

FAT TESTS

| Document Control | |
|------------------|---|
| Project name: | |
| Project number: | |
| Revision: | Date: |
| | |
| | |
| Document Number | Document Name |
| F1 | Reactor Factory Acceptance Test Report |
| F2 | Ring Main Unit Factory Acceptance Test Report |

FAT 1 - Reactor

Factory Acceptance Test Report

| | | | | | |
|-----------------------------|--|------------------|---|---------------------------|------------|
| Test Report: | | Revision: | 1 | Date of last rev.: | 2025-11-24 |
| Project no: | | | | | |
| Project description: | | | | | |
| Commissioning date: | | | | | |
| Retention period: | | | | | |

| | |
|---|--|
| Description of tested network (Miniature Substations names, Kiosk names, Street Names) | |
| | |
| Substation Name: | |
| Equipment Name: | |

1 Drawings

| Drawing number | Title | Revision |
|----------------|-------|----------|
| | | |
| | | |
| | | |

2 Reactor Detail

| | | | |
|-----------------------------------|--|------------------------|--|
| Make: | | Serial Number: | |
| Primary Voltage: | | kVA Rating: | |
| Secondary No Load Voltage: | | Vector Group: | |
| Impedance: | | Number of Taps: | |

3 Manual

| | | | |
|--|-----|----|-----|
| Nameplate mounted & information correct? | YES | NO | N/A |
| Final drawings received? | YES | NO | N/A |
| Test Certificates (Type & Routine) | YES | NO | N/A |

4 Physical Inspection

| | | | |
|--|-----|----|-----|
| Does reactor comply with technical requirements? | YES | NO | N/A |
| Clearances according to design? | YES | NO | N/A |
| Oil Leaks | YES | NO | N/A |
| Oil Level | YES | NO | N/A |
| Silica gel breathers | YES | NO | N/A |
| Insulators | YES | NO | N/A |
| Tap Switches - add lock or bolt to prevent switching on load | YES | NO | N/A |
| Temperature Indicators / alarm and trip set points | YES | NO | N/A |

5 Oil Samples

| | | | |
|-----------------------------|-----|----|-----|
| Isolation Resistance Tests | YES | NO | N/A |
| Acid content (ph) | YES | NO | N/A |
| Gas Analysis/ Fibre content | YES | NO | N/A |

6 Earthing

| | | | |
|-------------------------|----------------|------------|---------------|
| All connections tinned? | YES | NO | N/A |
| Reactor star point: | | | |
| Solid | Surge-arrestor | NER / NECR | Unearthed |
| | | | Delta Winding |

7 MV Couplings

| | | | |
|---|-----|----|-----|
| According to specifications and drawings? | YES | NO | N/A |
| Sufficient clearances? | YES | NO | N/A |

8 Surge Arrestors

| Model & Make | Class | System Voltage | MCOV | kA |
|--------------|-------|----------------|------|----|
| | | | | |
| | | | | |
| | | | | |

9 Tests

9.1 Reactor Winding Resistance

| #TAP | A to N | B to N | C to N |
|------|--------|--------|--------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

9.2 Reactor Reactance

Method:

Apply a 50 Hz source to the HV winding.

Measure the currents in each phase relative to neutral.

NOTE: When the short circuit voltage (% Z) is applied, the full load current will flow. Use principle for calculations. Currents values must be almost the same.

| #Tap | I _a to n | I _b to n | I _c to n |
|------|---------------------|---------------------|---------------------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

9.3 Reactor Load Loss

Method:

Test method to be proposed by supplier and agreed with Client.

Measured Reactor Loss Ω

9.4 Insulation Resistance Test

Method:

Apply 500 VDC between the primary winding and earth (tank) for 1 minute.

Reading: Ω

9.5 Applied Voltage Test on Reactor Winding

Winding

PASS

FAIL

9.6 Induced Voltage Test on Reactor

Winding

PASS

FAIL

9.7 Reactor Pressure Test

Pressure Test

PASS

FAIL

9.8 Impulse Test

Lightning

PASS

FAIL

Switching

PASS

FAIL

9.9 Bushing CTs

Polarity

YES

NO

N/A

Loop Resistance

YES

NO

N/A

Burden

YES

NO

N/A

Turns Ratio

YES

NO

N/A

10 Outstanding Items/Fault List

| Any outstanding items and modifications: |
|--|
| |
| |
| |
| |

11 Testing Instrumentation

NOTE: Duplicate sheet, populate individually for all test equipment used. Attach certificates for all test equipment used.

| | |
|--|----------|
| Manufacturer: | |
| Model and or type: | |
| Serial number: | |
| Calibration details: | |
| Date of calibration: | |
| Calibration register no. | |
| Calibration valid: | YES / NO |
| Copy of Calibration certificate attached: | YES / NO |

12 Declaration

Herewith it is certified that the complete installation described above complies with all necessary specifications and that the installation is complete, all the required tests have been carried out and that it is safe for use.

NOTE: CVs and Qualifications of responsible person(s) must be attached to this document.

| | Main Contractor | Sub-Contractor |
|-----------------------------|-----------------|----------------|
| Name of firm: | | |
| Name of responsible person: | | |
| Contact no: | | |
| Date | | |
| Signature | | |

| | SARAO Engineer | Site Operations Team receive test certificate | Supply Authority |
|-----------------------------|----------------|--|------------------|
| Name of firm: | | | |
| Name of responsible person: | | | |
| Contact no: | | | |
| Date | | | |
| Signature | | | |

FAT 2 - Ring Main Unit

Factory Acceptance Test Report

| | | | | | |
|-----------------------------|--|------------------|---|---------------------------|------------|
| Test Report: | | Revision: | 1 | Date of last rev.: | 2025-11-24 |
| Project no: | | | | | |
| Project description: | | | | | |
| Commissioning date: | | | | | |
| Retention period: | | | | | |

Description of tested network (Miniature Substations names, Kiosk names, Street Names)

| | |
|-------------------------|--|
| | |
| Substation Name: | |
| RMU Designation: | |

1 Drawings

| Drawing number | Title | Revision |
|----------------|-------|----------|
| | | |
| | | |
| | | |
| | | |
| | | |

2 RMU Detail

| | |
|---|--|
| Make: | |
| Model Name / Number: | |
| Current Rating: | |
| Nominal Voltage (V_{L-L}): | |
| Breaking Capacity: | |
| Making Capacity: | |
| Short Time Current & Duration: | |
| RMU Configuration: | |

3 Manual

| | | | |
|--|-----|----|-----|
| Nameplate mounted & information correct? | YES | NO | N/A |
| Final drawings received? | YES | NO | N/A |
| Test Certificates (Type) | YES | NO | N/A |

4 Physical Inspection

| | | | |
|---|-----|----|-----|
| Does RMU comply with technical requirements? | YES | NO | N/A |
| Configuration of Isolators and Circuit Breakers Confirmed | YES | NO | N/A |
| Earth switch connected to earthing conductor? | YES | NO | N/A |
| Enclosures, instrument cases, glands, earthing terminals, other metal work earthed? | YES | NO | N/A |
| Voltage indication lamps visible and in working order? | YES | NO | N/A |
| Manual operation of circuit breaker(s) functional? | YES | NO | N/A |
| Manual operation of isolator(s) functional? | YES | NO | N/A |
| Manual operation of earth switch(es) functional? | YES | NO | N/A |
| Gas levels correct | YES | NO | N/A |

5 Tests

5.1 Voltage Withstand Test

| | | | | | | | |
|--|--|-----------|-----------------|--|-----------|----------|-----------|
| Method: | | | | | | | |
| Ensure: | | | | | | | |
| <ol style="list-style-type: none"> 1. All CT secondary windings earthed 2. Disconnect all cables 3. Open switchgear | | | | | | | |
| Voltage: | | 2 | kV for 1 minute | | | | |
| Leakage Current | | | | | | | |
| R | | mA | W | | mA | B | mA |

5.2 Insulation Test: RMU to Earth Bar

| | | | | | |
|------------------|--|------|------------|--|----------|
| Injected Voltage | | V DC | Resistance | | Ω |
|------------------|--|------|------------|--|----------|

5.3 Current Transformers

NOTE: Add applicable test reports to this document.

| | | | |
|-----------------|-----|----|-----|
| Polarity | YES | NO | N/A |
| Loop Resistance | YES | NO | N/A |
| Burden | YES | NO | N/A |
| Turns Ratio | YES | NO | N/A |

5.4 Protection

NOTE: Tick which protection elements included and active.

| | | | |
|-------------|-----|----|-----|
| Earth Fault | Yes | NO | N/A |
| Overcurrent | Yes | NO | N/A |

6 Labelling

| | |
|-------------------------------------|--|
| Tier 1 - Cable Feed Right (name) | |
| Tier 3 - Cable Feed Left (name) | |
| Substation / Switching Station Name | |
| Tier 2 - Transformer / Feeder Label | |
| Danger Signs | |

7 Surge Protection

| | | | |
|---|-------------------------|-------------------------|-------------------|
| Are Surge Arresters provided? | | YES | NO |
| Detail of Surge Arresters | | | |
| Manufacturer | Current Rating | kA | MCOV Rating kV |
| Class: | DISTRIBUTION Class 1 | INTERMEDIATE Class 2 | SATION Class 3 |
| Is earthing according to specification? | | YES | NO |

8 General

| | |
|-------|--|
| Paint | |
| Locks | |

9 Outstanding Items/Fault List

| |
|---|
| Any outstanding items and modifications: |
| |
| |
| |
| |

10 Testing Instrumentation

NOTE: Duplicate sheet, populate individually for all test equipment used. Attach certificates for all test equipment used.

| | |
|--|----------|
| Manufacturer: | |
| Model and or type: | |
| Serial number: | |
| Calibration details: | |
| Date of calibration: | |
| Calibration register no. | |
| Calibration valid: | YES / NO |
| Copy of Calibration certificate attached: | YES / NO |

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Herewith it is certified that the complete installation described above complies with all necessary specifications and that the installation is complete, all the required tests have been carried out and that it is safe for use.

NOTE: CVs and Qualifications of responsible person(s) must be attached to this document.

| | Main Contractor | Sub-Contractor |
|------------------------------------|------------------------|-----------------------|
| Name of firm: | | |
| Name of responsible person: | | |
| Contact no: | | |
| Date | | |
| Signature | | |

| | SARAO Engineer | Site Operation Team receive test certificate | Supply Authority |
|------------------------------------|-----------------------|---|-------------------------|
| Name of firm: | | | |
| Name of responsible person: | | | |
| Contact no: | | | |
| Date | | | |
| Signature | | | |

