

**Transmission & Distribution**  
**Material & Installation Specification**

**Single Phase Padmount Transformer**

**I. Scope and classification**

Scope: This document is to govern the product and installation of Single Phase Padmount transformers commonly used by the City of Columbus, Division of Power.

Classification: The contractor shall supply single phase padmount transformers of various ratings and connections. The single phase padmount transformers specified herein shall be for connection at 14.4KV/GY8.32KV. The awarded supplier(s) shall be required to submit preliminary drawings for approval prior to the manufacturer of the transformers. The supplier shall perform a contamination testing prior to delivery. Final drawings, operating manuals and certified test results shall be provided. Transformers shall be shipped complete with oil.

Transformers manufactured under this specification shall meet the efficiency requirements as directed by the Department of Energy (DOE) per its Energy Conservation Program: Energy Conservation Standards for Distribution Transformers, Final Rule. – 10 CFR Part 431.196(b) (2013).

**II. Applicable publications and standards**

All items characteristic, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revisions of the following ANSI, IEEE, Department of Energy and NEMA standards, including US Department of Energy National Efficiency Standard 78 FR 2335.

**III. Requirements**

**GENERAL REQUIREMENTS**

- A. Term: This document is to govern the product and installation of single phase padmount transformers commonly used by the City of Columbus, Division of Power.
- B. Quantity: The quantities are specified for each item on the bid document.

- C. Quality standards: Transformers are to be new and unused. All insulating components, oil, paper, and wire enamel, shall be made of thermally upgraded materials, which are all compatible at today's industry standard 65 degrees Celsius temperature rise.
- D. Automatic pressure relief valve: Shall be provided per IEEE C57.12.20, Section 7.2.5.1 with the following clarifications:
  - Indicator shall include an orange or red indicator that becomes visible only after the valve has vented.
  - Cap and pull ring shall cover the valve that separates from the assembly during venting, revealing the orange or red indicator and hanging down from the valve via a chain or strap.
  - Sealant: Valve threads shall be sealed with a liquid pipe thread compound such as Rectorseal, liquid Teflon, or similar, not Teflon tape.
- E. All supplied equipment is to be complete with oil (NON-PCB), and all accessories, mounting hardware, lifting provisions, suitable and ready for their intended use upon delivery.
- F. The primary voltage ratings of the transformers specified herein are designated as per IEEE standard C57.12.00.
- G. The exterior of each transformer must be permanently marked with a "NON-PCB" decal.
- H. The contractor shall be required to submit preliminary drawings in one Adobe Acrobat PDF file for approval prior to the manufacturer of the transformers. The drawings will promptly be reviewed by the city and returned approved or with corrections as required.
- I. Final drawings, operating manuals, maintenance manuals, and certified test results shall be provided at time of delivery.

CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER SINGLE PHASE PADMOUNT TRANSFORMER		
DRAWN BY: AEC	DATE: 01/01/2017	<b>TDMIS-1201</b>
APPROVED:		
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**CONTRACTOR REQUIREMENTS**

- A. Approval drawings for transformers: All documentation shall be in English and use customary inch-pound units. The contractor shall submit in a single Adobe Acrobat PDF file the following:
  - An outline drawing showing the principle view and dimensions and including a descriptive table of the accessories.
  - A nameplate drawing including wiring diagram.
  - No-load (core) loss, load (winding) loss at 25%, 50%, 75% and 100% rated current, and delivery days after order.
  - Instructional materials demonstrating the proper installation, operation, and maintenance of the equipment.
  - Certified test data for each transformer type bid and for every category listed in IEEE C57.12.00 Section 8.7. Format test data using numbering system shown in IEEE C57.12.00 Section 8.7.
- B. The contractor shall test each transformer and provide factory certified test results to prove its compliance with efficiency requirements as directed by the Department of Energy (DOE) per its Energy Conservation Program: Energy Conservation Standards for Distribution Transformers, Final Rule. – 10 CFR Part 431.196(b) (2013).

**PRODUCT REQUIREMENTS**

Single phase padmount transformers 14400 Grd. Y/8320 (E1 Grd. Y/E)  
 Additional requirements specific to this type:

- A. The padmount transformers shall be 60 Hz, 65 degrees Celsius rise, oil immersed and self-cooled. The high voltage side shall be equipped with 4 taps at 2 ½% each below nominal for de-energized operation. The high voltage winding shall be rated at 95KV BIL and the low voltage winding shall be rated at 30 KV BIL.
- B. The transformer shall be furnished complete with oil (NON-PCB), lifting provisions, an automatic pressure relief device, and all accessories suitable and ready use for its intended use.
- C. The high voltage connections shall be bushing wells for use with “Elastimold” or approved equal, high voltage cable terminators.

- D. The transformer shall be painted on all sides (top, sides, and bottom) olive green, Munsell type 7GY3.29/1.5 to blend in with surrounding landscapes and the tank coating shall meet all requirements in IEEE Std. C57.12.28 Section 5. When measured with a magnetic thickness gauge, the paint thickness shall be the following:
  - Cover 8 mils thick, minimum
  - Tank 3 mils thick, minimum
- E. The enclosure shall meet or exceed the requirements for tamper resistance set forth in ANSI C57.12.28 including the pry test, pull test, and wire probe test. The enclosure hood and/or doors shall be secured by a recessed, penta head bolt and suitable for padlocking.
- F. A one inch filling plug and one inch drain plug shall be provided on single phase pad mounted units.
- G. Nameplate shall be according to the requirements of IEEE C57.12.24, Section 7.4 and IEEE C57.12.00-2010, nameplate attached with stainless steel fasteners on inside and outside door, with the following clarifications:
  - Nameplate shall be 300-series stainless steel and affixed to the transformer with 300-series stainless steel or silicon bronze fasteners and readable with cables in place
  - Lettering to be etched or engraved
  - Include: Fuse amperage, switches, total weight in pounds, total gallons, the statement “CONTAINS LESS THAN 1 PPM PCB AT TIME OF MANUFACTURE”, voltages high and low, taps four at 2 ½% listed below 14.4 kV, kVA rating, and fuse size
- H. Tank ground connectors shall be provided in both the low voltage and high voltage sections for tank grounding. All grounding provisions shall be treated with an oxide-inhibiting compound.
- I. The high voltage section shall be equipped with a tap changer for de-energized operation only, and must be externally operable with a hot-stick and must require at least two (2) operator actions to change taps. Taps shall be all four- 2-1/2% below rated voltage.
- J. One (1) internal oil immersed, gang operated, four-position “T” blade load break switch (1 total) for loop feed operation with a continuous current rating of 200A shall be provided. The switch must be capable of switching the continuous rated current

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to permit sectionalizing of the primary loop. Make-and-latch and momentary ratings shall 10,000 amps symmetrical. The switch controls shall be located in the primary compartment, convenient for hot stick operation. The switch shall provide for:

- Feed right
- Feed left
- Feed through with coil on / Feed through with coil off

- K. The high voltage bushing shall maintain a minimum distance of 15" between the center of the lowest bushing and the bottom of the enclosure. The parking stands shall be provided close to the bushings.
- L. This type transformer shall be the low-profile design and shall be designed for vertical feed. The cabinet shall include a flip top removable hood which shall open 180 degrees and rest securely back on the tank top to provide full access to transformer terminals and cable connections. The sill shall be removable to permit sliding of the transformer unit on or off the pad without disturbing the cables.
- M. The incoming line section on the left side shall enclose the high voltage bushing wells "Elastimold" type and provide for incoming cable from below. The incoming line equipment shall be arranged for radial feed, loop feed or open loop feed as required by project and shall have dead-front constructions. Equipment enclosed in the incoming line section shall include two (2) 200 amp bushing wells for loop feed transformers in accordance with ANSI Standard C119.2.
- N. The outgoing line section shall be on the right side and shall be arranged for cabling from below. Low voltage bushings shall be tinned, spade type with four (4) 9/16" holes spaced on 1-3/4" centers. Two (2) line bushings shall be provided; an insulated low voltage neutral bushing shall be supplied and shall be equipped with an externally removable ground strap.
- O. Over-current protection shall be provided by a dual element bayonet expulsion fuse with a flapper valve to minimize oil spillage. The bayonet assembly shall be used in series with an internally mounted isolation link.

**IV. Method of measurement**

Shall be per each completed and operational single phase padmount transformer including transformer, accessories, grounding lugs for tank bosses, #1/0 copper ground loop, ground rod, ground connections for shields and secondary XO bushing, bushing inserts, feed through bushing inserts, arresters, labor material, delivery and placement and attachment

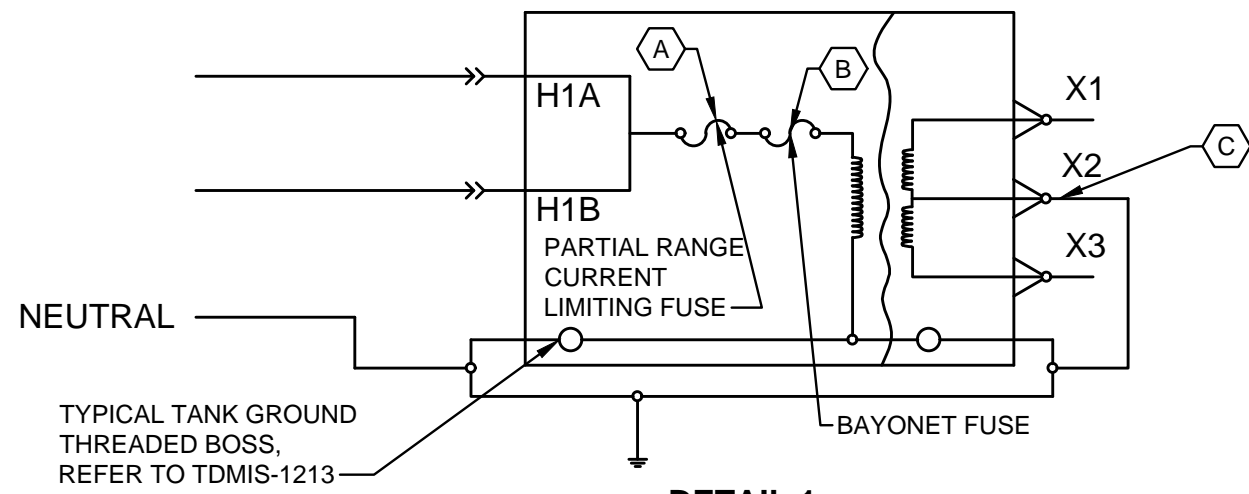
to / on pad, equipment, tools supervision and miscellaneous required for a complete and operational module.

The associated apparatus and hardware shall include, but not limited by items described in TDMIS-1100,1101,1102,1205,1206, and 1209 shall be included within this completed module.

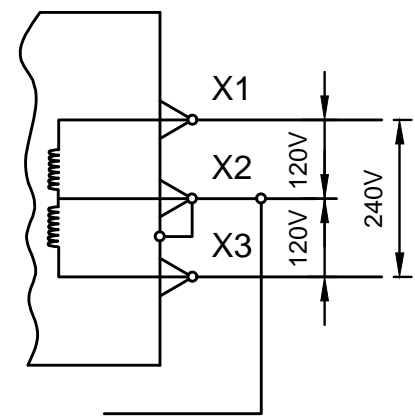
**V. Basis of payment**

Items	Unit	Description
TDMIS-1201	Each	__ kVA radial feed single phase padmount transformer
TDMIS-1201	Each	__ kVA loop feed single phase padmount transformer
TDMIS-1201	Each	__ kVA open loop feed single phase padmount transformer

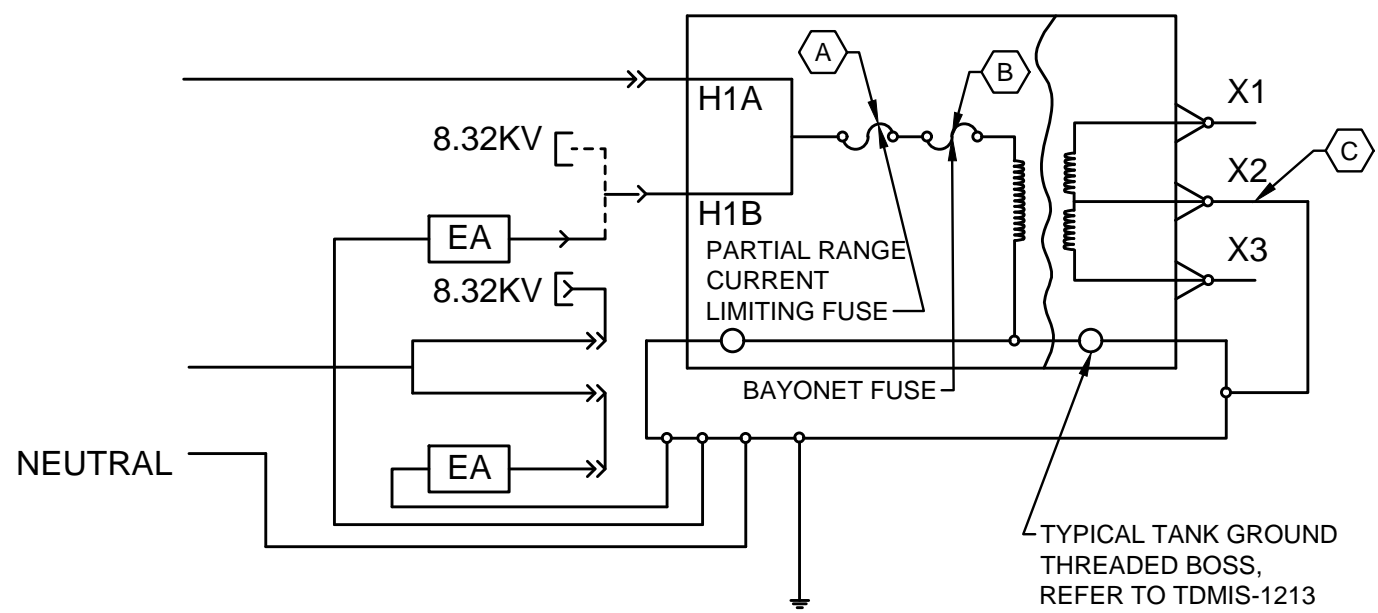
CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER SINGLE PHASE PADMOUNT TRANSFORMER		
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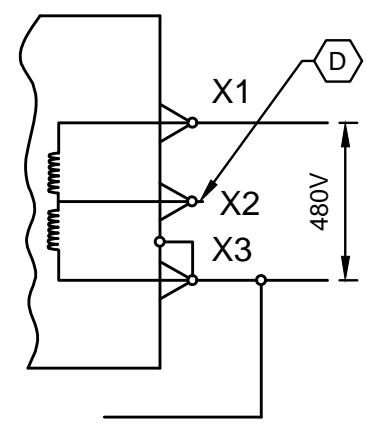
**DETAIL 1  
LOOP FEED PRIMARY**



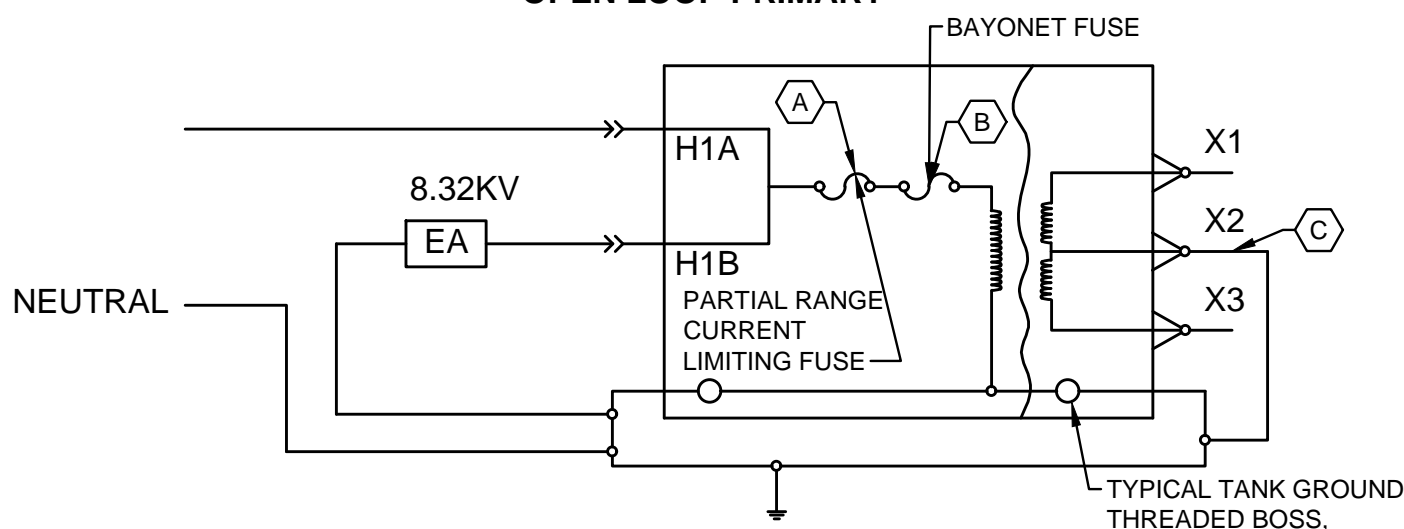
**DETAIL 4  
120/240 VOLT SECONDARY**



**DETAIL 2  
OPEN LOOP PRIMARY**



**DETAIL 5  
480 VOLT SECONDARY**



**DETAIL 3  
RADIAL PRIMARY**

**CODED NOTES:**

- (A) NOT REPLACEABLE BY FIELD PERSONNEL.
- (B) BAYONET TYPE, LOAD-BREAK FUSEHOLDER.
- (C) FOR SECONDARY CONNECTIONS, REFER TO DETAILS 4 OR 5 OF TDMIS-1201.
- (D) INSULATE THIS BUSHING AND ATTACH A TAG INDICATING THAT IT IS ENERGIZED.

LEGEND	
Y	BUSHING
→	ELBOW
[	INSULATING CAP
⋈	PARKING BUSHING
Y Y Y	FEED THRU CAN BE 2, 3, OR 4 OUTLETS
EA →	ELBOW ARRESTER
SA	OVERHEAD ARRESTER

CITY OF COLUMBUS, OHIO  
DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER

**SINGLE PHASE PADMOUNT TRANSFORMER  
STANDARD CONNECTION**

DRAWN BY: AEC	DATE: 01/01/2018	<b>TDMIS-1201</b>
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 4 OF 4	