CITY OF AUSTIN, ELECTRIC UTILITY DEPARTMENT
PURCHASE SPECIFICATION
FOR
TRANSFORMER, DIST, URD, 1PH, 25-100KVA, 12470Y/7200, 120/240, SUBMERSIBLE

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL PROCESS SUPV. / MATERIALS SUPV.
8/17/01		ISSUANCE	
9/2/15	DENNIS PATRICK	REVISION	Michael Pittman
12/2/15	Dennis Patrick	Revision	Michael Pittman
06/10/19	Brantley Gosey	Revision	

REASON FOR REVISION	AFFECTED PARAGRAPHS
9/2/15: ADDED AND UPDATED ATTACHMENTS, RE-FORMATTED SPEC	ATTACHMENT I, II, III, IV, V, V.A
12/2/15: Added IFD requirement	Section 4.1.11
06/10/19: Add Bar Coding requirements	Section 5.7

This specification, until revised or rescinded, shall apply to each future purchase and contract for the commodity described herein.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, mineral oil filled submersible type distribution transformers, rated at 25kVA through 100kVA. No taps are required. Voltage shall be 12470/7200. No PBC's are tolerated.

1.2 Classification

No deviations from these specifications on the part of the manufacturer 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.

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 SPECIFICATIONS

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

2.1 ANSI/IEEE C57.12.23 Latest Revision
General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.

2.2 ANSI/IEEE C57.12.24 Latest Revision
2.3 ANSI/IEEE C57.12.32 Latest Revision
2.4 SSPC-SP 6 Sandblasting Latest Revision

3.0 FUNCTIONAL REQUIREMENTS

3.1 Transformers shall be suitable for submersible operation.

3.2 Transformers shall be suitable for banking.

3.3 Transformers shall be equipped with secondary breakers.

3.4 Transformers shall be protected with a weak-link internal fuse in the Primary connection.

3.5 When so specified, transformers shall be equipped with two 200 amp load break loop feed internal primary switches arranged so that the transformer may be energized from either or both of the high voltage bushings.

3.6 When high voltage switches are not specified, the high voltage bushings shall be arranged for loop-feed operation with the transformer being energized from either or both bushings.

4.0 PHYSICAL AND ELECTRICAL REQUIREMENTS

4.1 Physical

4.1.1 Transformer tank and cover shall be constructed of AISI 400 series stabilized ferritic stainless steel (Crucible Steel E2 or Allegheny Ludlum MFI). The tank shall be covered with a suitable protective coating of either epoxy, coal tar epoxy, thermoplastic coal tar or vinyl.

4.1.2 Transformers shall be of sealed-tank construction.

4.1.3 A hand hole shall be provided in the cover. The hand hole cover shall be welded to the tank cover.

4.1.4 All welds shall be smooth and well made.

4.1.5 All transformers shall have strong lifting lugs with a good overhang.

4.1.6 All high voltage, low voltage bushings and grounding lugs shall be constructed and attached to the cove in such a manner that no leakage will occur after primary and/or secondary cables are attached.

4.1.7 All transformers shall be given an internal tank pressure test of at least 7PSIG.

4.1.8 The four low voltage insulated bushings shall be located on the cover in the quadrant of the cover opposite the primary bushings. The low voltage bushings shall be standard four hole spade.

4.1.9 Transformers shall be equipped with a parking stand on the cover between the primary bushings.

4.1.10 The two primary bushings shall be elastimold "Flower Pot" Universal bushing wells and shall be furnished with elastimold load break inserts.

4.1.11 All transformers shall be equipped with a resettable device (which can be reset by trained personnel only) which detects and provides 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.

4.2 Electrical

4.2.1 All transformers furnished under these specifications shall meet values for exciting current, no load loss, total loss, impedance, and BIL as shown in Table 1.

4.2.2 Dielectric Test
All transformer windings shall be capable of with standing dielectric tests as outlined below. These tests, when required by the City, will be performed at the City's testing facilities by the City or at the factory by factory personnel and witnessed by a Austin Energy representative. The decision as to location and selection of transformers to be tested will be left to the City's discretion.

Dielectric Tests:

a. Impulse Tests - The following tests will be required in the order specified and will be made without excitation.

(1) One reduced full wave per ANSI Standard C57.12.90-1968 Section 3.4.1

(2) Two Front-Of-Waves per ANSI Standard C57.12.90-1968 Section 3.4.3

(3) Two Chopped Waves per ANSI Standard C57.12.90-1968 Section 3.4.2

(4) One Full Wave per ANSI Standard C57.12.90-1968 Section 3.4.4.

(b.) Induced Potential Test - As per Section 4.1 of ANSI Standard C57.12.21-1969
Other applicable sections of the ANSI Standards shall also apply to the dielectric tests:
ANSI C57.12.90-1968

Sections:
All of 3.2
3.3.1
3.3.2
3.3.3
3.5.1
3.5.2
3.5.5
All of 3.7
All of 3.8

4.2.2 Short Circuit Tests

All transformers furnished under these specifications shall be capable of withstanding the following short circuit tests:

Two consecutive applications spaced five minutes apart, from an infinite bus of 7200 volts from high voltage terminal Hl to ground, with 240 volt secondary terminals connected together solidly through a 500 MCM jumper. A transformer which burns open, shows evidence of flashing or burning or indicates a change of impedance of 15 per cent or greater from that measured prior to the test shall be deemed to have failed the test.

4.2.4 Temperature Rise

All transformers shall conform to ANSI Standard C57.12.00-1968, Section 7, for temperature rise of 55 deg. C oil immersed transformers and shall use a 65 deg.thermally upgraded insulation system.

4.2.5 Cycled Life Tests

Each manufacturer supplying transformers under these specifications shall have made cycled life tests on the total insulation system.

5.0 GENERAL REQUIREMENT

5.1 All manufacturers furnishing transformers under these specifications shall supply at least 5 per cent of the distribution transformer market and have at least 10 years experience in the manufacture and sale of distribution transformers.

5.2 All manufacturers shall be subject, on request, to furnish exciting current, no load and full load loss and other certified test data as desired on any transformer or groups of transformers purchased by the Austin Energy.

5.3 All transformers furnished under these specifications shall be subject to tests by the Austin Energy and any transformer failing these tests or failing to meet the manufacturer's guarantee shall be returned to the manufacturer. If any manufacturer's transformer consistently fail the tests, the manufacturer will be removed from the approved list of suppliers. Evaluation tests shall be conducted at the convenience of the Austin Energy from time to time and a record kept of all tests. If more than 10 per cent of the total number of any manufacturers transformers tested to that date fail, then this shall be construed as "consistent failure". No further consideration shall be given this manufacturer for supplying the City any transformers until the next scheduled test and evaluation.

5.4 The manufacturer must have on file with the Austin Energy approved drawings or shall submit detailed manufacturing drawings to the Austin Energy for approval of each size of transformer to be supplied under this specification.

5.5 Transformer oil shall have no detectable PCB and each transformer nameplate shall be marked as "No-PCB". In addition, a blue "No-PCB" label with a minimum 1"x 2"" size shall be installed directly below the nameplate.

5.6 Production Tests
Each and every transformer shall undergo the following production test and be included in the certified test report mentioned in 5.2. These will consist of the following from those listed under 4.2:

Full wave test (a-(4))
Induced potential test (b)

5.7 The nameplate shall contain a permanent bar code that meets the following requirements:

Information: The bar code shall display the Manufacturer Identification Code and manufacturer’s serial number.

Durability: The bar code shall last the lifetime of the transformer, as specified by IEEE C57.12.00, regarding the nameplate. The bar code shall be constructed such that, when using a contact-type bar code reader, the bar code shall be capable of a minimum of thirty successful scans.

Dimensions: The height of the bar code shall be either 0.24 inches or 15% of the barcode length (L); whichever is greater (see Attachment IV).

Character Size: The bar code print quality shall be in accordance with ANSI X3.182. The permanent bar code shall be of medium density, ranging from 4 to 6.9 characters

per inch.

Bar Code Symbology: The bar code symbology shall be Code 39, also referred to as 3-of-9 bar code, using the 43-character ASCII set, in accordance with ANSI X3.4. Orientation of the Bar Code Characters: The bar code characters shall be arranged in one line. A start character shall precede the manufacturer's code and a stop character shall follow the transformer serial number (see Attachment IV).

Quiet Zones: A minimum quite zone of 0.25" shall immediately precede and follow the bar codes.

Human-Readable Interpretation: A human-readable interpretation line shall be provided directly beneath the bar code, in accordance with ANSI MH10.8M. The interpretation of the 3-of-9 bar code shall be clearly identifiable with the bar-code symbol above. The preferred shapes of the human-readable interpretation shall conform to either ANSI X3.17 or ANSI X3.49. As an alternative, any human-readable font with characters no less than 3/32" in height is acceptable

TABLE I

KVA	25	50	75	100
Exciting Current at 100% rated voltage	1.5%	1.0%	1.4%	1.4%
Exciting Current at 105% rated voltage	2.6%	2.25%	2.5%	2.5%
No Load Loss at 100% of rated voltage(watts)	115	215	280	335
No Load Loss at 105% of rated voltage(watts)	155	275	377	453
Total Loss at 85C and 100% Rated voltage & current (watts)	424	755	985	1250
Impedance voltage at 85C (Max)	2%	2%	2%	2%
Basic impulse level (insulation Class 15A) (KV)	95	95	95	95

ATTACHMENT I

TRANSFORMER VOLTAGE RATINGS FOR SINGLE-PHASE DISTRIBUTION TRANSFORMERS

HIGH VOLTAGE	HV BIL kV	LOW VOLTAGE	LV BIL kV
7200/12470Y	95	120/240	30
7200/12470Y	95	240/480	30
7200/12470Y	95	277	30

ATTACHMENT II

MAXIMUM GUARANTEED TRANSFORMER LOSSES

Transformer (kVA)	No-Load Losses (Watts)	Load Losses (Watts)	Impedance (%) @ 85º C
3	14	43	2.0
10	31	141	2.0
15	47	164	2.0
25	70	178	2.0
50	111	409	2.0
75	135	652	2.0
100	192	730	2.0
167	250	1295	3.0

ATTACHMENT III

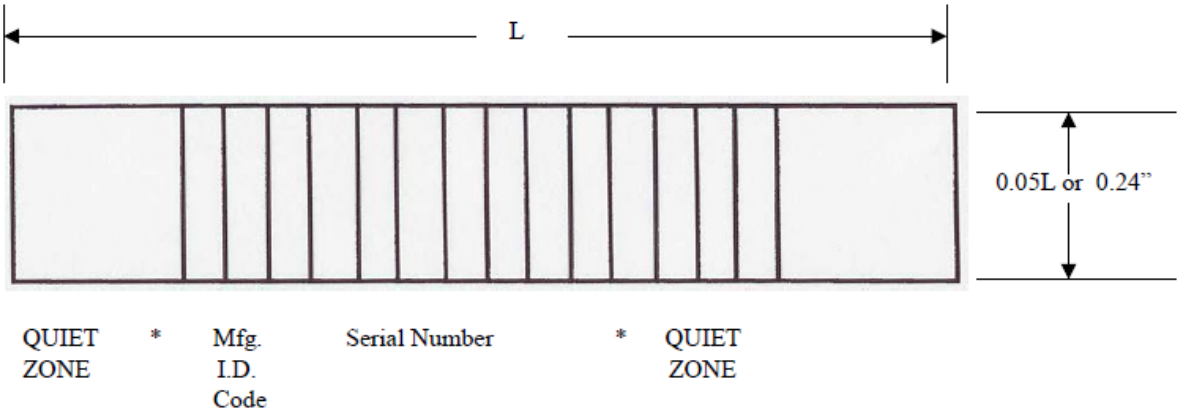
TANK-MOUNTED SURGE ARRESTERS FOR SINGLE-PHASE DISTRIBUTION TRANSFORMER

Nominal System Voltage (L-L) kV RMS	BIL* (kV)	Manufacturer	MCOV Rating** (kV)	Manufacturer Part Number
12.47	95	Cooper	8.4	UHS10050A1A1A1A
12.47	95	Ohio Brass	8.4	213709-7214
12.47	95	Maclean	8.4	ZHP010-0000000

ATTACHMENT IV

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 V

TYPICAL EXTERNAL SIGNAGE MATERIAL REQUIREMENTS OF SINGLE-PHASE PAD-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 (polyvinylflouride) 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.

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