



GUAM POWER AUTHORITY
AGANA, GUAM

SPECIFICATION No. E-007

REVISION: 2
October 19, 1998

PREPARED BY THE ENGINEERING DEPT.

GUAM POWER AUTHORITY
P.O. BOX 2977
AGANA, GUAM 96932

TRANSMISSION & DISTRIBUTION SPECIFICATION

SPECIFICATION NO. E-007

FOR

POTENTIAL TRANSFORMER
OUTDOOR TYPE

EFFECTIVE DATE: 10/19/98

ISSUED:

[Signature]

APPROVED:

[Signature]



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POTENTIAL TRANSFORMER OUTDOOR TYPE

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1.0 SCOPE

- 1.1 This specification covers GPA requirements for potential transformers used in station metering and relaying applications at line operating voltages herein specified.
- 1.2 The transformer is intended for use in tropical weather conditions with a corrosive sea air atmosphere, with a wind strength of 155 MPH and subject to moderate and severe earthquakes.

2.0 APPLICABLE PUBLICATIONS

The potential transformers shall meet the requirements of the following standards, including the latest revisions with respect to material, design and tests.

2.1 AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI) STANDARDS:

- C57.13-1978** Requirements for Instrument Transformers
- C68.1-1973** Techniques for Dielectric Tests
- C6.1** Terminal Markings for Electrical Apparatus
- Z55.1-1967** Gray Finishes for Industrial Apparatus and Equipment

2.2 NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) STANDARDS:

- 107-1964** Method of Measurement of Radio Influence Voltage (RIV) of High Voltage Apparatus
- CC1-1975** Electrical Power Connectors for Substations

2.3 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS:

- d3487-78** Mineral Insulating Oil used in Electrical Apparatus

2.4 FEDERAL SPECIFICATIONS:

- TT-P-636D** Primer Coating, Alkyd, Wood and Ferrous Metal
Mar. 1971

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3.0 DEVIATIONS AND NON-CONFORMANCE REQUIREMENTS

- 3.1 Deviations from this specification or changes in the material or design after the purchase order has been placed must be approved by the GPA Engineering department and acknowledged by a Purchase Order Amendment issued by GPA.
- 3.2 Units received with deviations or non-conformance that are not acknowledged per Section 3.1 are subject to rejection. The Supplier of rejected units is responsible for any corrective action including but not limited to materials, labor and transportation necessary to dispose of or make the units conform to the specification.
- 3.3 Notification of defective units discovered before or after installation that are believed to be inherent to manufacturing problems or workmanship shall be made and forwarded to the Supplier. The description of the item, documentation of the problem and the described information, disposition and/or follow-up (as appropriate) that GPA expects from the Supplier will be specified. The Supplier's response shall be made within thirty (30) days unless an extension is acknowledged and approved in writing by the GPA Manager of Engineering.

4.0 SUBMITTALS

- 4.1 Shop drawings indicating details of construction and the outline of all connectors shall be submitted to GPA Engineering for review and approval.

Information required includes:

- a. Mounting dimensions
 - b. Location of terminals
 - c. Polarity
 - d. Untanking clearance
 - e. Weights
 - f. Number of gallons of oil
 - g. Nameplate
 - h. Connection diagram
- 4.2 GPA shall be allowed two (2) weeks to review and approve drawings provided in Section 4.1 without affecting the shipping date. Delays in delivery due to drawings that are disapproved during this review period are the responsibility of the Supplier.
- 4.3 Drawings returned to the Supplier as approved shall be considered authorization to proceed with the work. The approval of GPA shall in no way abrogate the requirements of this specification.

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4.4 Instruction books shall be furnished which shall contain the description of components, parts and accessories, detailed installation instructions, complete instructions covering operation and maintenance of equipment, complete replacement parts list, typical ratio and phase angle curves for the ANSI meter burdens.

4.5 At least three (3) complete sets of drawings and instruction books shall be provided at the time of delivery.

5.0 CERTIFIED LABORATORY TEST REPORTS

Certified tests shall be conducted in accordance with ANSI C57.13. Transformers shall be given ratio and phase angle tests at rated voltage and 10% above and below rated voltage at 60 Hz with burdens W and Z. Transformers shall receive applied potential and induced potential tests. The Supplier shall furnish two (2) copies of the certified test reports of all tests covered by this specification to the GPA Manager of Engineering within two (2) weeks of transformer delivery.

6.0 RATINGS

6.1 The potential transformer rating requirements are as follows:

System line to line voltage (kV)	34.5	115
BIL (kV)	200	550
Primary (V)	20,125	69,000
Secondary (V)	67.08/115	69/115
Ratio	300/175	1000/600
Number of Primary Bushings	1	1
ANSI Group	3	3

6.2 The potential transformer shall have a 0.3 accuracy class at burdens W, X, Y and Z. Tapped secondaries shall meet the specified accuracy requirements on all windings or taps and when any or all secondaries are carrying any of the specified burdens.

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6.3 Insulation Withstand

System line to line voltage (kV)	34.5	115
BIL (kV)	200	550
Low-frequency withstand, dry (kV)	70	230
Low-frequency withstand wet (kV)	95	230
Chopped wave, crest (kV)	230	630
Chopped wave, minimum to flash (microseconds)	3	3

7.0 DESIGN AND CONSTRUCTION

7.1 Construction

Transformers, 350 kV BIL and below shall be butyl rubber or molded epoxy construction, compound or plastic-filled construction. Transformers 550 kV BIL and above shall be oil filled. Transformers shall be provided with eyebolts, lugs or similar lifting provisions.

7.2 Windings

There shall be one primary voltage winding and two secondary voltage windings in each transformer. The secondary voltage winding (X1-X3) shall have a nominal rating of 115 Volts with a tap (X2) brought out to give a nominal (X2-X3) rating of 69 Volts. The tertiary voltage winding (Y1-Y3) shall have a nominal rating of 115 Volts with a tap (Y2) brought out to give a nominal (Y2-Y3) rating of 69 Volts.

7.3 Terminals

7.3.1 Primary and secondary terminals shall be copper or high-conductivity copper alloy. They shall be provided with either a pad or stud mount drilled in accordance with the NEMA standard.

Terminals shall also be provided with line terminal connectors to receive 2C500 MCM copper or aluminum cable and a ground clamp type terminal for a 4/O copper ground wire. See Figure 1 for details of terminal connections.

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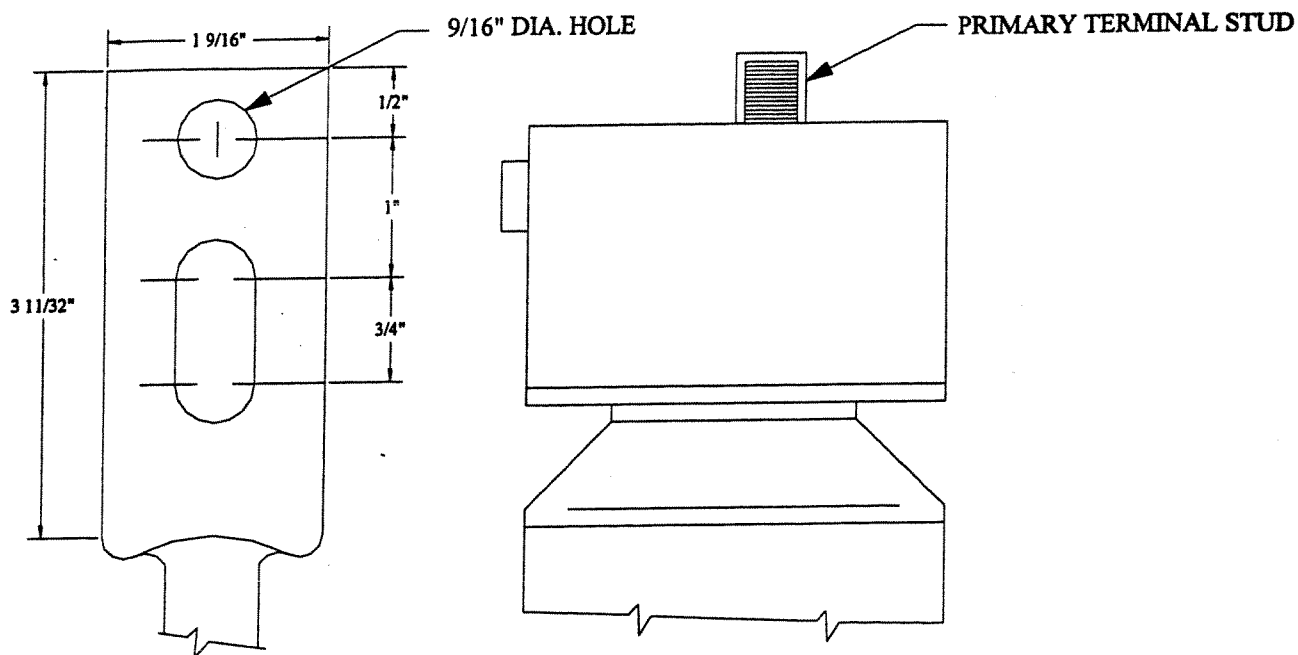


Figure 1

LINE TERMINAL DETAIL

7.3.2 Secondary Terminal Box

Secondary windings shall be terminated on terminal boards with corrosion resistant stud or screw type terminal connectors. The terminal boards shall be enclosed in a weatherproof terminal box which has a removable cover. The terminal box shall be provided with not less than two, tapped, 1-inch or 1 1/2-inch conduit hubs, each located on a different side of the terminal box or one similar conduit hub which can be rotated to allow the conduit to enter from at least three directions. The conduit hubs shall not interfere with the removable cover or with the access to the terminal board.

7.4 Insulating Oil

Any oil required for the transformer and bushing shall be the Manufacturer's standard or recommended type, except that PCB or any other liquid whose use is discouraged by the EPA will not be acceptable.

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7.5 Gauges and Valves

Gauges and valves shall be provided with an oil gauge marked to indicate the proper oil level and with valves for draining the tank completely and for sampling oil.

7.6 Nameplate

The transformer shall be provided with a permanent nameplate showing all of the required information, including voltage rating, ratio, BIL, weight, etc., plus a winding diagram showing all taps and connections.

7.7 Porcelain Color and Paint

All external porcelain shall be ANSI Z55.1 No. 70 gray.

8.0 QUALITY CONTROL

The Supplier shall have a quality control program to ensure compliance with the requirements of this specification. The program shall be documented and available for GPA's review if requested.

Documentation of the quality control program shall indicate where in the production and manufacturing process the quality checks are taken, describe the purpose of the checks, and describe the nature of the check, e.g. if check is visual only or if electrical or mechanical testing is used.

9.0 PACKING AND SHIPPING

9.1 The transformer shall be placed and crated with suitable material to prevent damage and injury during shipment and handling operations.

9.2 The transformer shall be securely blocked to prevent shifting during transit.

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