

**Typical Specification - Page 1 of 3****General**

The fusible primary transformer station shall be 25 kV class, 125 kV BIL, 600 ampere continuous current, suitable for use on both 8.3/14.4 kV and 15.2/26.3 kV grounded wye max design systems. The transformer station shall be constructed for connection to the utility system with 15 kV or 25 kV separable insulated connectors as described in IEEE Standard 386—latest revision (separable insulated connectors [and loadbreak inserts when required] shall be supplied by the user). The transformer station shall be designed for and accept a standard outdoor pole-type distribution transformers in a compartment separated from the elbow compartment by a steel equipment plate. Provisions for clip-mounted current-limiting fuses on the source side of the transformers shall be located in the transformer compartment in a position that allows fuse replacement with hot-line tools. Separate access shall be provided for each compartment. A door safety barrier shall be provided inside the door(s) on the transformer compartment as recommended in IEEE Standard C2 (National Electrical Safety Code) Rule 381G. Tamper resistance shall meet the Enclosure Security requirements of IEEE Standard C57.12.28 (Pad-Mounted Equipment—Enclosure Integrity). Together, the tamper resistance and the door safety barrier shall resist unauthorized entry, protect authorized and unauthorized persons, and provide positive safety features when installed in areas accessible to the general public. The primary transformer station shall be constructed for outdoor installation in areas subject to heavy precipitation and in areas with windblown contamination. The equipment shall be “air-insulated” and completely assembled prior to shipment.

**Enclosure Construction**

The enclosure shall be tamper-resistant, all-welded construction utilizing 11-gauge minimum sheet steel. Corner plates and braces shall be used as necessary to assure rigidity. The enclosure top shall be cross-kinked to provide watershed and rigidity. The enclosure shall be open bottom with a 1-inch flange inside, all around. Separate compartments shall be provided for cable termination and for transformers—each compartment equipped with its own individual access door(s) furnished with a stainless steel door holder that will latch the door open 100 degrees and 140 degrees and resist accidental closing. The equipment plate separating the two compartments shall be full length, constructed with 11-gauge minimum sheet steel braced to assure rigidity when operating the elbows. Doors shall be provided with

provisions for padlocking and a recessed penta-head (or hex-head) security bolt to prevent unauthorized entry (coordinated to prevent installation of the padlock until the security bolt is tightened *when closing the door(s)*) and to prevent a wrench from operating the security bolt until the padlock is removed *when opening the door(s)*). The security bolt shall be made captive with a stainless steel washer compressed to an oval shape to severely discourage removal. Hinges shall be stainless steel (with stainless steel pins not less than 0.3125-inch diameter) and shall be welded to both the enclosure and the door(s) to maintain door alignment for the life of the equipment. Ventilation, which meets the tamper resistance requirements of IEEE Standard C57.12.28, shall be provided in the top and bottom sill of the elbow compartment side of the enclosure and in the top and bottom sill of the transformer compartment side of the enclosure. Open-pore filter foam shall be installed in the outermost ventilation area to prevent entry of wildlife including wasps and similar size insects. The protective finish shall include necessary grinding, cleaning and phosphatizing, two-component rust-inhibiting epoxy primer and a Pad-Mount Green two-component polyurethane top coat finish (Munsell color 7GY 3.29/1.5). The primer and top coat shall be electronically monitored during application to insure proper ratio and mixing of each component. Total average thickness of paint (after curing) shall be not less than 5 mils. The protective coating shall meet the Enclosure Coating System requirements of IEEE Standard C57.12.28 (Pad-Mounted Equipment—Enclosure Integrity). Removable lift provisions, adequate to withstand handling with normal utility equipment, shall be provided on the outside of the enclosure. Threaded openings for lift provision bolts shall be blind holes to prevent the entrance of wire or other foreign objects into the enclosure when lift provisions are removed.

**Bushings and Terminals**

Bushings shall be 600 ampere Elliott #1201-625B2, 25 kV class (15.2 kV to ground) Air-Insulated Bushings, 125 kV BIL, per IEEE Standard 386 Fig. 11 (600 A Deadbreak Interface No. 1, 8.3 kV and 15.2 kV) for use with either 8.3/14.4 kV or 15.2/26.3 kV separable insulated connectors (Elastimold®, Eaton's Cooper Power Systems or other approved equal). The bushings shall be pressure-molded cycloaliphatic epoxy with a 1.25-inch diameter tin-plated aluminum conductor on the “air-insulated” side that is drilled and tapped 0.625-inch – 11UNC x 1-inch deep to provide direct connection of the bus and/or live parts. Leakage distance from the apparatus connection end of the bushing to ground

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shall be not less than 30 inches to assure trouble-free operation in a wet and/or contaminated environment. Integral shielding shall be provided to eliminate partial discharge caused by off-center mounting and mounting holes that may have sharp edges or burrs. Bushings shall mount in a 3.125-inch diameter opening and bolt in place to allow field replacement with standard tools. The bushing mounting bolts shall be self-locking stainless steel serrated-flange hex-head bolts that “cut” through the enclosure protective finish to ground the integral shielding of each bushing. To assure adequate strength for apparatus support, the bushing shall withstand a minimum cantilever loading of 600 pounds for five minutes without damage. The bushing interface shall be free of all voids, holes and heat sinks to assure proper mating with separable insulated connectors. Each bushing shall be tested in free air, mounted in a grounded steel plate not less than 10 inches x 10 inches, with an insulated protective cap (Eaton’s Cooper Power Systems #DPC625 or equal) installed on the interface to accurately simulate operating conditions (gas or liquid dielectric on the interface shall not be acceptable for this test). Each bushing shall meet the requirements for 25 kV devices in accordance with the test values of IEEE Standard 386 (latest revision), including 100 percent production testing.

### Bus and Fuse Mountings

Bus shall be copper with all burrs and sharp corners removed prior to installation. Fuse clips and/or fuse hinges shall be keyed to prevent rotation and to maintain alignment. Positive pressure shall be assured by use of stainless steel fasteners and lock washers or compression washers at all connection points. All connections shall provide direct contact of current-carrying parts and shall not depend on current transfer through fastener thread-to-thread contact. Fuses and their blown-fuse indicators shall be visible (*when the transformer compartment door(s) are open*) without removal of the clear-polycarbonate door safety barrier to allow easy identification of blown fuses without de-energizing or removing the fuse from service. Electrical components shall be “air-insulated” and positioned to allow visual inspection of all internal connections and components *without removing the clear-polycarbonate door safety barrier*, de-energizing or removing the equipment from service.

**Alternate 1:** Fuse mountings shall be Mounting Code 6 to accept 1.5 amp to 100 amp (max), 15.5 kV Eaton’s Cooper Power Systems NX® and 6 amp to 125 amp (max), 15.5 kV Eaton’s Cooper Power Systems X-Limiter™ clip-mounted current-limiting fuses. *When 1.5 amp to 40 amp 15.5 kV Code 5 fuses are supplied,*

*one Elliott Industries #3901-CM5-6 fuse extender per fuse shall be supplied to extend the Code 5 fuse length to fit Mounting Code 6 fuse mountings.* A Warning Sign, Elliott #7201-W2003-318, shall be provided inside the transformer compartment door to warn the operator to “Park the load side cable before installing or removing fuses.” A Danger Sign, Elliott #7203-D2003-313, shall be provided in a prominent location near the fuse clips to warn the operator “Do not remove fuse under load.”

**Alternate 2:** Fuse mountings shall be Mounting Code 6 to accept 1.5 amp to 40 amp (max), 23 kV Eaton’s Cooper Power Systems NX® and 1.5 amp to 40 amp (max) 23 kV Eaton’s Cooper Power Systems X-Limiter™ clip-mounted current-limiting fuses. A Warning Sign, Elliott #7201-W2003-318, shall be provided inside the transformer compartment door to warn the operator to “Park the load side cable before installing or removing fuses.” A Danger Sign, Elliott #7203-D2003-313, shall be provided in a prominent location near the fuse clips to warn the operator “Do not remove fuse under load.”

### Barriers

Phase and ground barriers shall be provided to assure correct phase-to-phase and phase-to-ground clearances for proper operation at rated voltage. These barriers shall be glass-reinforced polyester (NEMA GPO-3 class material) not less than 0.1875-inch thick.

A removable insulating barrier with a “DANGER – Keep Out! – Hazardous voltage” sign, Elliott #7203-D2003-309, shall be located inside the door(s) on the transformer compartment as recommended in Rule 381G of IEEE Standard C2 (National Electrical Safety Code). *When the enclosure width exceeds 74 inches,* the removable insulating barrier shall be divided to provide *sectional door safety barriers* with reduced size for secure handling. The door safety barrier(s) shall be constructed of 0.25-inch clear-polycarbonate (Lexan or equal) and *shall completely close the door opening* and be provided with a nonconductive safety latch requiring a positive action to remove the barrier. Handles and other hardware extending through this door safety barrier shall be nonconductive material. Handles shall be keyed to prevent rotation for secure handling. *Complete visual inspection of the internal components shall be possible without removing the door safety barrier.*

### Grounding Provisions

Four high-conductivity bronze eyebolt-type ground lugs, which accept #6 through #2/0 copper conductor, shall be installed—two in the cable terminating compartment and two in the transformer compartment—on each side of the door opening in an accessible position (as shown on the drawings).

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Stainless steel parking stands shall be provided in the quantity required to allow use of feed-thru bushings, parking bushings and grounding bushings. The parking stands shall be welded in place, in a position to allow the use of hot-line tools for installation of feed thru-bushings, etc. The parking stands shall be *unpainted* (except welds shall be painted) *to provide a ground* for feed-thru bushings and other devices that may be placed into the parking stands. *Keyed retainers* shall be welded above each parking stand *to prevent slipping or accidental removal* of portable devices such as feed-thru bushings, etc.

A corrosion proof nameplate with permanent thermal transfer printing shall be installed inside one door on the elbow compartment. It shall be located at the top corner farthest from the elbows when the door is open. The nameplate will provide Type of Equipment, Model Number, Amps Continuous, kV Maximum, BIL, Serial Number, Job Number, Date Manufactured and Weight of Equipment.

Bus, fuse and transformer connections between bushings shall be displayed (on the cable side of the equipment plate) using 0.5-inch-wide solid orange-color pressure-sensitive vinyl tape and die-cut orange-color pressure-sensitive vinyl fuse symbols not less than 2.5 inches high. The resulting schematic shall clearly indicate the circuit arrangement of the transformer station. The schematic shall be legible at a distance of six feet or more.

When enclosures have more than one door (or other access provision) each access shall be labeled in near proximity of the locking provisions with a pressure-sensitive vinyl label using letters not less than 0.375-inch nor more than 0.625-inch high. The label shall indicate the type of equipment behind the access (elbows, transformers, etc.).

When specified, four anchor-bolt brackets, Elliott #6102-A81-7 or approved equal, shall be supplied with each transformer station to provide a means of clamping the equipment to the concrete pad.

**Packaging**

Each transformer station shall be bolted to a solid-top wood pallet (to prevent the forks of a forklift truck from entering the open bottom of the equipment) to prevent hidden damage. The equipment shall be wrapped with 0.125-inch thick polyethylene foam or other suitable material to minimize damage to the finish during shipment.

**Drawings**

When specified, drawings shall be furnished for each transformer station that include:

- 1) enclosure dimensions and location of components.
- 2) proposed cable-training layout and dimensions.
- 3) proposed pad dimensions and location of anchor bolts.

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**25-kV Safefront 600 Amp  
Primary Transformer Station**  
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