
Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 00 10 – General Instructions.
- .2 Section 26 05 00 – Common Work Results for Electrical.
- .3 Section 26 09 23.01 – Metering and Switchboard Instruments.
- .4 Section 26 23 00 – Low Voltage Switchgear.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE)
 - .1 ANSI/IEEE C37.13-1990, Low Voltage AC Power Circuit Breakers Used in Enclosures.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 5-09, Moulded-Case Circuit Breakers, Moulded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489 and NMX-J-266-ANCE-2010).

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with 01 00 10 – General Instructions.
- .2 Include time-current phase protection co- ordination characteristic curves for breakers.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal all packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products**2.1 AIR CIRCUIT BREAKER**

- .1 Air circuit breakers to: ANSI/IEEE C37.13.

- .2 Air circuit breakers: 600 V class drawout type.
 - .1 Continuous current rating as indicated.
 - .2 Trip rating as indicated.
 - .3 Interrupting rating: 42 kA RMS symmetrical
 - .4 (I.C. sym.) without current limiting fuses.
- .3 Air circuit breakers shall be minimum 1600 A frame size or as noted on the drawings. Protection set for continuous feeder load protection as indicated, stored energy type.
- .4 Breakers shall be manually operated with spring loading operating mechanism charged by manual cranking with lever arm. Equip breakers with manual close and trip buttons, and ON/OFF indicators.
- .5 Drawout breakers shall have three positions: 'connected', 'test' and 'disconnected'. It shall be possible to move the breaker to any one of the positions without opening the breaker door. An indicator shall be provided to show the position of the breaker.
- .6 Interlocks shall be provided to prevent moving the breaker from one position to another with the breaker in the closed position.
- .7 Key interlocks shall be provided and mounted in the face plate where required and as indicated.

2.2 CURRENT RELAY

- .1 Breakers shall be supplied with microprocessor based control unit (relay) with the following adjustments and features:
 - .1 Long time adjustable 0.6 to 1.1 times sensor tap.
 - .2 Short time adjustable two (2) to ten (10) times sensor tap.
 - .3 Instantaneous adjustable 'off' and 4 - 12 time sensor tap.
 - .4 Ground fault adjustable 0.2 to 0.7 time sensor tap.
 - .5 Digital display for phase currents, highest load current, fault current, power and energy consumption, neutral current, ground current.
 - .6 Fault memory shall be backed up in a power failure event.
 - .7 Time delays for all the above except instantaneous shall also be adjustable.
 - .8 Breakers shall be provided with single-phase protection.
 - .9 Relays shall be provided with indication of trip from overload, short circuit or ground fault.
 - .10 Retention or indication shall not rely on external power or battery.
 - .11 Relays shall be self-powered from phase sensors. Sensors shall have at least three (3) taps suitable for field adjustment.
 - .12 Sensors shall be provided for up to 100% of the frame size.
 - .13 2 N.O. and 2 N.C. auxiliary contacts shall be provided wired to terminal blocks to indicate breaker status for building control centre.
 - .14 Relay shall measure true RMS currents by sampling the entire current wave shape and calculate the effective heating value.
 - .15 Digital display meter indicating current, kW and kVA on each phase.

2.3 LIFTING DEVICE

- .1 One (1) lifting device shall be provided to suit breaker frames used.

Part 3 Execution**3.1 INSTALLATION**

- .1 Install air circuit breakers as indicated.
- .2 All load buses shall be supplied with minimum two (2) hole, long barrel compression lugs for outgoing and incoming feeders.

3.2 FIELD QUALITY CONTROL

- .1 Refer to Section 01 91 13 – General Commissioning (Cx) Requirements and Section 26 05 00 – Common Work Results for Electrical.
- .2 Visual and Mechanical Inspection
 - .1 Inspect circuit breaker for proper mounting.
 - .2 Operate circuit breaker to insure smooth operation.
 - .3 Inspect case for cracks or other defects.
 - .4 Check tightness of bolted connections and/or cable connections by calibrated torque-wrench method in accordance with manufacturer's published data.
 - .5 Inspect mechanism contacts and arc chutes in unsealed units.
- .3 Electrical Tests
 - .1 Perform a contact resistance test.
 - .2 Perform an insulation-resistance test at 1000 Volts dc from pole-to-pole and from each pole-to-ground with breaker closed and across open contacts of each phase.
 - .3 Perform insulation resistance test at 1000 Volts dc on all control wiring. Do not perform the test on wiring connected to solid state components.
 - .4 Perform adjustments for final settings in accordance with breaker setting sheet when applicable.
 - .5 Perform long-time delay time-current characteristic tests by secondary injection.
 - .6 Determine short-time pickup and delay by secondary current injection.
 - .7 Determine ground-fault pickup and time delay by secondary current injection.
 - .8 Determine instantaneous pickup current by secondary injection.
 - .9 Verify correct operation of any auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, and anti-pump function.
 - .10 Verify the calibration of all functions of the trip unit by means of secondary injection.
- .4 Test Values
 - .1 Bolt-torque levels shall be in accordance with manufacturer.
 - .2 Compare microhm or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than fifty percent (50%). Investigate any value exceeding manufacturer's recommendations.

- .3 Insulation resistance shall not be less than 100 megohms.
- .4 Trip characteristic of breakers shall fall within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
- .5 Perform all testing in the presence of the Departmental Representative. Provide test results report and include copies in the Operation and Maintenance Manuals.

END OF SECTION