CITY OF AUSTIN
ELECTRIC UTILITY DEPARTMENT
PURCHASE SPECIFICATION
FOR
CIRCUIT BREAKER, 362 KV, DEAD TANK, GANG OPERATED

1 SPECIFICATION AND CLASSIFICATION

1.1 Specification

1.1.1 The City of Austin – Electric Utility Department d/b/a Austin Energy sets forth this specification as the minimum requirements for operating characteristics and safety features of a 362 kV power circuit breaker. **Hydraulic, spring-hydraulic and pneumatic mechanisms are not allowed under this specification. Independent Pole Operated circuit breakers are not allowed under this specification.**

1.2 Classification

1.2.1 The circuit breaker shall be a 362 kV, 3000 Ampere Continuous Current Rating, three (3) pole, Sulfur Hexafluoride (SF_6), outdoor, dead tank, gang operated power circuit breaker.

1.2.2 The circuit breaker will be installed in an outdoor electric utility substation below an altitude of 1,000 meters and subjected to an annual ambient temperature variance of -25° C to +45° C at 100% humidity. The average temperature for any twenty-four (24) hour period is 30° C.

1.2.3 All bidders shall have five (5) years of experience producing 362 kV power circuit breakers for the electric utility industry. Any product submitted in response to this specification shall have been available for purchase for a minimum of five (5) years.

2 APPLICABLE STANDARDS

2.1 The circuit breaker furnished under this specification shall conform to the latest NEMA, OSHA, IEEE, ANSI/IEEE, ANSI, ASTM, NESC, and NEC standards applicable to the AC high voltage power circuit breakers. In the case of a conflict between any of the standards mentioned in this specification and the content of this document, Austin Energy's specification shall govern.

3 FUNCTIONAL REQUIREMENTS

The circuit breaker will be used in an electric utility distribution substation to perform the necessary switching and protection functions for 362 kV transmission circuits, 138/345 kV autotransformers, and generator step-up transformers.

3.1 Design

3.1.1 All circuit breakers of the same design and rating furnished on a given order shall be electrical duplicates and have mechanically interchangeable parts.

3.1.2 Circuit breakers shall be capable of interrupting all faults up to its maximum rating for overhead or underground transmission lines. The circuit breakers shall be capable of interrupting all faults which include short line fault applications and breaker failure situations.

3.1.3 Sulfur hexafluoride (SF_6) gas shall be used as the insulating and interrupting medium.

3.1.4 The circuit breaker shall utilize SF_6 gas at a single pressure in a closed system.

3.1.5 The Contractor shall provide a 1 % leakage rate guarantee from -30°C to +45°C.

3.1.6 The circuit breaker shall comply with OSHA 1910.95 requirements for acceptable noise level.

3.1.7 The circuit breaker shall be a dead tank design with the capability of having current transformers on both sides of the interrupter and on all six (6) bushings.

3.1.8 The circuit breaker shall be designed, tested, and rated for 180° out-of-phase switching.

3.1.9 The operating mechanism shall be spring only. **Pneumatic, spring-hydraulic and hydraulic operating mechanisms are prohibited.**

3.1.10 The circuit breaker shall be gang operated. **Independent Pole Operated circuit breakers are prohibited.**

3.1.11 The circuit breaker shall provide low pressure alarms, low pressure trip and lockout relays as per the following requirements:

The gas system shall have a four (4) stage alarm system for SF_6 gas leaks.

1) For an SF_6 leak, a low gas alarm shall be initiated at the first Contractor-recommended set point.
2) At the second Contractor-recommended set point, a timer relay shall start and a time delay start alarm shall be initiated. The timer shall be capable of being set up to a 4-hour delay.
3) If, at the end of the time delay, the SF_6 pressure is below the second set point but above the lowest, Contractor -recommended set point, the timer relay shall trip and lock out the breaker to further operations and initiate an alarm indicating a low gas timed trip.
4) If the SF_6 pressure should fall below the lowest (third) Contractor-recommended set point at any time, a separate relay shall trip the breaker, lock out the breaker to further operations and initiate an alarm indicating low gas trip and lockout.
5) The Contractor shall determine and preset the pressure set-points.

3.1.12 An alarm shall be provided for the charged/discharged spring status of the spring charging system. Closing and tripping shall be disabled until the spring is charged to its normal operating compression.

3.2 Operating Mechanism

The circuit breaker shall utilize one mechanism to operate all three poles at the same time. The operating mechanism shall conform to the provisions of ANSI/IEEE C37.12 and shall be:

3.2.1 Electrically trip free but not required to be mechanically trip free.

3.2.2 Constructed to accommodate Vanguard or Doble Motion Analyzers (time travel devices). The successful bidder must provide test plans for the Doble TDR 9000 with delivery of the first circuit breaker.

3.2.3 Capable of reclosing in accordance with the provisions of ANSI/IEEE C37.04, ANSI C37.09, and ANSI C37.06 (including all Supplements for the above standards).

3.2.4 Furnished with primary and secondary trip coils; each coil shall be designed with separate electrical, mechanical, and magnetic circuits. Coils shall be capable of independent replacement.

3.2.5 Equipped with an external position indicator visible from outside the control cabinet without opening doors.

3.2.6 Capable of at least one and a half (1 ½) complete close-open operations without replenishing the store of energy when starting at normal operating pressure. The close-open sequence shall, as a minimum, be the following:

O – CO – ***time delay***– CO

Reference section 3.2.8 for time delay requirement.

3.2.7 A 30-cycle reclosing relay shall be wired into the close circuit to prevent reclosing faster than 30-cycles. Subsequent close-open operations may be delayed up to a maximum of 45 seconds.

3.2.8 The maximum spring charging time shall be 45 seconds at the lowest operating voltage.

3.2.9 A universal motor shall be utilized to provide the subsequent close-open operations. The universal motor shall be rated 120 V AC or 125 V DC with an automatic transfer device. The input supply will be 15A circuit. Primary feed for the universal motor shall be 120 V AC.

The operating limits of the universal motor shall be as follows:
AC Voltage range: 110-130 V AC
DC Voltage range: 70-140 V DC

3.2.10 Provided with a thermostatically controlled heater to minimize condensation inside the operating mechanism enclosure.

4 PERFORMANCE REQUIREMENTS

The circuit breaker shall conform to all ratings and capabilities as defined and listed in ANSI/IEEE 37.04 and ANSI C37.06 and as follows:

4.1	Maximum Voltage, kV, rms	362
	Nominal Voltage, kV, rms	345
	Rated Voltage Range Factor, K	1.0
	Frequency, Hz	60
	Continuous Current Rating, Amps, rms	3000
	Short Circuit Current Rating at Maximum Voltage, Amps, rms (including SLF)	50,000
	Interrupting time, Cycles	3
	Reclosing time, Cycles	20
	Permissible Tripping delay, Y, Seconds	1
	Rated Max. Voltage divided by K, kV, rms	362
	Max. Symmetrical Interrupting Capability, Amps, rms (including SLF)	50,000
	Three Second Short-time Current Rating, Amps, rms	50,000
	Close and latch, Amps, crest	135,000
	Low Frequency Withstand, kV, rms	555
	Full wave Impulse (BIL), kV, crest	1300

4.2 Auxiliary Voltages

AC Voltage nominal: 120 VAC Range: 110-130 VAC
DC Voltage nominal: 125 VDC Range: 70-140 VDC

5 MATERIAL REQUIREMENTS

5.1 Construction

5.1.1 The circuit breaker shall be constructed to permit access to all parts for inspection, maintenance, and adjustments.

5.1.2 The circuit breaker shall be designed to prevent pumping.

5.1.3 All SF_6 pressure vessels shall conform to the requirements of one of the following:

A. ASME Unified Pressure Vessel Code including inspection and code stamp.
B. CAN/CSA-C50052-99.

5.1.4 Breaker designs submitted without pressure relief devices must provide independent test results proving the design will not rupture from overpressure due to an internal breaker flashover.

If pressure relief device is supplied, it shall allow pressure to be released from the interrupter housing in case of sudden pressure build-up. The purpose of this device is to reduce the catastrophic effects of a breaker explosion by releasing pressure build-up in the interrupter.

5.1.5 All pressurized components shall comply with the provisions of ANSI/IEEE C37.04

5.1.6 Ground pads shall be provided that are capable of carrying fault current equal to rated short circuit current for three (3) seconds at 45° C ambient. The circuit breaker shall be furnished with three (3) grounding pads. Two (2) shall be located at opposite legs 12 to 18 inches above the base. The third ground pad shall be located on the

exterior of the control box, either on the bottom or on one of the sides. The pads shall be non-rust stainless steel and have a standard two (2) hole NEMA configuration. Provide thread protectors for any threaded holes. Provide protection to the surface of the pad to prevent damage during transportation and installation.

5.1.7 All metallic parts of the circuit breaker shall be aluminum, galvanized steel or non-rust stainless steel. All nuts, bolts, and washers shall be non-rust stainless steel. All wire fasteners, ties, and holders shall be nylon. Plastic wire ties and holders are not acceptable for use. Any substitutions must be approved by Austin Energy.

5.1.8 The circuit breaker, including the base and control cabinet doors, shall be designed such that, after installation, there will be no permanent deformation caused by shipping or handling.

5.1.9 Operating systems for the circuit breaker shall include the devices listed in Table 1 of ANSI/IEEE C37.12 and shall perform as indicated.

5.1.10 All wiring external to the control cabinets shall be run in UL listed liquid-tight flexible metallic conduit. The conduit and conduit fittings shall be UL listed and suitable for installation outdoors.

The conduit jacket shall be PVC. The jacket shall be moisture resistant and resist aging due to exposure to extreme sunlight, UV, and elevated temperature.

The conduit shall be routed to minimize the potential for moisture entry and installed to limit exposure to damage due to climbing. The conduit shall be secured with metal fasteners. No plastic or nylon fasteners shall be allowed exterior to the control cabinets. No excessive lengths of conduit will be allowed. Conduit runs shall be no longer than necessary.

Liquid-tight flexible metallic conduit shall be Liquatite Type ATLA or Austin Energy engineer approved equivalent.

5.1.11 Each circuit breaker assembly shall be provided with lifting lugs or provisions for lifting with slings.

5.1.12 Holes for the anchor bolts shall be 1-1/2 inch in diameter to accommodate 1-1/4 inch anchor bolts supplied by Austin Energy.

5.1.13 Transient recovery voltage (TRV) capacitors are not allowed to meet the interrupting rating specified in Section 4.1.

5.1.14 The circuit breaker shall be provided with all wiring, hoses, and piping required for pole to pole, and pole to control cabinet connections as well as means for supporting or carrying these connections between phases.

5.1.15 The circuit breaker assembly including control cabinet shall be mounted on a common base. All interpole conduits shall be firmly secured to the common base. If skid mounted, the runners shall be turned up at both ends to facilitate sliding.

5.1.16 The circuit breaker shall have one common SF_6 gas system for all three poles. This

common gas system shall be filled and evacuated through one Dilo Type DN8 connector supplied with and attached to the circuit breaker.

5.2 Bushings

5.2.1 All bushings shall be manufactured in accordance with the provisions of ANSI/IEEE C37.04 and ANSI/IEEE C37.09.

5.2.2 The Contractor shall supply polymer composite bushings or Austin Energy engineer approved equivalent. Porcelain bushings will not be accepted. The bushing color shall be ANSI #70 light gray.

5.2.3 The bushing terminals shall comply with the provisions of ANSI/IEEE C37.04 and have a four (4) hole NEMA pad mill surfaced on both sides. The four-hole NEMA pad shall not be the angled type.

5.3 Current Transformers

5.3.1 The circuit breaker shall be supplied with eighteen (18) current transformers that have fully distributed windings and NEMA standard taps. Refer to sections 5.3.2, and 5.3.3 for a description of these three options. These current transformers shall comply with provisions of ANSI/IEEE C57.13 and ANSI/IEEE C57.13.6 and shall be tested per ANSI/IEEE C57.13, ANSI/IEEE C57.13.2, and ANSI/IEEE C57.13.6.

5.3.2 Relay Accuracy Current Transformers

A. A total of eighteen (18) 2000:5 multi-ratio relay accuracy current transformers shall be supplied. These current transformers shall be C800 relay accuracy class with a continuous thermal rating (RF) of 2.0. Certified OEM test reports shall be provided for each of these current transformers.

5.3.3 Additional Current Transformers

Additional current transformers may be specified at the time of Purchase Order in the configurations below.

5.3.3.1 A set of three (3) metering accuracy class current transformers, single-ratio, 2000:5, RF=2. The current transformers shall be high accuracy extended range Class 0.15S-B1.8, accuracy for the primary current shall maintained down to 1% of rated current.

5.3.3.2 A set of three (3) metering accuracy class current transformers, single-ratio, 1000:5, RF=3. The current transformers shall be high accuracy extended range Class 0.15S-B1.8, accuracy for the primary current shall maintained down to 1% of rated current.

5.3.3.3 Certified OEM test reports shall be provided for each of these current transformers. In addition to testing per ANSI/IEEE C57.13 and ANSI/IEEE C57.13.6, OEM test reports shall certify the accuracy of each meter class current transformers.

5.3.4 Secondary leads of all winding taps shall be wired to a terminal strip equipped with shorting bars in the control box and marked for identification.

5.3.5 A metal plate showing tap connections and ratios shall be mounted in the general vicinity of the terminal blocks.

5.3.6 Bushing designation and CT arrangement shall be as shown on drawing **E-1364-1**.

5.4 Accessories

The circuit breaker shall be provided with the following accessories:

5.4.1 An operation's counter visible from outside the control cabinet without opening the control cabinet door.

5.4.2 An auxiliary switch with a minimum of 20 spare stages (10-"a" contacts and 10-"b" contacts) wired to an Austin Energy accessible terminal board. Auxiliary switches shall be mechanically operated. The use of hydraulically operated auxiliary switches is prohibited. All auxiliary contacts shall be wired to terminal blocks in the main control cabinet. See drawing **E-1364-2.**

5.4.3 A field calibratable, temperature compensated pressure gauge to monitor the SF6 gas pressure readable from the ground level.

5.4.4 A Solon brand temperature compensated combination pressure gauge and switch with normally open contacts to provide an alarm in the event of gas pressure loss with contacts wired to a common terminal board in the control cabinet. The combination pressure gauge/switch shall provide the SF6 alarm functions specified in Section 3.1.11.

5.4.5 Push buttons to trip and close the breaker locally. Local red and green indication lights shall be provided in the control cabinet. Provide jumpers for customer to wire (interject) permissive control of pushbuttons.

5.4.6 One (1) SEL-2523 Annunciator Panel with Standard Communications, 42 Digital Inputs, 11 Digital Outputs. One (1) Output Alarm contact from monitoring relay(s) listed below (A.-K.) shall be wired to one (1) Digital Input from the SEL-2523. The wiring in the control cabinet shall allow Austin Energy adequate access to the output alarms if repairs or modifications are needed. The configurable labels shall be modified to reflect accurately each alarm function. As a minimum, the following alarms shall be provided:

A. Loss of DC Close Voltage
B. Loss of DC Trip#1 Voltage
C. Loss of DC Trip#2 Voltage
D. Loss of AC Heater Voltage (Adjustable delay up to 5 minutes)
E. Loss of AC Motor Voltage (Adjustable delay up to 5 minutes)
F. Loss of DC Motor Voltage
G. Low SF6 Gas Pressure – XX PSIG
H. Low SF6 Trip Level – XX PSIG

I. Low SF6 Trip and Lockout – XX PSIG
J. Low SF6 Time Delay Trip
K. Loss of Spring Energy

Auxiliary relays required to provide these alarm functions shall be mounted on the load side of the molded-case circuit breaker and shall follow contact input. A loss of DC voltage alarm contact monitoring the SEL-2523 Annunciator supply shall be brought to an Austin Energy accessible terminal.

5.4.7 All indicating devices used to provide the alarms mentioned in Section 5.4.6 shall have their alarm and trip contacts wired to a terminal strip in the control cabinet. This terminal strip shall be labeled “From Auxiliary Relays”. Connection wiring from the (42) Digital Inputs and (11) Digital Outputs on the SEL-2523 Annunciator shall be wired to a separate terminal block. This terminal block shall be labeled “I/O From SEL-2523 Annunciator”. Wiring between terminal strip labeled “From Auxiliary Relays” to terminal block labeled “I/O from SEL2523 Annunciator” shall be wired by the breaker manufacturer at the factory. All relay and alarm contacts shall have the following ratings:

A. 125 V DC
B. 5 Amp continuous
C. 1 Amp break resistive
D. 0.3 Amp break inductive

5.4.8 The contractor shall allocate a space inside the breaker control cabinet back panel and in the proximity of the customer conduit knockout entrance to install a small 6-inch x 6-inch x 1-inch fiber optic patch panel for future communications to the annunciator. This space is not allowed to be allocated in any hinged or swivel panel such as the circuit breaker cabinet door.

5.5 Insulating Medium

The sulfur hexafluoride gas supplied for use in gas circuit breakers shall comply with the provisions of ANSI/ASTM D2472. The Contractor shall provide certified copies of the test reports demonstrating compliance. The sulfur hexafluoride gas shall be provided in a refillable cylinder. The maximum dew point of the gas shall be - 65° C.

5.6 Paint Requirements

No part of the circuit breaker shall require painting. All metallic parts shall be made of aluminum, galvanized steel or non-rust stainless steel.

5.7 Control Cabinet

5.7.1 All operating mechanism equipment, control equipment, Austin Energy connections, current transformer (CT) circuits, alarm circuits, potential circuits, interface linkage cover and other circuits shall be housed in one or more weatherproof cabinets.

5.7.2 The circuit breaker shall be furnished with an uncluttered non-rust stainless steel NEMA Type 3R weatherproof control cabinet. The control cabinet shall be accessible from ground level. The bottom of the cabinet shall be between 18 inches and 42 inches above the base. Design of the control cabinet shall be such that overlapping metal surfaces are sealed to prevent corrosion.

5.7.3 Suitable ventilating holes shall be provided and located in the control cabinet and other enclosures to permit proper air circulation. The vents shall be durable, maintenance free and designed to prevent entry of water and insects.

5.7.4 All cabinet hardware and door hardware shall be non-rust stainless steel. The cabinet shall be provided with provisions for padlocking.

5.7.5 The control cabinet and doors shall be sufficiently rigid to prevent warping of the doors and to insure positive operation of the doors and latches. Doors shall be hinged and shall have heavy-duty handles and latches. The control cabinet doors shall be supplied with wind latches. If multiple doors are used in the control cabinet, the wind latches of the inner door shall attach to the outer door.

5.7.6 Open-cell foam rubber and RTV silicone rubber are **not acceptable** as gasket material for the purpose of weatherproofing.

5.7.7 The control cabinet shall accommodate an uncut, aluminum bottom entrance plate, large enough to handle six (6), two 2-inch rigid conduits on 4-1/2-inch centers. A clear path shall be provided between the conduit entrance and all terminal boards. All knockouts intended for field installation of conduits on the control cabinet shall be sealed with weatherproof knockout seals. Snap-on knockout seals are not acceptable.

5.7.8 The following electrical accessories shall be provided in the control cabinet:

A. One (1) or more 240 V AC non-thermostatically controlled heaters with personnel protective barriers shall be mounted in the control cabinet. The heaters shall be operated at 120 V AC and rated at 240 V. The total power dissipated in each cabinet shall be equal to 3 (± 0.5W) Watts per cubic foot of space contained therein. All heaters shall be supplied from high temperature wire.

B. One (1) 120 V weatherproof light fixture controlled by a weatherproof door-operated switch. The light fixture shall have a medium screw base lamp socket.

C. One (1) 120 V, 20 Amp, outlet equipped with a Ground Fault Interrupting (GFCI) device.

Each accessory shall be supplied from a separately protected circuit.

5.8 Control Wiring

5.8.1 Current transformer circuits shall be wired to terminal strips equipped with shorting bars (General Electric Type EB-27 or Austin Energy engineer approved equivalent). A white marking strip shall be furnished, marked, and attached so that terminal points can be identified. **See drawing E-1364-1.**

5.8.2 All other control wiring shall be wired to #10-32 barrier type terminal strips properly sized to handle the loads (General Electric Type EB-25 or Austin Energy engineer approved equivalent). Terminal boards for control wiring shall be solid molded blocks, rated 600 V and a minimum of 30 A per terminal and able to accommodate wire sizes up to and including #10 AWG wire size. A white marking strip shall be furnished, marked, and attached so that terminal points can be identified. **See drawing E-1364-2.**

5.8.3 All screws shall be able to accept and be operated with a holding screw driver.

5.8.4 One (1) spare twelve (12) point terminal board shall be provided in the main control cabinet for Austin Energy use.
One (1) spare twelve (12) point terminal board shall be provided in each operating mechanism cabinet.

5.8.5 The use of "plug-in" type terminal boards is prohibited.

5.8.6 All wire terminals and exposed conducting parts shall be provided with barriers to prevent accidental contact or injury to personnel.

5.8.7 All CT wiring shall be a minimum of No. 12 AWG copper wire and have 600 V insulation. All circuit breaker auxiliary wiring shall be a minimum of No. 14 AWG copper wire and have 600 V insulation. All Wiring shall be flame resistant, oil resistant, heat resistant, and moisture resistant. All wiring shall be complete and professionally installed, and bundled or contained.

5.8.8 Wire ends shall be permanently fitted with compression type, ring lugs before attaching securely to terminal studs. Splices are not allowed in factory wiring, including CT leads. However, terminal blocks are allowed for point-to-point connection. The method of permanently tagging the conductor ends shall be approved by an Austin Energy engineer.

5.8.9 All wiring between devices/accessories external to the control cabinet shall be provided by the Contractor and installed in conduit with weatherproof fittings.

5.8.10 The auxiliary wiring shall be permanently identified at both ends and routed to the control cabinet in liquid-tight flexible metallic conduit and fittings. The Austin Energy engineer shall approve the method of permanently tagging the conductor ends. Wire ends shall be permanently fitted with compression type, ring lugs before attaching securely to terminal studs.

5.8.11 The Contractor shall design the layout of the electrical wiring in the control cabinet to segregate the Contractor's wiring from Austin Energy's wiring. Terminal boards shall be wired with one side reserved for the Contractor and one side reserved for Austin Energy. Factory wiring shall not be terminated on the side of the terminal boards reserved for Austin Energy use. **See drawing E -1364-2.**

5.8.12 All electrical control components shall be clearly and permanently identified with reference designation numbers and/or letters on or near them. These reference designations shall match the wiring and schematic diagrams. **See drawing E -**

1364-2.

5.9 Auxiliary and Control Power

5.9.1 Austin Energy will provide the 125 V DC, 2-wire and 120/240 V AC, 1 phase, 3-wire power sources necessary to operate the control circuits. The Contractor shall supply termination points clearly marked for Austin Energy's input power. **See drawing E-1364-2.**

5.9.2 The alarm circuits and other DC control equipment shall operate from 125 V DC.

5.9.3 Single phase 120/240 V AC and 125 V DC loads shall be supplied from molded-case circuit breakers properly sized for the loads. Molded-case circuit breakers shall be dual-rated at 120/240 V AC and 240 V DC. Molded case circuit breakers are to be used exclusively. All circuit breakers shall have a minimum interrupting rating of 10 kA AC and 5 kA DC.

Knife switches and fuses are not allowed as isolation or disconnecting devices. Fuses are only allowed as a protection device.

The control cabinet shall be equipped with molded case circuit breakers with non-exposed terminals for the following functions:

A. DC control power for primary trip circuit
B. DC control power for secondary trip circuit
C. DC control power for closing circuit
D. DC main breaker for incoming DC service
E. AC auxiliary power for 120 V outlet, 20 A, GFCI
F. AC spring charging motor circuit power, 1 phase
G. AC power to heaters
H. AC main breaker for incoming AC service

5.9.4 An AC failure relay and alarm shall be provided for the single phase 120/240 V AC circuits. The alarm shall have an adjustable time delay of up to 5 minutes. A set of contacts shall be wired to the annunciator. A separate set of contacts shall be wired to terminal blocks for Austin Energy use. The contacts for Austin Energy use shall be one normally open and one normally close.

5.9.5 DC failure relays and alarms shall be provided for each 125 V DC circuit. A set of contacts shall be wired to the annunciator. A separate set of contacts shall be wired to terminal blocks for Austin Energy use. The contacts for Austin Energy use shall be one normally open and one normally close. The DC failure alarm wired to the incoming DC service shall be wired to a terminal block for Austin Energy use.

5.10 Circuit Breaker Interrupting Duty

The Contractor shall provide interrupting duty data for contact maintenance and contact life curves for the circuit breaker.

5.11 Nameplate Requirements

5.11.1 The Contractor shall supply all nameplates as specified in the ANSI/IEEE C37.04. All nameplates shall be made from non-rust stainless steel or aluminum shall be permanently attached to the exterior of the control cabinet door. The information contained on the nameplates shall be inscribed and painted black and shall be readable from a distance of two feet perpendicular to the nameplate. All the information shall be in English and in standard non-metric units of measure.

5.11.2 The circuit breaker shall be provided with an additional nameplate mounted on the control cabinet door that includes the following information:

A. Manufacturer Name
B. Circuit Breaker Type
C. Serial Number
D. Austin Energy Purchase Order Number
E. Voltage rating (nominal and maximum)
F. K-Factor
G. Continuous Current Rating
H. Interrupting Current Rating
I. Close and Latch Current Rating
J. 3-second Withstand Rating
K. Interrupting Time
L. Reclosing Time
M. Basic Impulse Insulation Level (BIL)
N. Short Line Fault Ratings (90% and 75%)
O. Total SF_6 weight in pounds

5.11.3 The following information shall be provided on the operating mechanism nameplate:

A. Operating Mechanism Type
B. Operating Mechanism Serial Number
C. AC control voltage
D. DC control voltage
E. Normal SF_6 pressure and temperature
F. Low SF_6 alarm/lockout points

5.12 Material

5.12.1 All materials used in the circuit breaker shall be subject to rigid quality assurance and control standards. There shall be complete traceability on all materials from receiving until final installation in the circuit breaker. Material tracking and inspection reports shall be made available to the Austin Energy inspector upon request.

5.12.2 Initial vendor inspections and qualifying audits shall be conducted and ongoing spot checks shall be made on all materials used in the circuit breaker. Vendor inspection and audit reports shall be made available to the Austin Energy inspector upon request. As a rule, material found by the Austin Energy inspector to have been improperly qualified for use shall be unacceptable for use in the circuit breaker. The Contractor shall make arrangements satisfactory to Austin Energy, at its sole discretion, for the use of such material. Those arrangements may include replacement of the non-qualified material.

5.13 Spare Parts

The Contractor shall provide the following spare parts as part of a kit. Quantities will be specified on Purchase Order.

1. One (1) Trip Coil
2. One (1) Close Coil
3. One (1) SF6 Gauge
4. One (1) SF6 Fill Hose with proper fittings and fill gauge (per Section 5.1.16)
5. One (1) Pressure Relief Device (per Section 5.1.4)
6. One (1) Desiccant Bag
7. One (1) Charging Motor

6 TEST REQUIREMENTS

Austin Energy reserves the right to visit the manufacturing facility and to observe the circuit breaker while undergoing construction and testing. The Contractor may not charge Austin Energy for its right to visit the facility during construction and testing. Austin Energy shall be notified at least three weeks (3) prior to the start of the required tests. If three (3) weeks notice is not given before the start of testing, Austin Energy reserves the right to have the Contractor, at its sole expense, delay the testing until Austin Energy inspector(s) assigned to this purchase are available. Furthermore, if the Austin Energy inspector(s) arrives on site and the circuit breaker is not ready for testing within eight (8) hours, Austin Energy reserves the right to postpone the testing for up to three (3) weeks. The Contractor shall reimburse Austin Energy for any travel and labor costs incurred by Austin Energy due to Contractor delays.

Delays caused by Austin Energy exercising its rights as per the above paragraph shall not relieve the Contractor from meeting the required delivery dates.

6.1 Every circuit breaker in a given purchase order shall be tested in accordance with ANSI/IEEE C37.09. A template for the proposed test procedure shall be included in the bid documents.

6.2 The supplier of the SF_6 gas shall provide documentation guaranteeing that the SF_6 meets or exceeds the provisions of ANSI/ASTM D2472.

6.3 Every current transformer shall be tested in accordance with ANSI/IEEE C57.13. OEM test reports shall be provided.

6.4 Metering accuracy CT's are required to have OEM Accuracy Test Reports provided for each CT. These current transformers shall be tested for metering accuracy per the requirements outlined in section 5.3.3.

6.5 A photo of each **meter class CT's sticker** indicating which pole is connected to (2, 4, or 6), the serial number, ratio, accuracy class, RF, frequency, and manufacturer year shall be supplied with the current transformer test reports. Refer to **drawing E-1364-1** and purchase order meter class CT configuration. (example: if two breakers are purchased a total of six (6) photos will be required to be submitted. (2 breakers x 3 poles = 6 photos)

6.6 Control and Power Wiring Tests

Low frequency withstand-voltage tests shall be performed on all control and secondary wiring. All low voltage wiring, including control and indication wiring shall have full functional tests.

6.7 Quality control test results and quality assurance records shall be made available to the Austin Energy inspector upon request.

6.8 Reports

The Contractor shall present evidence of quality control testing and proof that the circuit breaker has passed all required tests. All reports shall be in English and in standard non-metric units of measure.

6.7.1 One (1) set of the certified test reports shall be provided. These reports shall be submitted to Austin Energy with the shipment of the circuit breaker. The test reports shall be included in the instruction manual.

6.7.2 The Contractor shall send the SF_6 gas test reports with the shipment of the circuit breaker.