

TECHNICAL SPECIFICATION

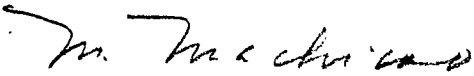
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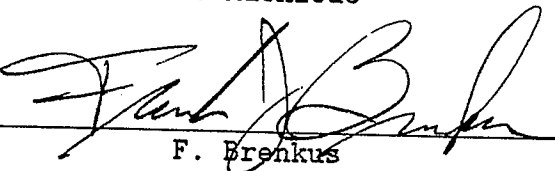
1000 KVA, DRY-TYPE POWER TRANSFORMER

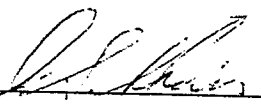
FOR

SSRL 3 GeV INJECTOR 12 KV SUBSTATION

PS-586-140-02

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TECHNICAL SPECIFICATION

1.1 SCOPE

This document specifies minimum requirements for furnishing all labor, materials, equipment, transportation, and services necessary to fabricate and deliver one (1) 1000 KVA, 12470-480/277V outdoor, dry-type power transformer.

DOCUMENTS AND STANDARDS

2.1 APPLICABLE DOCUMENTS

All work under this Subcontract shall be in accordance with the codes and standards listed below which shall be considered minimum requirements.

2.2 CODES AND STANDARDS

1. Safety Standards and Codes
 - a. Safety Code for Building Construction, ASA-A, 10.2
 - b. California Administrative Code, Title 8, Division of Industrial Safety, Safety Orders
 - c. American Safety Standards as applicable
2. Fire Codes: National Fire Codes
3. Building Codes
 - a. Uniform Building Code (Pacific Coast Building, Officials' Conference)
 - b. National Electric Code

4. Standards
- a. American National Standards Institute - ANSI
- | | |
|--------------------------|--|
| ANSI/IEEE C57.12.01-1979 | Requirements for Dry-Type Distribution and Power Transformers |
| ANSI C57.12.10-1977 | Requirements for Transformers 230 000 Volts and Below, 833/958 through 8333/10 417 KVA Single-Phase and 750/862 through 60 000/80 000/100 000 KVA Three-Phase, including Supplement ANSI C57.12.10a-1978 |
| ANSI C57.12.50-1981 | Requirements for Ventilated Dry-Type Distribution Transformers, 1 to 500 KVA Single-Phase and 15 to 500 KVA Three-Phase, with High-Voltage 601-34 500 Volts, Low-Voltage 120-600 Volts |
| ANSI C57.12.51-1981 | Requirements for Ventilated Dry-Type Power Transformers, 501 KVA and Larger Three-Phase, with High-Voltage 601 to 34 500 Volts, Low-Voltage 208Y/120 to 4160 Volts |
| ANSI C57.12.70-1978 | Terminal Markings and Connections for Distribution and Power Transformers |
| ANSI/IEEE C57.12.91-1979 | Test Code for Dry-Type Distribution and Power Transformers |
- b. Underwriters' Laboratories Inc. - UL
5. All codes, standards and referenced specifications indicated shall mean latest edition, including supplements when such exist, unless otherwise stated.
6. Where differences exist between codes, standards and referenced specifications, the greatest protection shall govern.
7. Other codes which may be involved elsewhere in the specifications and drawings shall apply as fully as if repeated here.
8. Where any conflict occurs between the California Administrative Code, Title I, Division of Industrial Safety, Electrical Safety Orders, and the National Electrical Code of the National Board of Underwriters, the code giving the greater protection as determined by the University shall govern the work.

TECHNICAL REQUIREMENTS

3.1 RATING

The transformer shall be open wound, dry type, 1000 KVA AA, 1333 KVA FA, 12, 470 V - 480/277 wye secondary, 60 Hz, three phase, 95 KV BIL, 115 degrees C temperature rise, 220 degrees C temperature class, standard impedance. Dual rating shall be achieved through forced ventilation by internally mounted fans. Full load losses shall exceed 12 KW.

Four taps shall be provided in the high voltage winding, approximately 2 1/2 percent rated KVA, two above and two below primary voltage. Tap selection shall be accomplished in the de-energized condition.

GENERAL REQUIREMENTS

4.1 CORE

The core shall be constructed of mitre cut, high grade, grain oriented, non-aging silicon steel. The core leg cross section shall conform to the shape of the low voltage coil. All core laminations shall be free of burrs and stacked without gaps. The core framing structure shall be rigid construction and so designed to provide full clamping pressure upon the core and to provide point for applying blocking and jacking to support the coil.

4.2 COILS

The coil conductor shall be electrical grade aluminum. Each coil shall incorporate 220 degrees C insulation as turn-to-turn and/or layer-to-layer protection. The coil design shall be suitable for the KVA rating, voltage class, and BIL rating. The coils shall be vacuum/pressure resin impregnated through a time proven process. The finished product shall be flame-retardant, non-hygroscopic, self extinguishing.

4.3 CORE AND COIL ASSEMBLY

The core and coil shall be supported on resilient mounting that shall effectively dampen vibrations to the transformer enclosure. Design and construction shall be such as to reduce the noise level as much as practicable. In no case shall the audible noise level exceed NEMA TR-1, Part 9, and TR-27 standards.

4.4 BUS AND TERMINATION

Termination shall be of the manufacturer's standard and shall incorporate functional design which provides appropriate current density and bolting surface capability.

Sufficient space shall be provided above the H.V. terminal lugs to allow for stress relief cones. The L.V. pad shall be provided with four holes. The L.V. pad and the H.V. connector shall be copper.

4.5 NAMEPLATE

A metal nameplate shall be provided which conforms to ANSI/IEEE C57.12.01. The nameplate shall have etched, engraved, or stamped information to include voltages, KVA ratings, temperature rise, schematic diagram, etc.

4.6 TESTS

The following tests shall be made in accordance with the latest revision of ANSI Test Code C57.12.91:

Ratio Test	Polarity Test
No Load Core Loss	Full Load Coil Loss
Applied Voltage Test	Induced Over-Potential Test
Impedance Test	Excitation Current Test
Resistance Of Both Windings	

The enclosure shall be tested by the artificial precipitation method specified in ANSI Standard C57.12.55-1987 Section "7.0 Outdoor Enclosures -- Design Tests."

4.7 TEST REPORTS

Test reports indicating results of tests specified shall be submitted to the University in duplicate. Format of the test reports shall be as called for by the applicable ANSI and NEMA standards.

4.8 ENCLOSURE

An outdoor padmount, weatherproof enclosure shall be provided. The ventilated enclosure shall be constructed of minimum 11 gauge steel. The base shall be of structural steel of sufficient strength to permit lifting, jacking, rolling, and skidding in any direction. The back and front panels shall be removable to permit transformer inspection, maintenance, and tap access. The ventilation openings shall be of weather resistant construction. The high voltage terminal enclosure shall be for overhead feed. The low voltage compartment shall connect to a cable tray for a bottom feed. The compartment doors shall have a three point latch with an external operating handle with provisions for padlocking.

High voltage terminations shall be porcelain bushings arranged for single feed. Low voltage terminations shall be cast spade-type with adequate strength to support cables. A high grade enamel paint finish shall be applied after all enclosure components have been cleaned, phosphatized, and primed.

4.9 EARTHQUAKE DESIGN

The earthquake design criteria shall be in strict accordance with the Uniform Building Code, Zone 4.

4.10 ACCESSORIES

The following accessories shall be provided:

1. Dial type thermometer.
2. Diagrammatic nameplate.
3. Two ground pads.
4. Thermostat operated ventilating fans.
5. Hand-off-auto selector switch.

6. Three metal oxide surge arresters for the high voltage side, intermediate type, rated for a solidly grounded system.
7. Over temperature alarm contacts.

4.11 SUBMITTALS

1. Within 30 calendar days following award of the Subcontract, the following shall be submitted for review and approval:

Shop drawings showing complete layouts, construction and assembly details, details of field anchorage and assembly requirements, wiring diagrams and all other related details.
2. Production test data shall be submitted prior to shipment of the equipment.
3. Five (5) copies of a complete manual covering installation, operation and maintenance of all equipment furnished under this Subcontract shall be submitted prior to delivery of equipment. The manual shall contain, but not be limited to, the following items:
 - a. Drawings, catalog and performance data and wiring diagrams for all equipment and components.
 - b. Installation instructions.
 - c. Operating and maintenance bulletins with complete parts lists.
 - d. All other information which is essential to the proper installation, operation and maintenance of the transformer.
 - e. The manuals shall be bound in hard back binders and thoroughly cross-indexed.
4. Each submittal of shop drawings and materials lists shall consist of six copies. Following their approval by the engineer, shop drawings shall be corrected as required and a reproducible print, in addition to the standard submittal, of each shall be submitted for permanent record. Following approval of materials lists and data sheets, four (4) additional copies of each as approved shall be submitted for permanent record.

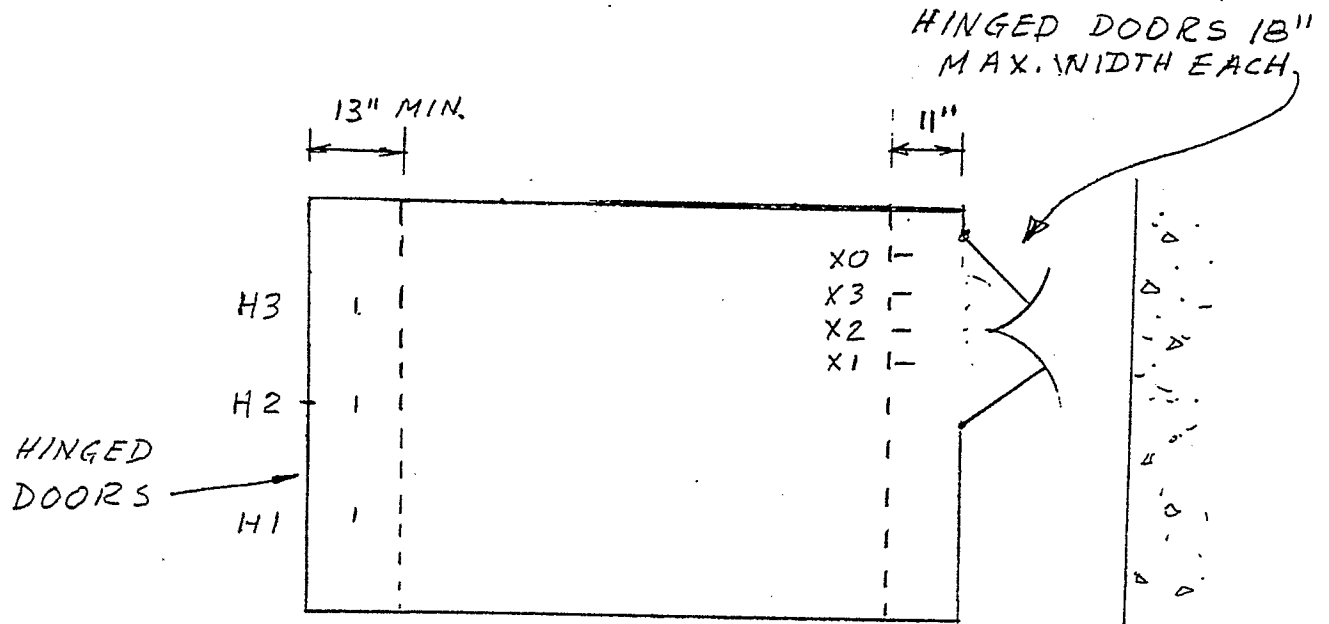
4.12 GUARANTEE

All equipment and materials shall be guaranteed in accordance with the requirements of the Subcontract documents.

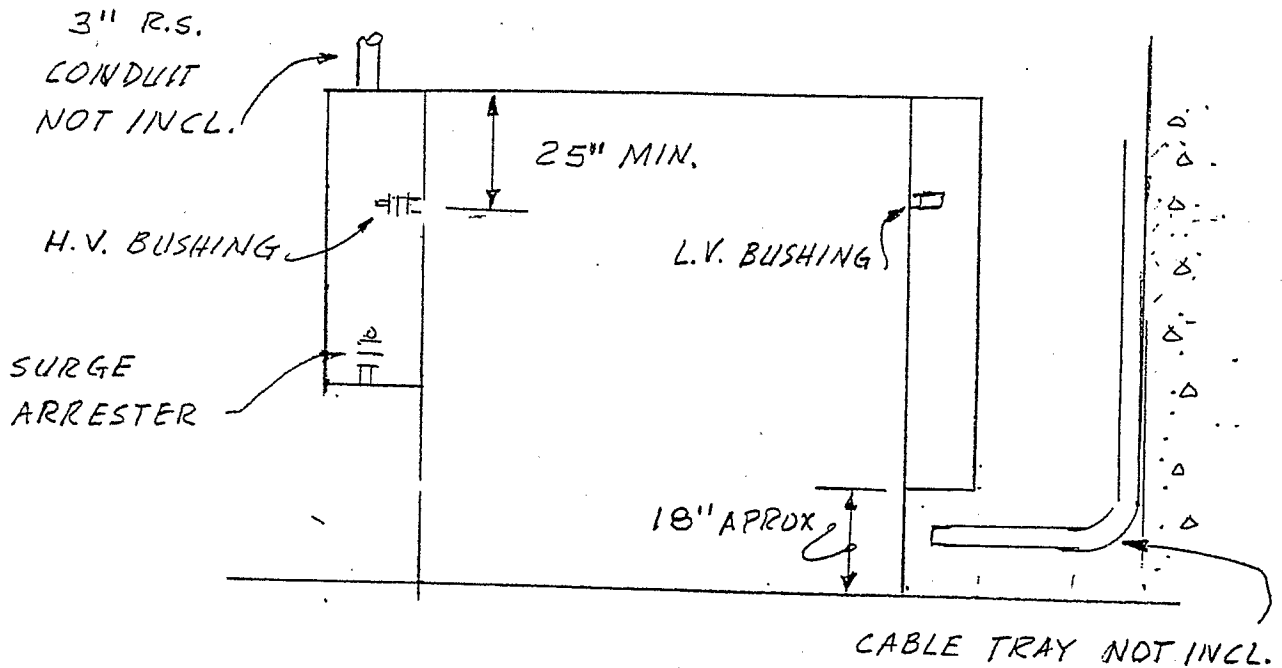
4.13 INFORMATION TO BE INCLUDED IN THE BID:

1. Sketch showing primary and secondary cable entrance, overall dimensions, low and high voltage compartments.
2. Approximate weight.
3. No load and full load losses.
4. Impedance.
5. Detailed description of insulation, electrical and mechanical characteristics, moisture resistance treatment process, flammability, etc.
6. Coil material and design.
7. Delivery.

NOTE: H.V. BUSHINGS NEED NOT BE SYMMETRICAL WITH RESPECT WITH THE ϕ OF THE THE TRANSFORMER.



PLAN



ELEVATION
NOT TO SCALE

PROPRIETARY DATA OF STANFORD UNIVERSITY AND/OR U.S. DEPARTMENT OF ENERGY.
 RECIPIENT SHALL NOT PUBLISH THE WITHIN INFORMATION WITHOUT SPECIFIC
 PERMISSION OF STANFORD UNIVERSITY.

STANFORD LINEAR ACCELERATOR CENTER
 U.S. DEPARTMENT OF ENERGY
 STANFORD UNIVERSITY STANFORD, CALIFORNIA

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APPROVALS

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