CITY OF AUSTIN - AUSTIN ENERGY

PURCHASE SPECIFICATION

SWITCH, VACUUM INTERRUPTER, NETWORK, SOLID DIELECTRIC INSULATED, 38 KV, 600 A

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL PROCESS SUPV. / MANAGER
02/07/95	David Baker	Issuance	
11/30/05	David Baker Ted Schoenberg	Revision	
05/21/15	Daniel McReynolds	Revision	
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REASON FOR REVISION	*AFFECTED PARAGRAPHS*
Original Issue	New Document
Change to Solid Dielectric	All
Update submittal language – 5/21/15	
Updated grammar, wording of sentence structure, and removals.	Remove blank page and 7.3, changes to 3.11, 6.3, 7.2.3.3

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein. Retain for future reference.

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FOR
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1.0 SCOPE AND CLASSIFICATION

1.1 Scope

1.1.1 Austin Energy (AE) requires a qualified Contractor to provide a 600-Ampere, 38 kV, solid dielectric insulated, fully submersible, motor operated, vacuum fault interrupter switch for use in the Downtown Network system.

1.1.2 The Manufacturer of this switch shall have a minimum of five (5) years experience in the manufacture of vacuum switches at 15 kV to 38 kV.

1.2 Classification

The switch will be used as a load and fault interrupter on a 34.5 kV system.

2.0 APPLICABLE SPECIFICATIONS

Unless otherwise stated in this specification, switches furnished under this specification shall be designed, built, and tested per the latest editions of the following

2.1 ANSI/IEEE C37.60 - Standard Requirements for Overhead, Pad-Mounted, Dry Vault, and Submersible Automatic Circuit Reclosers and Fault Interrupters (R 1992).

2.2 ANSI/IEEE C37.71 - Standard for Three-Phase, Manually Operated Subsurface Load-Interrupting Switches for Alternating Current Systems (R 1990).

2.3 ANSI/IEEE C37.72 - Standard for Pad-Mounted Load Interrupting Switches.

2.4 ANSI/IEEE C37.74 - Standard Requirements for Subsurface, Vault, and Pad-Mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems Up to 38 kV.

2.5 ANSI/IEEE 386 - Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600 V (R 1991).

2.6 ANSI/IEEE 592 - Standard for Exposed Semi-conducting Shields on High Voltage Cable Joints and Separable Insulated Connectors.

2.7 The manufacturer shall have both ISO9001:2000 and ISO14001 registration. The manufacturer shall provide copies of the registrations with the bid; otherwise, it will be assumed that the manufacturer is <u>not</u> ISO registered.

In case of conflict between any of the standards mentioned in this specification and the contents of this document, the Austin Energy specification shall govern.

3.0 FUNCTIONAL REQUIREMENTS

3.1 The switch shall be a non-self-reclosing vacuum interrupter incorporating three (3) vacuum bottles and of a two-way configuration, one three-phase line in and one three-phase line out. The switch shall provide three-phase simultaneous tripping.

3.2 The vacuum interrupter shall incorporate a programmable, fuseless, resettable, electronically controlled overcurrent protection system to sense the load and fault current on each phase of the load side of the switch and provide tripping which emulates Westinghouse C08 relay curves or other applicable curves. Curves shall also be customizable.

3.3 The control system shall be powered from epoxy embedded current transformers located on the interrupter.

3.4 The control system shall provide dry contact points for remote close and trip operations. Also, four "a" and four "b" auxiliary contacts for remote open and close, supervisory alarms, and remote annunciators shall be provided.

3.5 The switch shall have a motor operator capable of closing three phases simultaneously *by a* remote electronic operation. The motor operator must be easily disconnected to allow for manual operation. The motor operator shall be powered by an external 120 V source provided by AE.

3.6 The completed unit must be capable of withstanding internal failure such that any resulting rupture shall not expel or blow off any parts, material, or debris. The switch and electronic controls shall function in an ambient temperature range of -10°C to +80°C and be submersible [control enclosure(s) NEMA 6P (IP67) rated].

3.7 The complete assembly shall be maintenance-free with no gas or oil.

3.8 The electronic control and motor operator shall be capable of being remotely operated, i.e. remote power – remote trip/close. Austin Energy will provide 120vac for this function.

3.9 The electronic control shall be remotely mounted from the switch. The control cable length shall be a minimum of 35 feet.

3.10 The electronic control shall be settable by both a front keypad and laptop computer. The control shall have the following features:

- Appropriate Display
- Trip Curves per Par. 3.2
- Ground Fault Trip
- Phase Identification and Magnitude of Fault
- Selectable Minimum Response
- RS232 Serial Interface
- Manual Trip Button
- Adjustable Phase Time Delay
- Inrush Restraint
- Selectable Instantaneous Trip
- Real-Time Load Current Readout

3.11 Quote as separate items any software, special cables, or adapters to program unit & retrieve data with a laptop computer.

4.0 PERFORMANCE REQUIREMENTS

4.1 Ratings

Voltage Class Maximum (kV):…… 38
Voltage Class Nominal (kV):…….. 35
BIL Impulse (kV):……. 150
Continuous Current, Amperes:…….. 600
Load Break Current, Amperes:…….. 600
1 Minute AC Withstand (kV):……. 60
1 Minute AC Withstand (dry), Prod. Test (kV):….. 50
15 Minute DC Withstand, (kV):……103
Momentary Current, kA Asym:……20
Fault-Close (3-times), kA Asym:……. 20
1 Second Current, kA Sym:……12.5
Fault Interrupting Current, kA Sym:……. 12.5
Fault Interrupting Current, kA Asym:……..20
Mechanical Operations:…….. 2,000
Interrupting Time, Maximum (cycles):……..… 3

4.2 Fault Interrupting Duty shall be tested according to ANSI C37.60 as shown in the following table:

Percent of Maximum Interrupting Duty	Approx. Interrupting Current, Amps	No. of Fault Interruptions
15-20%	2,000	44
45-55%	6,000	56
90-100%	12,000	16

Total Number of Fault Interruptions: 116

5.0 MATERIAL

5.1 The switch operating mechanism shall be spring-assisted for quick-make quick-break operation. A trip-free mechanism shall permit the switch interrupter to be independent of the operating handle if closing into a fault. The operating shaft shall be pad-lockable.

5.2 All current-carrying components shall be equivalent to 500Kcm copper minimum. Cable entrances shall be 900 Amp apparatus bushings with 100% copper current path. The apparatus bushings shall accommodate 900 Amp 35 kV separable non-loadbreak connectors and shall conform to ANSI/IEEE 386. All apparatus bushings shall be shipped with protective caps.

5.3 The switch shall have overall maximum dimensions of 42 inches high, 25 inches wide, and 18 inches deep (including the motor operator). Both incoming and outgoing bushings shall be front mounted to provide for ease in the routing of elbows and cables.

5.4 The vacuum bottles shall be mounted vertically and completely encapsulated in a solid dielectric. The moveable contact shaft shall have a contact position indicator visible through a viewing window. The viewing window shall be on the mechanism cover.

5.5 The switch shall have provisions for bolting to a rear wall or the floor. Any required mounting frame shall be made of galvanized steel. Cables will approach the switch from below and attach it to the front of the switch.

5.6 The exterior hardware components of the switch shall be brass or stainless steel only. Two (2) welded lifting eyes shall be provided and be capable of supporting the weight of the switch. Two (2) 4/0 AWG clamp-type ground lugs shall be provided, one (1) for the bushings and one (1) for the operator.

5.7 The motor operator shall be mounted and connected to the switch such that the motor operator can be de-coupled for complete electric operational testing.

5.8 A stainless steel nameplate shall be provided showing the ratings, circuit configuration, and date of manufacture.

6.0 SAMPLE, INSPECTION AND TEST REQUIREMENTS

6.1 Austin Energy reserves the right to visit the manufacturing facility and observe the switch undergoing construction and testing. Advance notice of at least two (2) weeks shall be given to Austin Energy before the start of testing.

6.2 The switch shall be tested in accordance with applicable sections of ANSI/IEEE C37.60 and ANSI/IEEE C37.71. One hundred percent production testing shall include:

- One minute AC high potential test – phase to phase, phase to ground, and across open contacts
- Mechanical and electrical operational test to ensure proper operation of the switch, control(s), and motor operator
- Circuit resistance

- X-ray inspection and Partial Discharge to insure void-free solid dielectric
- Apparatus bushings shall be tested in accordance with ANSI/IEEE 386.

An electronic copy of certified production test reports shall be submitted 2 weeks prior to delivery.

6.3 One complete set of Certified Design Test shall be submitted two weeks prior to delivery. All certified design tests shall be conducted in the order and with the product being tested completely as described in the ANSI/IEEE Standards referred to in this specification. Any deviation from what is prescribed by ANSI/IEEE shall be considered an exception and the test results will be rejected as non-compliant to the referenced ANSI/IEEE Standards.

7.0 SUBMITTALS

7.1 Documentation

7.1.1 The Offeror shall submit one (1) set of approval drawings to Austin Energy within six (6) weeks after the receipt of the order and prior to beginning construction of the switches. Austin Energy requires two (2) weeks for review of approval drawings.

7.1.2 The Offeror shall submit one (1) complete installation, operating, and maintenance instruction book for each switch, bound in an 8 ½" x 11" lightweight folder suitable for reference and filing. A spare parts list with prices and catalog numbers shall also be provided.

7.1.3 Final Documentation shall include outline drawings, control block diagrams, control wiring diagrams, installation manual, operations manual, maintenance manual, TCC Curves: Two (2) hard copies to ship with each switch, and two electronic copies on CDs.

7.1.4 Electronic drawings shall be in industry common formats: dwg or dfx and be readable by the latest version of AutoCAD® 2016 or later

7.1.5 Other electronic documentation shall be in industry common formats: doc, xls, tif, or pdf.

7.2 Delivery

7.2.1 Each switch shall be shipped as an individual unit.

7.2.2 All switches shall be shipped FOB Destination to the address shown on the Purchase Order.

7.2.3 Final acceptance of the switches will depend on the following conditions:

7.2.3.1 Delivery requirements as specified have been met.

7.2.3.2 Final Documentation requirements as specified have been met.

7.2.3.3 Tests and inspections have been made by Austin Energy to determine that the switch meets all requirements of the specification and any written agreements between Austin Energy and the Offeror. The conditions of any tests shall be mutually agreed upon by Austin Energy and the Offeror. The Offerorwill be notified and may be represented at all tests. If inspections and/or tests show the switch is deficient in workmanship, Austin Energy will refuse to accept it and the Offeror will have reasonable time to correct the workmanship, at its own cost.