CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT

PURCHASE SPECIFICATION (E-1806)

FOR

TRANSFORMER,DISTRIBUTION,OH,1PH,1KVA,15K, FOR CAP BANKS

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL PROCESS SUPV. /MATERIALS SUPV.
08/24/16	Brantley Gosey	Issuance	
01/04/17	Brantley Gosey	Revision	

REASON FOR REVISION	AFFECTED PARAGRAPHS
Where test reports will be sent; relocated section 11.3 to 7.3	5.0, 7.3, 11.1, 11.3

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.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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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, single HV bushing with tank-mounted surge arrester, mineral insulating oil (NO-PCBs), conventional distribution transformers rated 1 kVA.

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 are not in complete compliance with these specifications will not be accepted and will be returned to the Manufacturer.

1.2.2 All Manufacturers furnishing transformers under these specifications shall have at least ten (10) years experience in the manufacture and sale of distribution transformers.

2.0 APPLICABLE STANDARDS

All characteristics, definitions, and terminology, except specifically covered in this specification shall be in accordance with the latest revision of the following standards:

IEEE C57.12.20

C57.12.31

DOE CFR Title 10, Volume 3, Chapter II, Subchapter D, Part 431, Subpart K.

ASTM D3487

IEEE C57.637

IEEE C57.93

IEEE C57.12.90

3.0 FUNCTIONAL REQUIREMENTS

3.1 Voltage and kVA Ratings

The voltage ratings shall be in accordance with the below table.

HIGH VOLTAGE	HV BIL kV	LOW VOLTAGE	LV BIL kV
7200/12470Y	95	120	30

3.2 Maximum Guaranteed Transformer Losses

The single phase distribution transformer maximum guaranteed Load Losses shall be 25W at 100% capacity.

3.3 High Voltage (HV) Taps

The manufacturer shall **not** provide taps for the transformers described herein.

3.4 High Voltage Bushings and Terminals

3.4.1 The High Voltage Terminals shall be in accordance with IEEE C57.12.20.

3.4.2 High voltage bushing shall be in accordance with IEEE C57.12.20, IEEE C57.19.00, and IEEE C57.19.01.

3.5 Low Voltage (LV) Bushings and Terminals

3.5.1 The low-voltage bushings and terminals shall be 2-hole spades. All secondary bushings shall have captive, compression limited, fully shielded conductor and flange seals. Bushings shall be certified to withstand the following cantilever loading without leaking. The bushings for the pole mounted transformers shall be Central Maloney Speedmount Series Bushings as required by the cantilever withstand rating table shown below. Terminal designation and markings shall be in accordance with IEEE C57.12.70.

	SECONDARY VOLTAGE
kVA	120/240
1	160-181 FT LBS

3.5.2 The terminals shall be finished on both sides to enable a complete connection to either side.

3.6 CORE AND COIL

3.6.1 The transformer coils shall be designed to maintain their nameplate kVA rating throughout the temperature range. The continuous kVA ratings shall be based on an average winding temperature rise by the resistance of 65°C as per IEEE C57.12.00.

3.6.2 All materials used shall be of the 65ºC (85º C Hot Spot) Class and be thoroughly tested for compatibility with all transformer components.

3.6.3 Oil ducts shall be strong enough to withstand full short circuit forces.

3.6.4 The windings shall be a mechanically rigid assembly to resist axial and radial short circuit forces.

3.6.5 The primary coil shall be wound in such a manner, that when properly cured, will have an effective bond both turn to turn and layer to layer.

3.6.6 The primary coil shall be wound with continuous conductor without splices, joints or welds inside the windings.

3.6.7 High Voltage (HV) leads shall be trained and appropriately insulated to avoid dielectric breakdown between adjacent cables. Spacers, permanently held in place, shall be used to prevent a phase-to-ground short.

3.6.8 The secondary coils shall be wound with a rectangular or strip conductor. Each secondary coil shall be wound with a continuous conductor without splices, joints or welds inside the windings.

3.6.9 LV bushing leads shall be cold or thermally welded, where joined to the winding material

3.6.10 Aluminum low voltage leads shall be connected to their bushings, with hardened aluminum connectors which have been cold or thermally welded to the leads.

3.6.11 The core and coil assembly shall be rigidly held together as a unit with a core clamp whose design shall maintain reasonable pressure on the assembly throughout the life of the unit.

3.7 Tank

3.7.1 Leak Resistant

The transformer tank shall be leak resistant throughout the operational life of the transformer.

3.7.2 Covers

The transformer cover shall be insulated. The transformer shall have a removable cover with nitrile rubber gaskets. The cover, when secured in place, shall prevent any moisture from entering the tank.

3.7.3 Pressure

The transformer tank and cover shall be designed to withstand pressure in accordance with IEEE C57.12.20.

3.7.4 Pressure Relief Valve

All transformers shall be equipped with a resettable device (which can be reset by trained personnel only) which detects and provides an external indication of internal transformer faults, and also incorporates pressure relief functionality. The approved device is manufactured by IFD Corporation part number IFD-ORCA-10PSI-aA or approved equal.

3.7.5 Hand Holes

The transformers shall not have hand holes.

3.7.6 Support Lugs (Hangers)

All transformers shall have support lugs for one (1) position mounting. The support lugs shall be in accordance with IEEE C57.12.20.

3.7.7 Grounding

All transformers shall have two tank ground provisions as per IEEE C57.12.20, section 7.5.4.1. As shown in figure 7, the two tank ground provisions shall be located under the low voltage bushings.

In addition to the two tank ground provisions, all transformer sizes shall have a low voltage ground provision as shown in IEEE C57.12.20, section 7.5.4.4.

Transformers with two LV bushings shall have a grounding strap attached from the X2 bushing to a grounding lug on the tank centered between X1 and X2.

3.7.8 Labels

The Vendor shall place all labels required by AE Distribution Construction Standard #1000-17, and shown in Attachments III and IV, on the tank of each transformer. This includes the "SIZE kVA" and the "NO PCBS" labels.

3.8 Arresters

3.8.1 An arrester shall be mounted on the transformer adjacent to the H1 bushing. The arrester shall be connected from the top of the arrester to H1 transformer bushing. The arrester wire shall be 24 inches long; #6 compressed soft stranded copper transformer riser wire, polyethylene covered. A single hole tin plated compression connector shall be utilized to connect the wire on both ends that connect the H1 bushing to the arrester. The connection from the bottom of

the arrester shall be solid copper strap rated for 10KA and bolted to the bottom of the transformer tank. All connections to the lugs, bushing and arrester shall be properly installed as per manufacturer instructions .

3.8.2 The arrester supplied shall have a rating of 10 kV, 8.4 kV MCOV, polymer, metal- oxide type, with a wire nut and wire clamp on top terminal. The transformers shall be delivered with one of the arresters listed as shown in Attachment I.

4.0 WILDLIFE GUARDS

All transformers shall be delivered with the below-listed animal guard properly installed on the HV bushing and arrester: No other Wildlife Guards will be permitted.

a. Central Maloney 70380330

b. Cantex EZGUARD

5.0 TRANSFORMER DIELECTRIC OIL

The transformer shall have insulating mineral oil and shall be in accordance with the latest revision of IEEE C57.106 and all of its applicable normative references.

The manufacturer shall provide batch test reports of the oil characteristics to the Austin Energy Distribution Standards Supervisor, upon request.

The PCB content in the dielectric fluid shall be less than 1 ppm. The vendor shall provide written certification to the Austin Energy Distribution Standards Supervisor, upon request, that all dielectric fluid contains less than 1 ppm. The PCB content shall be shown on the nameplate of the transformer.

6.0 PAINT REQUIREMENTS

The unit shall be painted Light Gray Number 70, Munsell Notation 5BG 7.0/0.4 as described in IEEE C57.12.31.

7.0 DATA REQUIREMENTS

The Vendor shall provide for the AE Standards Engineer, upon receiving a new shipment of transformers to Vendor's receiving site, including but not limited to the following information on each transformer:

7.1 The following items shall be provided for each transformer on every shipment. Data that is gathered from testing, shall be done so in accordance with IEEE C57.12.00, C57.12.80:

7.1.1 **S**erial Number

7.1.2 kVA Rating

7.1.3 Voltage Rating

7.1.4 Core (Iron) losses at rated load, corrected to 85°C

7.1.5 Copper losses at rated load corrected to 85°C

7.1.6 Percentage (%) impedance

7.1.7 Exciting current at 100% rated voltage

7.1.8 Percentage (%) regulation at 80% power factor and rated load

7.1.9 Percentage (%) regulation at 100% power factor and rated load

7.1.10 Gallons of mineral oil used in the transformer

7.1.11 Percentage (%) efficiency @ DOE efficiency criteria

7.2 The following items shall be provided in a yearly report with every first shipment of every year:

7.2.1 Drawings

7.2.2 Total transformer weight, filled with oil and with arrester mounted

7.2.3 Winding Material

7.2.4 Core Material

7.2.5 Conductor temperature at rated load (Design Test)

7.2.6 Hot Spot temperature at rated load (Design Test)

7.2.7 Top Oil temperature at rated load (Design Test)

7.2.8 Thermal time constant (Design Test)

7.2.9 Short-Circuit Withstand Capability (Design Test)

7.2.10 Exciting current at 110% rated voltage (Design Test)

7.2.11 Radio Influence Voltage (RIV) at 110% rated voltage (Design Test)

7.3 The Vendor shall provide the information in Section 7 (numerical values and/or pass/fail, as applicable) of this specification to the Austin Energy Distribution Standards Supervisor:

Austin Energy Distribution Standards Supervisor
4411-B Meinardus Drive
Austin, TX 78704

The test reports shall clearly state Austin Energy's specification number E-1806 and the type of transformer (Pole mount).

8.0 NAMEPLATE

The nameplate of the transformer shall be in accordance with IEEE C57.12.00, Table 6 (Nameplate A). The following additional information shall be provided on the nameplate:

8.1 Bar Code (Section 9.0)

8.2 PCB content (No-PCB or Less than 1PPM)

9.0 Permanent Bar Code

The bar code shall be in accordance Attachment II and with the latest revision of the following standards: ANSI X3.17, ANSI X3.182, ANSI X3.4, ANSI X3.49, and ANSI MH10.8M

10.0 AUSTIN ENERGY REQUIREMENTS

Austin Energy or its designated representative reserves the right to inspect and test transformers and materials in all stages of manufacturing and testing, at whatever location the manufacturing is performed, at no charge to Austin Energy.

11.0 OTHER REQUIREMENTS

11.1 All transformers supplied to AE shall meet or exceed the efficiency values in accordance with Department of Energy (2016 requirements) CFR Title 10, Volume 3, Chapter II, Subchapter D, Part 431, Subpart K 10 CFR 431 part III - Energy Conservation Efficiency Program for Certain Commercial and Industrial Equipment: Distribution Transformers Energy Conservation Standards table I.1431.196 (b) (1) & (2) . Certified test data by serial number shall be provided with each transformer and sent the Austin Energy Distribution Standards Supervisor. Any transformer not complying with Department of Energy efficiency ratings shall be rejected.

11.2 A decal shall be placed on the transformer in accordance with Attachments III and IV. The decal shall be colored blue with white lettering. The decal shall be 6” tall by 6” wide and shall have the precise wording, in capital letters, “NO PCBS”.

11.3 If any defect in the equipment supplied, or failure to comply with this specification, shall appear within the period of 18 months from date of final acceptance of the equipment, the Contractor shall be notified, and the Contractor shall thereupon correct without delay and at Contractor's own expense the defect or failure of compliance by repairing the defective part or parts, by supplying a non-defective replacement or replacements, and/ or by correcting a deficient design as required. The Contractor shall further replace or repair all other similar equipment if such defect may reasonably be expected to develop or occur in said similar equipment. Removal and installation cost of the defective parts or equipment shall be at Contractors expense. In the event the Contractor shall correct any defect(s) or failure of compliance by repair, replacement, or correction as required above, then with respect to the equipment corrected, the aforesaid warranty period shall begin from the date of completion of installation of such correction and acceptable, therefore, provided same is not unreasonably delayed by Austin Energy.

ATTACHMENT I

TANK-MOUNTED SURGE ARRESTERS FOR SINGLE-PHASE DISTRIBUTION TRANSFORMER

Nominal System Voltage (L-L) kV RMS	BIL* (kV)	Manufacturer	MCOV Rating** (kV)	Manufacturer Part Number
12.47	95	Cooper	8.4	UHS10050BA1A1A1A
12.47	95	Ohio Brass	8.4	213709-7214
12.47	95	Maclean	8.4	ZHP010-0000000

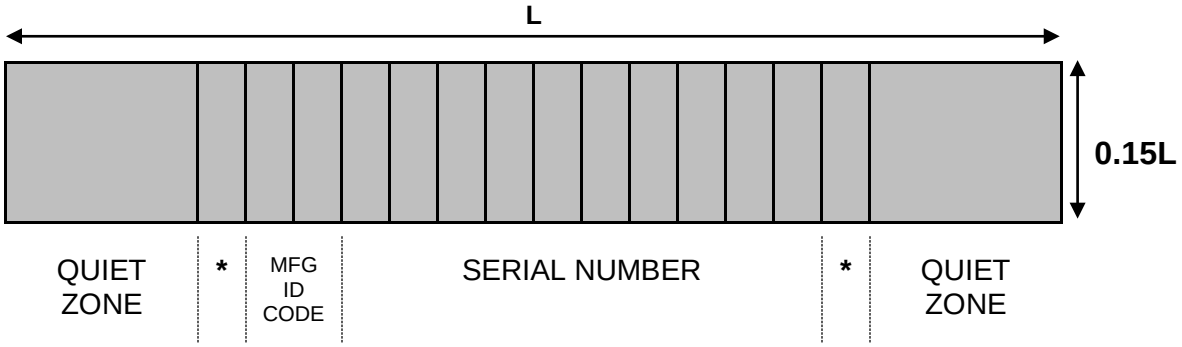
* Minimum BIL of Surge Arrester Housing with Metal Oxide Blocks

** MCOV - Maximum Continuous Operating Voltage

ATTACHMENT II

BAR CODING AND MANUFACTURING CODES FOR SINGLE-PHASE DISTRIBUTION TRANSFORMER

1.0 ORIENTATION OF BAR CODE CHARACTERS



*Start/Stop Character

2.0 MANUFACTURER IDENTIFICATION CODES

The Manufacturer Identification Codes suggested below represent, in part, codes which are utilized for bar coding distribution transformers. The above listing does not represent an inclusive list of distribution transformer manufacturers.

AB	–	Asea Brown Boveri / Power Partners
CM	–	Central Moloney
CP	–	Cooper
GE	–	General Electric
HI	–	Howard Industries
KU	–	Kuhlman

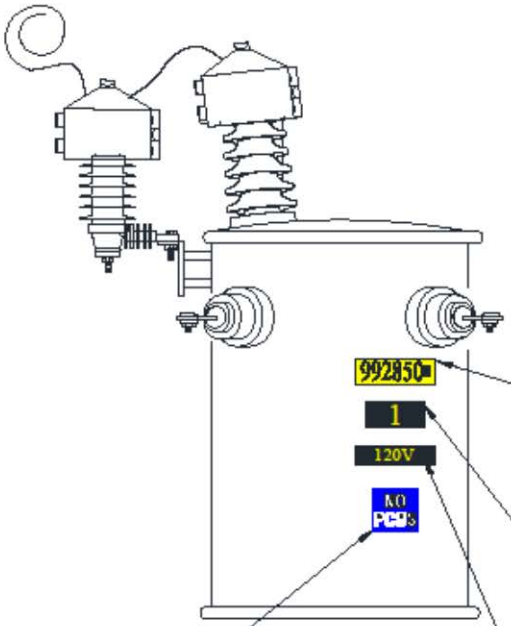
ATTACHMENT III

SIGNAGE FOR SINGLE-PHASE POLE-MOUNTED TRANSFORMERS

AUSTIN ENERGY	GENERAL INFORMATION	1000-17B
	ENGINEERING NOTES AND SIGNAGE	Sheet 1 of 1
Rev: 09/08/16	SIGNAGE- POLE MOUNT TRANSFORMER	05/15/06

1000-17B SIGNAGE- POLE MOUNT TRANSFORMER

SIGNAGE PLACEMENT FOR POLE MOUNTED 1KVA TRANSFORMER



CITY ID NUMBER
LOCATED AT THE TOP OF THE TRANSFORMER ON THE RIGHT-HAND SIDE WHERE IT IS VISIBLE FROM THE STREET/YARD.

SIZE KVA
LOCATED IN THE CENTER ABOVE THE SECONDARY VOLTAGE STICKER WHERE IT IS VISIBLE FROM THE STREET/YARD.

SECONDARY VOLTAGE:
LOCATED IN THE CENTER ABOVE THE PCB STICKER WHERE IT IS VISIBLE FROM THE STREET/YARD.

NO PCBS
LOCATED IN THE CENTER OF THE TRANSFORMER UNDER THE SECONDARY VOLTAGE STICKER WHERE IT IS VISIBLE FROM THE STREET/YARD.

ATTACHMENT IV

TYPICAL EXTERNAL SIGNAGE MATERIAL REQUIREMENTS POLE-MOUNTED TRANSFORMERS

"NO PCBS" decal: 6 inch X 6 inch, blue. Base Film: 0.0035-inch cast polyvinyl chloride, with UV inhibitors as per MIL-M-22106A. Cyasorb UV-9 light absorber C14H1203. Gloss 80 UL 94 rated. Over lamination: 002PVF (polyvinyl fluoride) tedlar UV screening film from E.I. Dupont. Cold-seal bonded. Adhesive: 0.002-inch permanent acrylic hi-tack, with high-temperature-resistant Elasticisors for adhesion at 40 deg. F. PSTC test method: #1 modified for a 15 minute dwell time, with 2 mils of adhesive, 56 oz/inch width rating. Ink: Silkscreen type 4, with automotive grade pigments and binders, 0.0004-inch thick ± 0.0001, inch high pigment volume concentration total PVC 40-50 (copper phthalocyanines). Liner: 0.0007-inch ± 0.001-inch Kraft, coated one side chemical resistant. Salt spray 240 hours 5%, at 100 degrees, with no blistering, color change, or other material degradation. No effect when immersed in diesel fuel, motor oil, anti-freeze, detergent 2 %, ammonium hydroxide (12% and 39%), kerosene, acetic acid, acetone, and water. Service temperature range: -40 to +170 deg. F. Minimum lifetime exterior durability of 15 years from installation date with proper surface preparation.

Approved Manufacture or equal: Mitrographers, catalog number COA-001

"SIZE kVA" decal: width as required, 2 7/8 inches tall, Engineer Grade, adhesive reflective vinyl. Yellow numbers, black background.

"City ID Number" decal: width as required, 2 7/8 inches tall, Engineer Grade, adhesive reflective vinyl. black numbers Yellow background.

"SECONDARY VOLTAGE" decal: width as required, 2 7/8 inches tall, Engineer Grade, adhesive reflective vinyl. Yellow numbers, black background. The sticker shall read "L-L Voltage / L-G Voltage".

CITY OF AUSTIN – AUSTIN ENERGY

PURCHASE SPECIFICATION

FOR

Capacitor Bank, Distribution, Pre-Assembled

DATE	PREPARED BY	ISSUANCE/REVISION	DIRECTOR
10/18/2005	Steven Booher	Re-issue	David L. Wood
11/16/2005	Steven Booher	Revision	David L. Wood
1/11/2006	Steven Booher	Revision	
9/28/2009	Gary Haydon	Revision	Allen Small
4/17/2013	Brantley Gosey	Revision	Allen Small
5/9/2013	Brantley Gosey	Revision	Allen Small
6/28/13	Brantley Gosey	Revision	Allen Small
01/04/17	Brantley Gosey	Revision	

REASON FOR REVISION	AFFECTED PARAGRAPHS
Revised switch requirements	3.4
Deleted Capacitor Control	3
Revised Functional Requirements	3
Added Capacitor Requirements	3.8
Changed HV wire requirements, Updated part numbers, Changed wire length, Added control requirements	3.1, 3.5.7, 3.6.7, 3.7
Removed Remote Programmable Controller Section	3.7
Various Changes	3.2.3, 3.2.5, 3.4.1, 3.4.7
Added Remote Programmable Controller Section	3.9
Upon request, where to send tests reports; reference E-1806	3.2.7, 3.5, 3.7.1,

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

CITY OF AUSTIN – AUSTIN ENERGY

PURCHASE SPECIFICATION

FOR

PRE-ASSEMBLED DISTRIBUTION CAPACITOR BANK

1.0 SCOPE AND CLASSIFICATION

1.1 SCOPE

1.1.1 The City of Austin (COA) through its Electric Utility Department DBA Austin Energy (AE) requires a qualified Vendor to provide preassembled capacitor banks. The qualified Vendor shall have at least five (5) years of experience in the manufacture of pre-assembled capacitor banks.

1.1.2 The capacitor bank shall be shunt connected, switched and pole-mounted.

1.1.3 The capacitor bank shall be shipped factory assembled, pre-wired and ready for installation.

1.2 CLASSIFICATION

1.2.1 The capacitor bank shall be externally fused, grounded-wye design, for use on a 12.47 kV, 3-phase, 60 Hz, solidly grounded neutral distribution system.

1.2.2 AE will purchase either 600 kVar or 1200 kVar pre-assembled switched capacitor banks in accordance with this specification and the attached design drawings.

2.0 APPLICABLE SPECIFICATIONS

The capacitor bank furnished shall be designed, fabricated, tested and delivered in accordance with the latest revision of all applicable ASTM, ANSI, IEEE, ICEA, NEMA and UL standards and to the requirements stated herein.

3.0 FUNCTIONAL REQUIREMENTS

3.1 Wire

3.1.1 All wire shall be stranded concentrically-lay soft uncoated copper in accordance with ASTM B-8. The wire shall be insulated for wildlife protection.

3.2 Capacitor Unit

3.2.1 The individual capacitor units shall be rated 200 kVar, 7200 volt, single phase, 15 kV, 60Hz, double bushing 95.0 kV BIL.

3.2.2 Line-to-Line System Voltage is 12.47 kV.

3.2.3 The Capacitor unit elements shall be all film type and not contain Kraft paper. The solid dielectric material shall consist of a minimum of 2 sheets of polypropylene film.

3.2.4 The Capacitor unit shall be equipped with an internal discharge resistor.

3.2.5 Capacitor units shall be equipped with two glazed wet process bushings. The bushing terminal stud shall be solid type design. All porcelain shall be ANSI No. 70 light gray finish.

3.2.6 Capacitor unit bushings shall be provided with a tin plated copper alloy clamp type parallel-groove terminals that accommodate copper or aluminum conductors from #8 solid through number #2 stranded AWG and shall come with appropriate wildlife protection installed.

3.2.7 The dielectric fluid contained in the capacitor units shall be PCB free (less than 0.1ppm). The test method used for analysis of PCB content shall be EPA Method 608 latest revision. The contractor shall supply Austin Energy two copies of certified test reports, upon request, indicating that the dielectric fluid is PCB free. Upon request, copies of the certified test reports shall be sent to the Austin Energy Distribution Standards Supervisor.

3.2.8 Each capacitor unit shall be furnished with a heavy-duty stainless steel or aluminum nameplate in accordance with ANSI-C55.2. The name plate shall contain, but not limited to the following:

a. Manufacture name

b. Manufacture model

c. Manufacture serial number

d. Year of manufacture

e. Rated reactive power

f. Rated voltage, rms

g. Rated frequency

h. BIL

i. Statement as to whether insulating fluid is or is not flammable

j. NO-PCB

k. The actual tested production capacitance value

3.2.9 Capacitor tanks shall have type 304 stainless steel and be hermetically sealed by welding. Each tank shall be ANSI No. 70 gray in color. All parts requiring painting shall be guaranteed rust free for five (5) years.

3.2.10 Capacitor units shall have stainless steel mounting brackets left unpainted on the underside for positive grounding.

3.2.11 Each capacitor unit shall be supplied with a blue "NO-PCB" decal on the capacitor tank to provide quick and easy identification.

3.3 Capacitor Rack Mounting Frame

3.3.1 The pole mounted capacitor rack frame shall be provided to mount the capacitor units. The rack frame shall be made using lightweight, structural aluminum.

3.3.2 The capacitor rack frame shall include the following features:

a. Provision for grounding.

b. Lifting eyes, which provide for level lifting and are capable of supporting a completely equipped bank.

c. Riser wire shall be #4 AWG stranded concentrically-lay soft uncoated copper in accordance with ASTM B-8. The wire shall be covered with 110 mils of non-shielded black polyethylene in accordance with ICEA S-70-547. The riser wire length shall be a minimum of six feet.

d. Pole mounting bracket shall be supplied with a ground connector.

e. Pole mounting bracket shall be designed to mount the rack to a round wood pole.

f. Stainless steel hardware shall be utilized for mounting capacitor units and required accessories.

g. Capacitor rack shall have proper electrical clearances for 95 kV BIL, 7.2 kV phase to ground and 12.47 kV phase to phase.

h. Capacitor rack shall be sized to accommodate six 200 kVar capacitor units. The frame rack shall be provided with sway braces.

i. Capacitor rack shall be self-supporting, such that extra bracing is not required to keep the capacitor units from touching the ground during shipment and storage.

j. The capacitor rack shall have NEMA 3 cast aluminum or polymer weather resistant junction box to terminate all of the low voltage wiring. The junction box shall be mounted on the side of the capacitor rack in accordance with AE drawing titled 600 and 1200 kVar Switched.

3.4 Capacitor Switches

3.4.1 Capacitor switches shall be solid dielectric, single-phase vacuum, and have a solenoid driven operator. There shall be no porcelain used on the external portion of the switch. The switches shall be manufactured and tested in accordance with the latest revision of ANSI C37.66. Capacitor switches shall be rated as follows:

a.	Voltage Class	15kV
b.	Rated Impulse Withstand Voltage (BIL)	125kV
c.	Continuous Current Rating	200A

d.	Symmetrical Current Rating	6,000A
e.	Asymmetrical Current Rating	9,000A
f.	High Frequency Transient	12,000A
g.	Transient Inrush Frequency	6,000Hz
h.	Nominal Control Voltage	120Vac
i.	Operating Control Voltage Range	95-127 Vac
j.	Mechanical Operations-open/close without maintenance	25,000
k.	Operating Temperature Range	-40° to +65°C

3.4.2 Each vacuum switch shall include a five (5) pin weatherproof receptacle for connection to the junction box. Each switch shall be factory assembled and wired to the capacitor bank rack at the factory.

3.4.3 The switch shall require no routine maintenance.

3.4.4 The vacuum switch weight shall not exceed 28 pounds.

3.4.5 One vacuum switch shall be provided per phase.

3.4.6 The vacuum switch shall be mounted in accordance with Attachment I.

3.4.7 The switch shall be equipped with a manual hookstick operable disconnect handle.

3.4.8 Solenoid operated mechanism is required and motor operated switches will not be considered.

3.4.9 Capacitor vacuum switch supplied shall be ABB PS15 or Buyer approved equal.

3.5 Control Power Transformer (CPT)

3.5.1 A 1 kVA CPT shall be provided to operate the vacuum switches and capacitor control. The CPT shall have one (1) HV bushing and two (2) LV bushings with eyebolt connectors. The CPT shall be in accordance with Austin Energy Specification E-1806 latest revision.

3.5.2 The CPT shall have the rated secondary rated at 120 volts.

3.5.3 The CPT shall have an external tank-grounding lug.

3.5.4 CPT shall be rated for 65°C temperature rise.

3.5.5 The CPT shall be mounted on the capacitor rack prior to shipment from the factory in accordance with Attachment I.

3.5.6 The CPT shall be pre-wired to the junction box.

3.5.7 Each CPT shall include a 10 kV, 8.4 MCOV polymer housed arrester mounted on the transformer adjacent to the H1 bushing. The arrester supplied shall be Cooper URT1005-0A1A-1A1A or Ohio Brass 221609-7314 or Buyer approved equal.

3.6 Junction Box Requirements

3.6.1 The junction box supplied shall be NEMA 3 cast aluminum or polymer with hinged cover utilizing 2 wing nuts for securing the cover closed.

3.6.2 All cable entry bushings shall be aluminum liquid tight strain relief type.

3.6.3 The junction box shall be supplied with a seven (7) point terminal strip with the following designation:

a. Line "L"

b. Neutral "N"

c. Close "C"

d. Trip "T"

e. Neutral Sensor "N/S"

f. Spare

g. Spare

3.6.4 All junction box terminations shall use insulated ring tongue terminals. Only ratcheting type tools are acceptable for crimping the terminal onto the wire.

3.6.5 The junction box shall include control cables with a five (5)-pin plug to connect to the vacuum switches. The wire from the junction box to each of the vacuum switches shall be 3-conductor #14 cable. The termination and wire color code for the five (5) pin screw on plug, to the vacuum switch is as follows:

a. Pin A Not Used

b. Pin B Neutral (White)

c. Pin C Close (Red)

d. Pin D Trip (Green)

e. Pin E Not Used

3.6.6 The junction box shall include a control cable to connect to the control power transformer. The wire from the junction box to the control power transformer shall be a 2 conductor #10 stranded wire, with a bare #10 copper ground. The termination and wire color code is as follows:

a. Line (Black)

b. Neutral (White)

3.6.7 The vendor shall provide 35.0 ft of cable from the junction box to the capacitor controller. The cable shall be 7 wire, 12-gauge stranded. The wire colors shall be black, orange, green, red, blue, white and white with black stripe.

3.6.8 All control cable shall be 600 volt multi-conductor flame retardant. Control cable insulation shall be color coded, flame-retardant cross-linked polyethylene (XLPE). Cable assembly shall be wrapped with clear polyester tape. The control cable jacket shall be flame-retardant, abrasion, chemical, sunlight and weathering resistant polyvinyl chloride (PVC).

3.7 Drawings and Instruction Manuals

3.7.1 The following information should be provided with each size capacitor bank at time of bid:

a. One (1) set of drawings showing the capacitor bank layout, dimensions and component locations.

b. One (1) set of control wiring diagrams for the entire unit.

c. One (1) set of individual component instruction and operating manuals.

d. Approval drawings are required, two (2) weeks after receipt of order. Approval drawings shall be sent to the Austin Energy Distribution Standards Supervisor.

3.7.2 Austin Energy will provide and install the capacitor controller and meter base for the pre-assembled capacitor bank.

3.8 Capacitor Unit Testing Requirements

3.8.1 Each capacitor unit should be subjected to the following routine production tests as listed below:

a. Short-time overvoltage test

b. Capacitance test

c. Leak test

d. Discharge resistor test

e. Loss determination test

3.8.2 One copy of the production test shall be provided upon request to the Austin Energy Distribution Standards Supervisor.

3.8.3 The following design tests shall be preformed on the capacitor units as listed below:

a. Impulse Test

b. Thermal stability test

c. Radio influence test

d. Voltage decay test

e. Overvoltage Endurance Test, similar to IEC 60871 -25°C.

This design test shall include the application of 2.0 times AC voltage for 15 cycles and then reducing the voltage to 1.1 times rated voltage for 1.5 minutes without interruption, and then repeating the cycle again, without interruption, until the test unit has been subjected to 170 daily overvoltage cycles. This test shall continue until the test unit has been subjected to a total of 850 overvoltage cycles. At the start of each daily test period the dielectric temperature of the test unit(s) shall be -25°C.

3.8.4 Certified Design test reports verifying the above tests should be included in the bid for this item prior to final bid award. The Design tests shall be performed on capacitor units from a standard current production run. Failure to submit design test reports may be grounds for bid rejection.

3.9 Capacitor Controller

3.9.1 Mounting shall be six jaw ringed meter socket.

3.9.2 Enclosure shall be no larger than 10 in x 10 in x 7 in. NEMA 4X weather tight. Hinged with lockable hasp, exterior red neutral current fault light and surge protector pre-installed for an antenna. The surge protector shall be a Polyphaser IS-BOLN-C2 or buyer approved equal. The surge protector shall have a protective cap on the exterior male threads.

3.9.3 Contactor output shall be 30 A, 120/240VAC, 15 second on duration for motor and solenoid operated switches.

3.9.4 Surge and lighting protection shall be in accordance with ANSI C37.90.1 1989

3.9.5 Line Current Sensor input configurable for Lindsey or Fisher Pierce CT's via software.

3.9.6 Line Current Accuracy shall +/- 1%, +5 counts

3.9.7 Voltage accuracy +/- 0.5 VAC resolution

3.9.8 Temperature accuracy +/- 1 deg. F. resolution

3.9.9 Time accuracy Temperature compensated oscillator, +/- 0.001%

3.9.10 Clock backup shall power capacitor controller clock for 10 days

3.9.11 Liquid crystal display.

3.9.12 Data logging shall be 5000 records. 15 minute interval, approximately 45 days

3.9.13 Computer interface USB

3.9.14 Communications Interface Comm. 1: RS-232 serial interface for DNP 3.0 communication. Comm. 2: RS-232 serial interface for local or remote PC interface

3.9.15 Communications Power supply 12 VDC, 1 amp

3.9.16 Communication protocol DNP 3.0

3.9.17 Unit shall be designed to operate -22 deg. F to 185 deg. F. and at humidity 5-95%, non-condensing.

3.9.18 Settings Voltage: Voltage Close shall be 105-127/210-257 VAC; Max. Setting=Open Volts-3 VAC. Open: 108-103/213-260 VAC: Min. setting= close Volts +3 VAC, 5-minute time averaged voltage response. Setting in 0.1 volt increments.

3.9.19 Settings user interface shall be front panel user with visible access to all local control settings via rotary and rocker switches.

3.9.20 Amp Settings -Close shall be 10- 600

3.9.21 Amp Settings -Open shall be 5-300, no less than 5 amps less close amps.

3.9.22 KV AR settings -Close shall be -10 to -2000.

3.9.23 KVAR settings -Open. Shall be -280 to 1000. No less than 20 KVAR more than leading to Close KVAR.

3.9.24 Temperature settings Close: 0-120 deg. F; Open: 0-120 deg. F, no closer than *5* deg. F to close temperature.

3.9.25 Time delay settings shall be 3-600 seconds, 3 second increments.

3.9.26 Maximum operations per day Configurab1e from 2-24.

3.9.27 Manual trip momentary open or close, close and open operations delayed by selected time delay, 5-minute delay following open before re-close.

3.9.28 The Control shall have a red neutral current fault light on the exterior of the Control Enclosure. Neutral Amps trip shall be 3-100 amps, harmonic filtered, 5-minute time averaged response, manual reset, and 5-minute minimum tripped time.

3.9.29 The control shall have a split core neutral current sensor Fisher Pierce Part-number AT929-l-6 or buyer approved equal. The Neutral current sensor shall be packaged with the control.

3.9.30 The control shall have a PT ratio of 1-300.

3.9.31 The control shall have the following control modes:

- Time
- Voltage
- Temperature
- Current
- KVAR
- Time with voltage and temperature override

- Current with voltage override
- KVAR with voltage override

3.9.32 The controller shall be prewired and have mounting provisions to accept the UtiliNet Landis & GYR radio model number 26-1309.

3.9.33 The control shall have software features to design capacitor bank strategies from the office for future uploading to the control. Create and save different control schemes. View and analyze data downloading from capacitor controls. Examine control switching operations, power outages and system parameters. Graph stored voltage and temperature data. Zoom-in on areas of interest. Connect to a control for real time monitoring of the control parameters, such as voltage and temperature. Download stored programs to update a control scheme or download a control program from a control back to a computer. Set up the control for data logging. Program the control to store control and system parameter such as switching operations, voltage, and temperature.

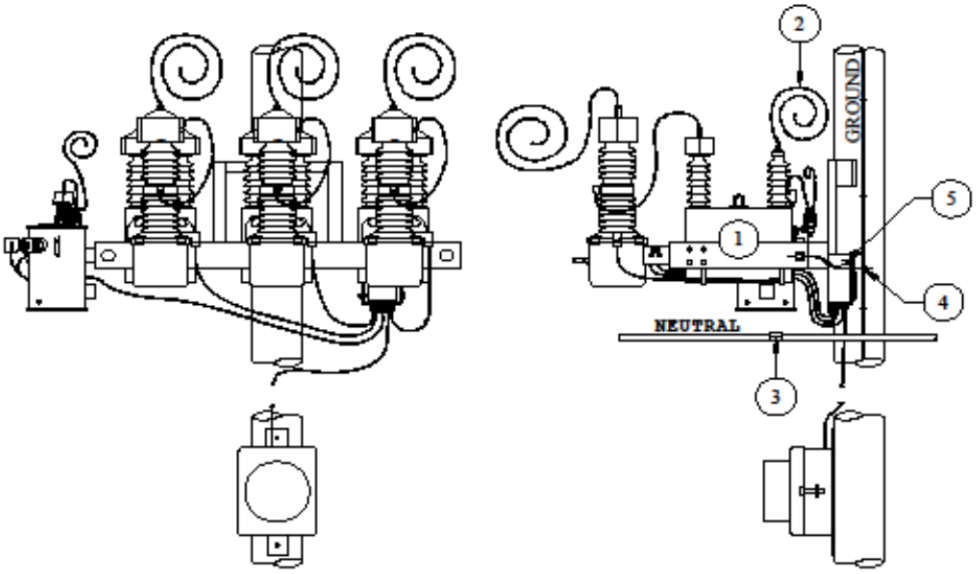
3.9.34 The Capacitor Controller supplied shall be a HD Electric 2600 Series Model Number VCC2616N058 or buyer approved equal.

ATTACHMENT I

1349-30	POLE APPARATUS	
Sheet 1 of 2	CAPACITOR BANKS	
11/01	CAPACITOR BANK - 1200 KVAR SWITCHED	Rev: 12/20/10

1349-30 CAPACITOR BANK - 1200 KVAR SWITCHED

FITALL FUSE LINK



NOTE:
METER BASE SHALL BE INSTALLED
7' ABOVE GROUND LEVEL.

1349-30-10 1/0 NEUTRAL
1349-30-20 4/0 NEUTRAL

CITY OF AUSTIN

PURCHASE SPECIFICATION

FOR

CAPACITORS, DISTRIBUTION

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL PROCESS MANAGER
4/10/90	Richard Dreiss	Issuance	Steven Booher/Peter Gerard Soosay
7/05/95	Peter Soosay	Revision	Richard Dreiss/Peter Gerard Soosay
8/01/95	Peter Soosay	Revision	Richard Dreiss/Peter Gerard Soosay
9/26/96	Steven Booher	Reviewed	Steven Booher/Gary Noble
6/20/06	Steven Booher	Revision	David Wood
6/23/06	Steven Booher	Revision	
01/04/17	Brantley Gosey	Revision	

REASON FOR REVISION	*AFFECTED PARAGRAPHS*
Changed Function Requirements to Construction Requirements	Paragraph 3.0
Added Capacitor Test requirements	Paragraph 4.0
Revised Paragraph & Deleted Section 5.0	Paragraph 1.1& 5.0
Receiving test reports; Years mfg.	Paragraph 1.4, 3.7, 4.2, 4.4

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

CITY OF AUSTIN
PURCHASE SPECIFICATION FOR
CAPACITORS, DISTRIBUTION

1.0 SCOPE AND CLASSIFICATION

1.1 The City of Austin (COA) through its Electric Utility Department DBA Electric Utility Department is hereinafter referred to as Austin Energy (AE). This specification covers minimum requirements for outdoor capacitors to be used for distribution-line compensation on the AE Electric Utility system.

1.2 No deviation from these specifications on the part of the bidder shall be allowed. Any material supplied under these specifications, not in compliance with these specifications shall be unacceptable and returned to the manufacturer.

1.3 Capacitors shall be suitable for arrangement on a three-phase bank configuration.

1.4 All manufacturers furnishing capacitors under these specifications shall have at least five years of experience in the manufacture and sale of distribution capacitors.

2.0 APPLICABLE STANDARDS

Equipment furnished under this specification shall be manufactured, tested, and made ready for shipment in accordance with applicable ANSI, ANSI/IEEE, and NEMA standards latest revisions. In the case of conflicting requirements, the City of Austin's purchase specification shall preside.

3.0 CONSTRUCTION REQUIREMENTS

3.1 The individual capacitor units shall be rated 200 kVar, 7200 volt, single phase, 15 kV, 60Hz, double bushing 95.0 kV BIL.

3.2 Line-to-Line System Voltage is 12.47 kV.

3.3 The Capacitor unit elements shall be all film type and not contain Kraft paper. The internal element connections shall be metallurgically joined using a zinc rich soldering alloy. The edges of the foil electrode shall be folded to minimize edge stress. The solid dielectric material shall consist of a minimum of 2 sheets of polypropylene film.

3.4 The Capacitor unit shall be equipped with an internal discharge resistor.

3.5 Capacitor units shall be equipped with two glazed wet process bushings, which are weld sealed to the case. The bushing terminal stud shall be solid type design. All porcelain shall be ANSI/IEEE No. 70 light gray finish.

3.6 Capacitor unit bushings shall be provided with a tin plated copper alloy clamp type parallel-groove terminals that accommodate copper or aluminum conductors from #8 solid through number #2 stranded AWG.

3.7 The dielectric fluid contained in the capacitor units shall be PCB-free (less than 0.1ppm). The test method used for analysis of PCB content shall be EPA Method 608 latest revision. The contractor shall supply Austin Energy two copies of certified test reports, upon request, indicating that the dielectric fluid is PCB free. Upon request, copies of the certified test reports shall be sent to the Austin Energy Distribution Standards Supervisor.

3.8 Each capacitor unit shall be furnished with a heavy-duty stainless steel or aluminum nameplate in accordance with ANSI- C55.2. The nameplate shall contain, but not limited to the following:

3.8.1 Manufacturer name

3.8.2 Manufacture model

3.8.3 Manufacture serial number

3.8.4 Year of manufacture

3.8.5 Rated reactive power

3.8.6 Rated voltage, RMS

3.8.7 Rated frequency

3.8.8 BIL

3.8.9 Statement as to whether insulating fluid is or is not flammable

3.8.10 NON- PCB

3.8.11 The actual tested production capacitance value.

3.9 Capacitor tanks shall have type 409 stainless steel and be hermetically sealed by welding. Each tank shall be ANSI/IEEE No. 70 gray in color. All parts requiring painting shall be guaranteed rust free for five (5) years.

3.10 Capacitor units shall have stainless steel mounting brackets left unpainted on the underside for positive grounding.

3.11 Each capacitor unit shall be supplied with a blue “NON-PCB" decal on the capacitor tank to provide quick and easy identification.

3.12 Each capacitor shall be provided with a bird guard for each bushing.

4.0 CAPACITOR UNIT TEST REQUIREMENTS

4.1 Each capacitor unit shall be subjected to the following routine production tests as listed below:

4.1.1 Short-time overvoltage test

4.1.2 Capacitance test

4.1.3 Leak test

4.1.4 Discharge resistor test

4.1.5 Loss determination test

4.2 A copy of the production test shall be provided, upon request. Upon request, the copy of the test report shall be sent to the Austin Energy Distribution Standards Supervisor.

4.3 The following design tests shall be performed on the capacitor units as listed below:

4.3.1 Impulse Test

4.3.2 Thermal stability test

4.3.3 Radio influence test

4.3.4 Voltage decay test

4.3.5 Overvoltage Endurance Test, similar to IEC 60871 -25° C.

This design test shall include the application of 2.0 times AC voltage for 15 cycles and then reducing the voltage to 1.1 times rated voltage for 1.5 minutes without interruption, and then repeating the cycle again, without interruption, until the test

unit has been subjected to 170 daily overvoltage cycles. This test shall continue until the test unit has been subjected to a total of 850 overvoltage cycles. At the start of each daily test period, the dielectric temperature of the test unit (s) shall be 25 ° C.

4.4 Certified Design test reports verifying the above tests should be included in the bid for this item prior to final bid award. The Design tests shall be performed on capacitor units from a standard current production run. Failure to submit design test reports may be grounds for bid rejection.