CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT

PURCHASE SPECIFICATION

FOR

REGULATOR, DIST, OH, 1PH, 38.1KVA-833KVA, STEP-VOLTAGE

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL SIGNATURES
10/23/2000	Steven Booher		
11/09/2009	Arthur Gonzalez	Revision	
7/8/2011	Arthur Gonzalez	Revision	
08/26/2014	Brantley Gosey	Revision	
10/20/2015	Brantley Gosey	Revision	

REASON FOR REVISION		AFFECTED PARAGRAPHS
07/08/11	Revised Beckwith Control Descr. And Part #	7.11
08/26/14	Changed control and added configuration	3.5.4, 7.11
10/20/15	Removal of section	1.2.2

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.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

CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT
PURCHASE SPECIFICATION
FOR
STEP-VOLTAGE REGULATOR, SINGLE-PHASE OVERHEAD-TYPE DISTRIBUTION
(38.1 KVA THROUGH 833 KVA)

1.0 SCOPE AND CLASSIFICATION

1.1 Scope

The City of Austin Electric Utility Department, hereinafter referred to as Austin Energy (AE), requires a qualified Vendor, to provide, single phase, 60 hertz, 7.63kV with a tank-mounted 8.4kV MCOV-type series surge arrester, oil-filled, step-voltage regulators 38.1 kVA through 833 kVA. Regulator size will be requested on bid sheet. Unless specified, all step-voltage regulators shall meet ANSI/IEEE C57.15 latest revision.

1.2 Classification

1.2.1 No deviation from these specifications on the part of the Vendor shall be allowed. Any item supplied under these specifications, which is not in complete compliance with these specifications, will not be accepted and will be returned to the Manufacturer.

2.0 APPLICABLE SPECIFICATIONS

All characteristics, definitions, and terminology, except specifically covered in this specification shall be in accordance with the latest revision of ANSI/IEEE C57.15.

3.0 FUNCTIONAL REQUIREMENTS

3.1 Voltage and kVA Ratings

The voltage ratings shall be in accordance with Table 3 of ANSI/IEEE C57.15 latest revision.

3.2 Voltage Regulator Losses

The single phase step-voltage regulator total losses (both No Load and Load Loss) shall be in accordance with ANSI/IEEE C57.15 - 5.7.1. Additional tolerances for regulator losses shall meet values shown in Table 1.

3.3 Voltage Regulation

Voltage regulation shall be plus and minus 10%, thirty-two 5/8% steps, 16 above and 16 below neutral.

3.4 Insulation Levels

Insulation levels of step-voltage regulators shall meet values shown on ANSI/IEEE C57.15 - Table 8.

3.5 Components & Accessories

All materials used shall be of the 55°C (65°C Hot Spot) Class and be thoroughly tested for compatibility with all voltage regulator components.

3.5.1 Liquid-filled step-voltage regulators shall be designed and constructed to withstand the mechanical and thermal stresses produced by external short circuits of 25 times the base RMS symmetrical current.

3.5.2 Clamp-Type bushing terminals shall be supplied and based upon the nameplate line current ratings as follows:

Nameplate Line Current Rating	Conductor Size Range or Threaded Stud
150 A or less	#2 str-4/0
151 A-300 A	#2-477 Kcm
301 A-668 A	#2-800 Kcm
669 A-1200 A	1-1/8-12 UNF-2A
1201 A-2000 A	1-1/2-12 UNF-2A

3.5.3 Bushing shall have an insulation level not less than that of the winding terminal. Impulse and low-frequency insulation levels shall meet those included in ANSI/IEEE C57.15-Table 10.

3.5.4 Voltage regulator shall have a Type "A" configuration in accordance with IEEE Std C57.15-2009 or latest revision.

A Type "A" configuration is when the primary circuit is connected directly to the shunt winding of the voltage regulator. It is sometimes referred to as a *straight* design in the industry. The series winding is connected to the shunt winding and, in turn, via taps, to the regulated circuit. In a Type A step-voltage regulator, the core excitation varies because the shunt winding is connected across the unregulated primary circuit. The maximum range of regulation on the *raised* side equals the maximum range of regulation of the *lower* side with 10% being the nominal amount of regulation for the preferred kVA ratings.

4.0 TANK

4.1 Tank Grounding Provisions

Tank grounding provisions shall consist of a two (2) NEMA pad with a 0.5 in. 13 NC tapped hole 0.44 in. deep and located near the bottom of the tank.

4.2 Leak Resistance

The step-voltage regulator tank shall be leak resistant throughout the operational life of the step-voltage regulator. The tank shall be all welded construction.

4.3 Covers

The step-voltage regulator shall have a removable cover with nitrile rubber gaskets. The cover, when secured in place, shall prevent any moisture from entering the tank. Wildlife protectors shall be provided for each regulator bushings and arresters. Lifting eyes shall be provided for lifting covers only.

4.4 Pressure Relief Valve

The tank shall have automatic pressure relief device for all internal fault conditions.

4.5 Lifting Lugs

All step-voltage regulators shall have lifting lugs for one (1) position mounting.

4.6 Mounting

Regulators rated below 200 shall be provided with pole-mounted welded-on hanger brackets. Regulators rated 200 kVA and above shall be provided with a base suitable for securing them to a pad or elevating structure. All regulators must be suitable of being secured to elevating structures.

4.7 Paint

The Unit shall be painted ANSI 70 light gray, Munsell notation 5BG7.0/0.4 on the outside, inside of the tank, and the bottom of the cover.

5.0 TANK EXTERNAL ACCESSORIES

5.1 Arrester – regulator shall be equipped with 3 kV MOV bypass arrester connected across the series winding between the source and load bushings. An 8.4 kV MCOV arrester shall be supplied and mounted to the regulator for the source and load bushings. The arresters shall have wildlife protection and an insulated conductor connecting the arresters.

5.2 An external oil sight gauge shall be provided which indicates oil level at 25 deg. C.

5.3 An external position indicator shall indicate the tap changer position. The position indicator shall be mounted above the oil level and slanted downward at a 45 deg. angle.

5.4 Drain valve (with sampling device) and lower filter press valve, with a malleable iron pipe plug.

5.5 A blue “NO-PCB” label with a minimum 2 inches tall x 3 inches wide size shall be installed on the tank so that it is visible from the ground.

6.0 STEP-VOLTAGE DIELECTRIC OIL

6.1 Step-voltage regulator dielectric oil shall be Type II in accordance with ASTM D3487.

6.2 The step-voltage regulator dielectric oil shall have a minimum dielectric strength of 30 kV when tested in accordance with ASTM D877.

6.3 THE STEP-VOLTAGE REGULATOR DIELECTRIC OIL SHALL NOT CONTAIN GREATER THAN 1 PART PER MILLION (PPM) OF POLYCHLORINATED BIPHENYL (PCB).

6.4 The test method for the analysis of PCB content in step-voltage dielectric oil shall be in accordance with EPA 600.

7.0 REGULATOR CONTROL

7.1 The control must be able to communicate in Modbus and DNP 3.0 level #2 protocol.

7.2 The control shall have the capabilities to provide reverse power operation without any extra potential transformers.

7.3 The control shall operate from – 30 deg.F to +160 deg. F

7.4 The control shall have the capability to reset the position indicator drag hands.

7.5 The control shall be suitable for base pole mounting and be supplied with all connectors and 35 foot of control cable.

7.6 The control shall have lighted indicator on the control panel when the regulator is in the neutral position.

7.7 The control shall have auto/manual, raise, lower, and SCADA remote type switches along with voltage test terminals and have a set of external power terminals to power the regulator for maintenance purposes.

7.8 The control shall have raise, lower, and in band LEDS.

7.9 The control shall store in non-volatile memory the min/max readings along with their respective date and time stamp since the last reset for kW, KVAR, KVA, amps avg., amps (IA, IB, IC), volts source, volts load, tap raise, tap lower. The control will also have the capability to store the same values on a 15-minute interval and hold 45 days of data.

7.10 The Manufacture shall supply two (2) copies of software for setting and integrating the control. This software shall be capable of SCADA control of the regulator. The software shall be Windows XP compatible. The two copies shall be supplied to upon knowledge of being awarded the bid. The copies shall be sent to the AE Standards Engineer at the following address:

Austin Energy – St. Elmo Service Center
Attn: AE Distribution Standards
4411–B Meinardus Drive
Austin, TX 78744-1835

7.11 The regulator shall be supplied with a Siemens MJ-4A control or the latest MJ version, with RS-485 and RS-232 port, flip toggle switch, and ct shorting plug options regulator control with proper adapter panel or Austin Energy engineer approved equal. The control enclosure needs to be stainless steel NEMA type 3R with hasp for padlocking. The control shall have CO-GEN power flow capabilities.

8.0 DATA REQUIREMENTS

Upon receiving a new shipment of step-voltage regulators to Vendor's receiving site, the Vendor shall provide following information on each regulator. This information shown below shall be provided, but not limited to, to the Standards Engineer referenced in section 7.10, upon knowledge of being awarded the bid:

8.1 Serial Number

8.2 KVA Rating

8.3 Number of Phases

8.4 Voltage Rating

8.5 Frequency

8.6 Drawings

8.7 Total step-voltage regulator weight, filled with oil and with arrester mounted

8.8 Winding Material

8.9 Core Material

8.10 Month and year of manufacture

8.11 Short-Circuit Withstand Capability

8.12 Exciting current at 100% rated voltage.

8.13 Gallons of mineral oil used in the voltage regulator.

8.14 Weight of regulator.

9.0 NAMEPLATE

The nameplate shall be affixed to the regulator and be made of corrosion-resistant material. The nameplate shall be in accordance with ANSI C57.12 latest revision.

The following additional information shall be provided on the nameplate:

9.1 PCB content (No-PCB or less than 1 PPM) (The NON-PCB statement will be "Filled with ANSI Type II mineral oil that contained less than 1 ppm PCB at the time of manufacture.

9.2 The nameplate shall be stamped “NO-PCB”.

10.0 TESTING

10.1 All regulator routine tests shall be performed in accordance with IEEE C57.00 Section 8.

In addition to the IEEE C57.00, section 8, table 19 routine test requirements the following tests shall be required:

a. On 500 kVA and smaller Winding insulation resistance, Core insulation resistance, control (auxiliary) cooling losses, single phase excitation tests on the rated voltage connection, lightning impulse (as per IEEE C57.12.90 Section 10.4.2, Method 1), and audible sound level.

b. On 501 kVA and larger control (auxiliary) cooling losses, single phase excitation tests on the rated voltage connection, lightning impulse (as per IEEE C57.12.90 Section 10.4.2, Method 1), and audible sound level.

10.2 The frontal wave impulse and switching, phase to ground tests as listed in IEEE C57.00 section 8, table 19 will not be required.

10.3 Prior to accepting a contract Austin Energy shall receive a full test report from a reputable domestic testing lab on subject product(s). The lab shall not be affiliated directly with the manufacturer of the subject product(s). Tests performed on products shall be according to(ANSI STD). Test results shall indicate the exact product number that the tests were performed on.

11.0 AE REQUIREMENTS

11.1 The manufacturer shall provide a one-time free training on operation and maintenance on products new to Austin Energy.

11.2 The manufacturer shall notify Austin Energy of any software and firmware upgrades and provide upgrades to Austin Energy free of charge for the life of the product.

11.3 AE item numbers impacted by this specification include, but are not limited to the following:

15590

15591

19648