



# 25 kV Safefront 600 Amp Primary Transformer Station Pad-Mounted - Outdoor

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## 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 and 15.2/6.3 kV grounded wye max design systems. The primary transformer station shall be constructed for connection to the utility system with 15 kV or 25 kV separable insulated connectors as described in ANSI/IEEE Standard 386-1985 or 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. Provision for clip mounted current limiting fuses on the source side of the transformers shall be located in the transformer compartment in a position which 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 ANSI Standard C2 (National Electrical Safety Code) Rule 381G. Tamper resistance shall meet the Enclosure Security requirements of ANSI 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 90 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 (or Hex) head security bolt to prevent unauthorized entry (co-ordinated 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 obround 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 ANSI 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, phosphatizing, rust inhibiting alkyd primer, and a top coat of Pad-Mount Green enamel (Munsell color 7GY 3.29/1.5). Total average thickness of paint (after baking) shall not be less than 5 mils. The protective coating shall meet the Enclosure Coating System requirements of ANSI 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 ANSI/IEEE Standard 386-1985 Fig. 10 (600 A Dead-Break Interface, 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, RTE or other approved equal). The bushings shall have a 1.25 inch diameter aluminum conductor on the "air insulated" side which is drilled and tapped 0.625 inch -11 x 1 inch deep to provide direct connection of the bus and/or live parts. Integral shielding shall be provided to eliminate partial discharge caused by off center mounting and mounting holes which may have sharp edges or burrs. Bushings shall bolt in place to allow field replacement with standard tools. Each bushing shall be tested and shall meet the requirements for 25 kV



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devices in accordance with the test values of ANSI/IEEE Standard 386-1985 or latest revision. Each bushing shall be tested in free air, mounted in a grounded steel plate not less than 10 inches x 10 inches, and with an insulated protective cap (RTE #2625041A01 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*). The bushing interface shall be free of all voids, holes and heat sinks to assure proper mating with separable insulated connectors.

### 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 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 fasteners thread to thread contact. Fuses and their blown fuse indicators shall be visible (*when the fuse 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 McGraw-Edison NX® and 6 amp to 125 amp (max), 15.5 kV Combined Technologies 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-WPLC80-189 shall be provided inside the fuse compartment door to warn the operator to "Park the load side cable before installing or removing fuses". A Danger Sign, Elliott #7203-DRF80-129 shall be provided in a prominent location near the fuse clips to warn the operator to "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 McGraw-Edison NX® and 1.5 amp to 40 amp (max) 23 kV Combined Technologies X-Limiter™ clip mounted current limiting fuses. A Warning Sign, Elliott #7201-WPLC80-to warn the operator to "Park the load side cable before installing

or removing fuses". A Danger Sign, Elliott #7203-DRF80-129 shall be provided in a prominent location near the fuse clips to warn the operator to "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 - HIGH VOLTAGE" warning sign, shall be located inside the door(s) on the transformer compartment as recommended in Rule 381G of ANSI 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 non-conductive safety latch requiring a positive action to remove the barrier. Handles and other hardware extending through this door safety barrier shall be non-conductive 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, eye bolt type, ground lugs which accept #6 thru #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).

### ACCESSORY EQUIPMENT

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 which 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.



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An anodized aluminum nameplate 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, 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. 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, fuses, bus, 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 cardboard or other suitable material to minimize damage to the finish during shipment.

### DRAWINGS

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

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