

TEST PROCEDURES

Switchgear and Switchboards

Visual and Mechanical Inspection

1. Inspect physical, electrical, and mechanical condition including evidence of moisture or corona.
2. Inspect anchorage, alignment, grounding, and required area clearances
3. Clean the unit.
4. Verify that circuit breaker sizes and types correspond to drawings and coordination study.
5. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.
6. Use appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
7. Exercise all active components.
8. Inspect mechanical indicating devices for correct operation.
9. Verify that vents are clear.
10. Perform visual and mechanical inspection of instrument transformers in accordance with Section 7.10.
11. Inspect control power transformers.
12. Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.

Electrical Tests

1. Perform resistance measurements through bolted connections with a lowresistance ohmmeter, if applicable, in accordance with Section 7.1.A.7.1.
2. Perform insulation-resistance tests on each bus section, phase-to-phase and

phase-to-ground, for one minute in accordance with Table 100.1. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1.

3. Operate controls and check correctness of functions.

Panelboard

Visual and Mechanical Inspection

1. Inspect physical, electrical, and mechanical condition including evidence of moisture or corona.
2. Inspect anchorage, alignment, grounding, and required area clearances
3. Clean the unit.
4. Verify that circuit breaker sizes and types correspond to drawings and coordination study.
5. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.
6. Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.

Automatic Transfer Switches

Visual and Mechanical Inspection

1. Inspect physical and mechanical condition.
2. Inspect anchorage, alignment, grounding, and required clearances.
3. Prior to cleaning the unit, perform as-found tests.
4. Clean the unit.
5. Use appropriate lubrication on moving current-carrying parts and on moving

and sliding surfaces.

6. Verify that manual transfer warnings are attached and visible.
7. Verify tightness of all control connections.
8. Perform manual transfer operation.
9. Verify positive mechanical interlocking between normal and alternate sources.
10. Perform as-left tests.

Electrical Tests

1. Perform a contact/pole-resistance test at normal and emergency positions.
2. Verify settings and operation of control devices.
3. Verify correct operation of normal source voltage-sensing relays.
4. Verify correct operation and timing of time delay upon transfer.
5. Verify correct operation alternate source voltage-sensing and frequency sensing relays.
6. Verify correct operation and timing of automatic transfer operation.
7. Verify correct operation and timing of time delay and retransfer upon normal power restoration.

Circuit Breakers, Low-Voltage Power

Visual and Mechanical Inspection

1. Inspect physical and mechanical condition.
2. Inspect anchorage, alignment, and grounding.
3. Prior to cleaning the unit, perform as-found tests, if required.
4. Clean the unit.
5. Inspect arc chutes.
6. Inspect moving and stationary contacts for condition, wear, and alignment.
7. Perform all mechanical operator and contact alignment tests on both the

breaker and its operating mechanism in accordance with manufacturer's published data.

8. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.

9. Verify cell fit and element alignment.

10. Use appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

11. Perform as-left tests.

Electrical Tests

1. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with the circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1.

2. Perform a contact/pole-resistance test by millivolt drop method at rated current.

3. Determine long-time pickup and delay by primary current injection.

4. Determine short-time pickup and delay by primary current injection.

5. Determine ground-fault pickup and delay by primary current injection.

6. Determine instantaneous pickup value by primary current injection.

7. Verify correct operation of auxiliary features such as trip and pickup indicators, trip-free, and trip unit battery condition.

8. Reset all trip logs and indicators.

9. Verify operation of charging mechanism.

Circuit Breakers, Insulated-Case/Molded-Case

Visual and Mechanical Inspection

1. Inspect physical and mechanical condition.
2. Inspect anchorage and alignment.
3. Prior to cleaning the unit, perform as-found tests, if required.
4. Clean the unit.
5. Operate the circuit breaker to insure smooth operation.
6. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.
7. Inspect operating mechanism, contacts, and arc chutes in unsealed units.
8. Perform as left tests.

Electrical Tests

1. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with the circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1.
2. Perform a contact/pole-resistance test by millivolt drop method at rated current.
3. Determine long-time pickup and delay by primary current injection.
4. Determine short-time pickup and delay by primary current injection.
5. Determine ground-fault pickup and time delay by primary current injection.
6. Determine instantaneous pickup by primary current injection.
7. Perform minimum pickup voltage tests on shunt trip in accordance with Table 100.20, as applicable.
8. Verify correct operation of auxiliary features such as trip and pickup indicators, trip-free, anti-pump function, and trip unit battery condition.

9. Reset all trip logs and indicators.

Ground-Fault Protection Systems

Visual and Mechanical Inspection

1. Inspect the components for damage and errors in polarity or conductor routing.
2. Verify that the ground connection is made on the source side of the neutral disconnect link and also on the source side of any ground-fault sensor.
3. Verify that the neutral sensors are connected with correct polarity on both primary and secondary.
4. Verify that the grounded conductor is solidly grounded.
5. Clean the unit.
6. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.12.
7. Verify correct operation of all functions of the self-test panel, if applicable.
8. Verify pickup and time-delay settings in accordance with the settings provided in the owner's specifications.

Electrical Tests

1. Measure the system neutral-to-ground insulation resistance with the neutral disconnect link temporarily removed. Replace the neutral disconnect link after testing. Test duration shall be one minute. For units with solid-state components or control devices that cannot tolerate the applied voltage, follow manufacturer's recommendation.
2. Perform ground-fault protective device pickup tests using primary injection.
3. Measure time delay of the ground-fault protective device at a value equal to or greater than 150 percent of the pickup value.

4. Verify the device did not operate at seventy-five percent of the pickup setting.