opened 23H02PE-S bypass disconnect switch and turn off its 125Vdc supply

SCC shall carry out (or advise the HO23 Operator to carry out) the following:

- Open 23H02PE breaker

SCC shall carry out (or advise PE24 Operator to carry out) the following:

- Open 24HO2PE-A disconnect switch and turn off its 125Vdc supply
- Check for no potential on H02PE line

SCC shall advise HO23 Operator to carry out the following:

- Open 23H02PE-A disconnect switch and turn off its 125Vdc supply

- Close 23H02PE-G ground disconnect switch

SCC shall advise PE24 Operator to carry out the following:

- Close 24HO2PE-G ground disconnect switch

3.3. To restore HO2PE line to service after work

3.3.1. Prepare HO2PE line for restoration:

PE24 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 HO2PE line

SCC shall advise HO23 Operator to carry out the following:

- Check opened 23H02PE-S bypass disconnect switch

- Check opened 23H02PE breaker

- Open 23H02PE-G ground disconnect switch

- Turn on 125Vdc supply and close 23H02PE-L2 disconnect switch

SCC shall advise PE24 Operator to carry out the following:

- Open 24HO2PE-G ground disconnect switch

- Turn on 125Vdc supply and close 24HO2PE-A disconnect switch

3.3.2. Restoration of HO2PE line to service:

SCC shall:

- Advise the HO23 and PE24 Operators of readiness to restore HO2PE line to service

- Close (or advise the HO23 Operator to close) 23HO2PE breaker

3.4. To restore HO2PE line to service after automatic outage

If HO2PE line trips auto due to fault:

PE24 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 HO23 Operator to energize) the line **ONCE** by closing 23HO2PE breaker

PE24 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 take PE1PU line out of service

SCC shall advise the PE24 Operator to carry out the following:

- Verify opened 24PE1PU-S bypass disconnect switch

SCC shall carry out (or advise the PE24 Operator to carry out) the following:

- Open 24PE1PU breaker

SCC shall advise the PU25 Operator to carry out the following:

- Check opened 25PE1PU-S bypass disconnect switch

SCC shall carry out (or advise the PU25 Operator to carry out) the following:

- Open 25PE1PU breaker
- Check for no potential on PE1PU line

3.6. To take out, isolate and de-energize PE1PU line for work

- PE24 Operator shall request for Station Guarantee from PU25

SCC shall advise the PE24 Operator to carry out the following:

- Checked opened 24PE1PU-S bypass disconnect switch

SCC shall carry out (or advise the PE24 Operator to carry out) the following:

- Open 24PE1PU breaker

SCC shall advise the PU25 Operator to carry out the following:

- Check opened 25PE1PU-S bypass disconnect switch

SCC shall carry out (or advise the PU25 Operator to carry out) the following:

- Open 25PE1PU breaker
- Check for no potential on PE1PU line

SCC shall advise PU25 Operator to carry out the following:

- Open 25PE1PU-L1 disconnect switch and turn off its 125Vdc supply
- Close 25PE1PU-G ground disconnect switch

SCC shall advise PE24 Operator to carry out the following:

- Open 24PE1PU-L1 disconnect switch and turn off its 125Vdc supply
- Close 24PE1PU-G ground disconnect switch

3.7. To restore PE1PU line to service after work

3.7.1. Prepare PE1PU line for restoration:

PE24 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 PE1PU line

SCC shall advise PU25 Operator to carry out the following:

- Check opened 25PE1PU-S bypass disconnect switch
- Check opened 25PE1PU breaker
- Open 25PE1PU-G ground disconnect switch
- Turn on 125Vdc supply and close 25PE1PU-L1 disconnect switch

SCC shall advise PE24 Operator to carry out the following:

- Check opened 24PE1PU-S bypass disconnect switch
- Check opened 24PE1PU breaker
- Open 24PE1PU-G ground disconnect switch
- Turn on 125Vdc supply and close 24PE1PU-L1 disconnect switch

3.7.2. Restoration of PE1PU line to service:

SCC shall:

- Advise the PE24 and PU25 Operators of readiness to restore PE1PU line to service
- Close (or advise the PE24 Operator to close) 24PE1PU breaker
- Close (or advise the PU25 Operator to close) 25PE1PU breaker

3.8. To restore PE1PU line to service after automatic outage

If PE1PU line trips auto due to fault:

PE24 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 PE24 Operator to energize) the line **ONCE** by closing 24PE1PU breaker
- Close (or advise the PU25 Operator to close) 25PE1PU breaker

PE24 Operator shall:

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

3.9. To isolate 24T1 Transformer for work

- PE24 Operator shall request Station Guarantee from customer on 24F1 Feeder

SCC shall carry out or advise PE24 Operator to carry out the following:

- Inform customers about readiness to take off 24T1 Bank
- Request customers on 24T1 Bank to take off their load
- Transfer Station Service from AC1 to the Standby Generator
- Open AC1 Contactor/MCB to take off supply to 24T1 transformer auxiliaries

SCC shall carry out (or advise PE24 Operator to carry out) the following:

- Check opened 24ATI-S bypass disconnect switch
- Open 24T1F1 breaker to take off supply to customer
- Open 24AT1 breaker
- Check for no potential on 24T1 Bank
- Open 24AT1-T1 disconnect switch and turn off its 125Vdc supply
- Open AC control MCB to 24T1 auxiliaries and tag
- Open 125V DC MCB to 24T1 primary and secondary protection and tag with PC13

3.10. To restore 24T1 Bank to service

3.10.1. Prepare 24T1 Bank for service after work

PE24 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 24T1 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 24AT1-T1 disconnect switch
- Close AC control MCB to 24T1 auxiliaries and remove tag

- Close 125V DC MCB to 24T1 primary and secondary protection and remove PC13 tag

- Advise SCC of readiness to restore 24T1 Bank to service

3.10.2. Restoration of 24T1 Bank to service:

- SCC shall close (or advise PE24 Operator to close) 24AT1 breaker

- Advise Customer of readiness to restore 24F1 feeder

- SCC shall close (or advise PE24 Operator to close) 24T1F1 breaker

3.11. To restore 24T1 Bank to service after automatic outage

If 24T1 Bank trips auto due to fault:

PE24 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 PE24 Operator to energize) the bank **ONCE** by closing 24AT1 breaker

PE24 Operator shall advise Customer of readiness to restore 24T1 bank to service

SCC shall close (or advise PE24 Operator to close) 24T1F1 breaker

PE24 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.

3.12. To isolate 24T1F1 Breaker for work

- PE24 Operator shall request Station Guarantee from Customer on 24FI feeder

SCC shall advise PE24 Operator to carry out the following:

- Inform customers about readiness to take off 24T1 bank
- Request Customer on 24T1 Bank to take off their load
- Transfer Station Service supply from AC1 to a Standby generator
- Open AC1 Contactor/MCB to take off supply to 24T1 transformer auxiliaries

SCC shall carry out (or advise PE24 Operator to carry out) the following:

- Open 24T1F1 breaker
- Check opened 24ATI-S bypass disconnect switch
- Open 24AT1 breaker

SCC shall advise PE24 Operator to carry out the following:

- Open 24AT1-T1 disconnect switch and turn off its 125Vdc supply
- Check for no potential on 24T1 Bank

3.13. To restore 24T1F1 Breaker to service after work

3.13.1. Prepare 24T1F1 breaker for restoration:

PE24 Operator shall:

- Advise SCC when work on the feeder breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 24T1 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 24AT1-T1 disconnect switch
- Advise SCC of readiness to restore 24T1F1 breaker to service

3.13.2. Restoration of 24T1F1 Feeder breaker to service:

- SCC shall close (or advise the PE24 Operator to close) 24AT1 breaker
- PE24 Operator shall advise customers of readiness to restore 24T1F1 feeder to service
- SCC shall close (or advise PE24 Operator to close) 24T1F1 breaker

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 is only one 69Kv bus arrangement. The main 'A' bus provides the normal points of supply to all circuits/equipment such as PE1PU, HO2PE lines and 24T1 transformer.

5. Approval

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Director, Technical Services