CLARK PUBLIC UTILITIES

TECHNICAL SPECIFICATIONS

SINGLE-PHASE PADMOUNTED TRANSFORMERS

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SPECIFICATIONS
PADMOUNTED SINGLE-PHASE
DISTRIBUTION TRANSFORMERS
12470 GRD Y/7200 VOLTS

1. GENERAL REQUIREMENTS

This specification covers new, single-phase, low-profile, deadfront, loop feed, padmounted transformers for use on a 12.47/7.2 kV multi-grounded wye, 60 HZ distribution system.

The transformers to be offered under this bid shall conform to the characteristics, definitions, terminology and voltage designations specified in the appropriate standards except as otherwise noted. The standards covering this specification include the most recent revisions of: IEEE C57.12.00, ANSI C57.12.25, ANSI C57.12.28, IEEE C57.12.70, IEEE C57.12.80, IEEE C57.12.90, IEEE C57.147, IEEE 386, ANSI Z535, NEMA 260, and NEMA TR-1.

The core shall be grain-oriented silicon steel. Amorphous cores will not be accepted.

Transformer rating to be 3" yellow letters on green or black background mounted 4" above lid handle. Transformers with taps to have the rating suffixed by the letter "T".

All units shall have an externally operated tap changer.

Transformer oil shall be non-PCB containing less than 1 ppm of PCB. Transformer nameplate to be stamped as follows:

NON-PCB/LESS THAN 1 PPM PCB WHEN MANUFACTURED

Mineral oil or natural ester fluids which meet the requirements of IEEE C57.147, “IEEE Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers” are acceptable. All transformers may be retro-filled with mineral oil so they shall be designed for mineral oil.

The bottom and two inches up the sides shall have a coat of coal tar epoxy paint (or equivalent approved by CPU Standards Engineer) applied to the bare metal to a dry film thickness of 5 mils minimum.

2. RATINGS

All transformers shall have 12470 Grd Y/7200 volt primaries and 240/120 or 120/240 volt secondaries.

All primary windings shall be furnished with 4-2½% taps below 100%.

kVA ratings shall be 25, 50, 75 or 100 kVA as specified on the description sheets.

All transformers rated 25, 50 and 75 kVA shall have maximum either line-to-ground and line-to-line short circuit current of 10,000 amp symmetrical at the external low voltage bushing terminals. All 100 kVA transformers shall have a maximum 14,000 amp symmetrical short circuit current either line-to-ground and line-to-line at the external low voltage bushing terminals. These limits shall be based upon the assumption that the high voltage bushing terminals are infinite short circuit current source.

The maximum and minimum %Z for each kVA size shall be as follows:

KVA	Max %Z	Min %Z
25	2.0	1.04
50	3.0	2.08
75	4.0	3.13
100	4.0	2.98

3. CONNECTORS AND TERMINALS

All units shall have high-voltage, externally-bolted, universal bushing wells with removable studs.

The number, location, and arrangement of the high-voltage connectors and low-voltage terminals shall be as shown in Figure 2 of ANSI C57.12.25.

Loadbreak bushing inserts shall be provided.

There shall be a clear area around all primary bushings so that Cooper feed-through inserts can be installed when needed.

The low voltage bushings shall be externally bolted and have copper stud terminals on the phase and neutral. Studs size shall be in accordance with ANSI C57.12.25.

4. FUSING

All transformers shall be equipped with Cooper flapper-valve bayonet primary fuses and Cooper isolation links. Each bayonet shall have a drip shield below it and arranged to prevent oil from dripping onto elbow terminators or cables. Fuse links shall be furnished and installed as follows:

KVA	Bayonet Fuse	Isolation Link
25	358C05	1861A02
50	358C08	1861A03
75	358C10	1861A05
100	358C10	1861A05

All units shall have provisions for storing one spare replacement fuse link in a moisture-proof container and one link of the proper size shall be included.

5. CONSTRUCTION FEATURES

A. A removable front sill such that the transformer can be lifted, skidded, or slid into place on the mounting pad without disturbing the high or low voltage cables.

B. A fully insulated low voltage neutral terminal and a ground pad on the outer surface of the tank.

C. A removable ground strap, sized for the rating of the transformer, connected between the low voltage neutral bushing and the tank.

D. Stainless steel hinges.

E. Stainless steel pins.

F. Pentahead bolt in a recessed cup as per ANSI C57.12.25, Figure 3.

G. A pressure relief valve, with the following characteristics as described in ANSI C57.12.25 Section 6.5.2.

H. All 25kVA, 50kVA and 75kVA padmount transformers shall meet the following dimensions:

	Minimum	**Maximum**
Height	24”	n/a
Width	34”	38”
Depth	n/a	38.5”

All 100kVA padmount transformers shall meet the following dimensions:

	Minimum	**Maximum**
Height	24”	n/a
Width	34”	38”
Depth	n/a	45”

6. NAME PLATE

In addition to the ANSI standard nameplate information, the nameplate shall show: 1.) The maximum low voltage, line-to-ground, short circuit current. It shall be shown "Max. L.V. L-G Isc = xxxx where “xxxx” = the actual maximum Isc, 2.) total weight, and 3.) gallons of oil.

7. SHIPPING PALLETS

All shipping pallets shall have the following general requirements.

A. The minimum clearance for lift truck forks shall be 3 inches.

B. Two-way access is acceptable.

C. Four-way access is preferred.

D Pallet strength and design shall be adequate to contain the load for which it is intended. Stackable pallets are acceptable as long as they protect the paint and transformers from shipping damage. Double stacking is the maximum allowed.

E. Materials or equipment shall be secured to pallets with suitable bands, bolts, screws, or nails.

7.1 RETURNABLE SHIPPING PALLETS

A. Returnable shipping pallets shall be adequately marked to identify the owner and return location.

B. No environmentally harmful substance shall leach from or be abradable from the pallets.

7.2 NON-RETURNABLE SHIPPING PALLETS

A. Non-returnable shipping pallets shall be biodegradable.

B. Non-returnable shipping pallets shall be made with natural wood, dimensional lumber, and metal nails, screws, or bolts.

C. No adhesive or non-metal fastening will be permitted.

D. No paint is allowed.

E. No composite materials such as, but not limited to, plywood, particle board, flake board, or paper products are acceptable.

F. No plastics are acceptable.

7.3 It shall be the responsibility of the vendor to deliver all transformers free from mechanical or electrical damage and/or damage to the paint system.

8. ANSI Z535 SAFETY SIGNS

Clark Public Utilities will provide its own custom “danger” and “warning” signs which will be placed on the transformers in the Clark Public Utilities’ warehouse once they are received. The transformer manufacturer does not need to provide these signs.

9. MAXIMUM LOSSES

Losses shall not exceed the values shown on the following table. No-load (core) and load (copper) losses shall be independent of each other. No combining or averaging is acceptable.

1Ø Padmount Transformer
Maximum Losses

kVA	No-load (watts)*	Load (watts)*
25	80	245
50	115	495
75	174	600
100	149	1045

Note: All loss values are based upon the maximum values from bid data for 1990 through 2005.

* No-load losses calculated at 20° C and load losses at 85° C

CPU does not specify efficiencies. It is expected that the transformer manufacturer will meet whatever the current DOE efficiencies are without exceeding the maximum losses as outlined in this section.

9.1 Transformers Purchased by Contractors

Certified loss data on all transformers will be required from contractors during the installation inspection for review and approval before the facility will be accepted and energized.

Transformers which exceed maximum losses for each kVA as outlined in the table above will be subject to loss dollar penalties on losses over the maximum. Cost of losses will be $4,277/kW no-load (core) and $2,007/kW load (copper) for 1Ø units.

9.2 Transformers Purchased by Clark Public Utilities

Clark Public Utilities will evaluate losses on all bids and quotes. However, all designs must ***not*** exceed the maximum losses in the table above. Certified loss data on all transformers will be required for each shipment of transformers. Transformers which exceed the design losses quoted will be subject to loss dollar penalties. Cost of losses will be $4,277/kW no-load (core) and $2,007/kW load (copper) for 1Ø units.

BID DATA SHEET
PADMOUNT TRANSFORMER
SINGLE-PHASE

Distributor _____ Date _____
Manufacturer _____
Manufacturing Plant Location _____
Clark Stock Code Number _____ Bid Number_____

KVA	_____
High Voltage (ANSI Desig.)	_____ KV
Low Voltage (ANSI Desig.)	_____ Volts
High Voltage Taps	_____ AN _____ BN
Impedance Voltage	_____ %
Maximum L.V. Short Circuit Current	_____ KA
Maximum L.V. Short Circuit Current is at	L-L _____ or _____ L-N
Short Circuit Impedance	_____ %
Total Weight	_____ Pounds
Dimensions	
Height	_____ inches
Width	_____ inches
Depth	_____ inches
Oil	_____ Gallons
H.V. Winding Metal	_____
L.V. Winding Metal	_____
Core Metal, Type (Grain oriented, only)	_____
Minimum Paint Thickness (Tank)	_____ Mils
No-load losses	_____ watts
Load losses	_____ watts
Total losses	_____ watts
Efficiency Rating (Informational only)	_____ %

Minimum bottom and lower side coating (corrosion resistance) describe below:

A separate Bid Data Sheet *must be completed* for each KVA size and voltage rating.

This form must be completely filled in and included with all bid submittals at the time bids are due. Bid submittals without the Bid Data Sheet will be deemed non-responsive and will not be evaluated for award. Only Clark's Bid Data Sheets will be acceptable.