A. General

1. Product
   The pad-mounted gear shall be in accordance with the applicable plans, drawings and one-line diagrams and shall conform to these specifications.

2. Assembly
   The outdoor pad-mounted gear shall consist of a single self-supporting enclosure, containing three-phase group-operated interrupter switches and three-phase sets of single-pole fuses with the necessary accessory components, all completely factory assembled and operationally checked.

3. Coordination
   To ensure a completely coordinated design, the pad-mounted gear shall be integrally designed and produced by the manufacturer of the basic switching equipment.

4. Ratings
   Ratings for the integrated pad-mounted assembly shall be as designated below

<table>
<thead>
<tr>
<th>System Voltage Class</th>
<th>15kV†</th>
<th>25kV†</th>
</tr>
</thead>
<tbody>
<tr>
<td>kV, Nominal</td>
<td>14.4</td>
<td>25</td>
</tr>
<tr>
<td>kV, Maximum Design</td>
<td>17.5</td>
<td>275</td>
</tr>
<tr>
<td>kV, BIL</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Main Bus Continuous, Amps</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Switch Load-Interrupting, Amps</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Switch Fuse Load-Interrupting, Amps</td>
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<td>200</td>
</tr>
</tbody>
</table>

   Switch Short-Circuit Ratings

<table>
<thead>
<tr>
<th>Amps, RMS Symmetrical</th>
<th>Standard</th>
<th>HFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15kV†</td>
<td>14,000</td>
<td>12,500</td>
</tr>
<tr>
<td>25kV†</td>
<td>25,000</td>
<td>25,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peak Withstand Current, Amperes</th>
<th>Standard</th>
<th>HFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15kV†</td>
<td>36,400</td>
<td>32,500</td>
</tr>
<tr>
<td>25kV†</td>
<td>65,000</td>
<td>65,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MVA, 3-Phase Symmetrical at Rated Nominal Voltage</th>
<th>Standard</th>
<th>HFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15kV†</td>
<td>350</td>
<td>540</td>
</tr>
<tr>
<td>25kV†</td>
<td>620</td>
<td>1,080</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault-Closing Amps, RMS, Asym., 3-Time Duty-Cycle‡</th>
<th>Standard</th>
<th>HFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15kV†</td>
<td>22,400</td>
<td>20,000</td>
</tr>
<tr>
<td>25kV†</td>
<td>40,000</td>
<td>40,000</td>
</tr>
</tbody>
</table>

5. Certification of Ratings
   The manufacturer shall be completely and solely responsible for the performance of the basic switch and fuse components as well as the complete integrated pad-mounted gear assembly as rated.

   The manufacturer shall furnish, upon request, certification of ratings of the basic switch and fuse components and/or the integrated pad-mounted gear assembly consisting of the switch and fuse components in combination with the enclosure. This certification of the integrated unit shall include testing the pad-mounted gear to the fault-close requirements of the specification to assure the bus support system and components are adequate.

6. Submittals
   When requested, the manufacturer shall furnish the following drawings and reports:
   a) Layout showing dimensions, arrangements, electrical ratings, components and weights.
   b) Certified test reports of similar manufactured units showing fault-closing capability and load-interrupting capability of switches and complete pad-mounted gear assembly based on maximum design voltage.

7. Compliance with Standards & Codes
   The pad-mounted switchgear shall conform to or exceed the applicable requirements of the following standards and codes:
   a) All portions of ANSI/IEEE C57.12.28, covering enclosure integrity for pad-mounted equipment.
   b) Article 490.21(E) "Load Interrupters" in the National Electrical Code, which specifies that the interrupter switches...
in combination with power fuses shall safely withstand the
effects of closing, carrying, and interrupting all possible
currents up to the assigned maximum short-circuit rating.

c) All portions of IEEE C37.74 covering design and testing
of the distribution switchgear; components and ways.

d) All portions of ANSI, IEEE, and NEMA standards
applicable to the basic switch and fuse components.

8. Enclosure Design

To ensure a completely coordinated design, the pad-mounted gear
shall be constructed in accordance with the minimum construction
specifications of the fuse and/or switch manufacturer to provide
adequate electrical clearances and adequate space for fuse handling.

In establishing the requirements for the enclosure design,
consideration shall be given to all relevant factors such as controlled
access and tamper resistance.

B. Construction - Assembly

1. Insulators, Bushings and Bushing Wells
The interrupter-switch and fuse-mounting insulators and the bushings
and bushing wells shall have the following material characteristics and restrictions:

a) Operating experience of at least twenty (20) years under
similar conditions.

b) Ablative action to ensure non-tracking properties.

c) Adequate leakage distance established by test per IEC
Standard 60507.

d) Adequate strength for short-circuit stress established by
test.

e) Conformance with applicable ANSI standards.

f) Homogeneity of the cycloaliphatic epoxy resin throughout
each insulator, bushing and bushing well to provide maximum
resistance to power arcs. Ablation due to high temperature
from power arcs shall continuously expose more material of
the same composition and properties so that no change in
mechanical or electrical characteristics takes place because
of arc-induced ablation. Furthermore, any surface damage
to insulating components during installation or maintenance
of the pad-mounted gear shall expose material of the same
composition and properties so that insulating components
with minor surface damage need not be replaced.

g) Each insulator, bushing and bushing well shall be x-rayed to
assure it is essentially void free. An alternate testing method
may be used only by approval of the engineer.

h) Conductor rods of bushings and bushing wells shall be of all
copper with silver flash at threaded studs.

2. High-Voltage Bus

a) Bus and interconnections shall consist of bare aluminum bar
of 56% IACS conductivity with an oxide-inhibiting agent
at all bus joints.

b) Bus and interconnections shall withstand the stresses
associated with short circuits up to the maximum
rating of the pad-mounted gear; including proper allowance
for transient conditions.

c) Bolted aluminum-to-aluminum connections shall be made with
a suitable number of non-corrosive bolts and with two
Belleville spring washers per bolt, one under the bolt head
and one under the nut, or with a wide, flange-head bolt and

one Belleville spring washer under the nut per bolt. As an
alternate, bolted aluminum-to-aluminum connections shall
be made with a suitable equivalent surface area, i.e. 1-bolt
and spring washer. Bolts shall be tightened to an appropriate
torque to assure good electrical connection.

d) Before installation of the bus, all electrical contact surfaces
shall first be prepared by abrading to remove any aluminum-
oxide film. Immediately after this operation, the electrical
contact surfaces shall be coated with a uniform coating of
an oxide inhibitor and sealant.

3. Ground-Connection Pads

a) A ground connection pad shall be provided in each
termination compartment of the pad-mounted gear.

b) The ground connection pad shall be constructed of 1/4"
thick, stainless steel and have a NEMA 2-hole pattern for
ground connections. The pad shall be welded to the enclosure
and shall have a short-circuit rating equal to that of the
integrated assembly.

c) A full width copper grounding rod shall be provided in each
cable-termination compartment.

C. Construction - Enclosure & Finish

1. Enclosure

a) The pad-mounted enclosure shall be of unitized construction
(not structural frame and bolted sheet) to maximize
strength, minimize weight, and inhibit internal corrosion.

b) The basic material for the enclosure, roof and doors shall
be 11-gauge, hot-rolled, pickled-and-oiled steel sheet.

c) All structural joints and butt joints shall be welded, and the
external seams shall be ground flush and smooth. A welding
process shall be employed that eliminates alkaline residues
and minimizes distortion and spatter.

d) To guard against unauthorized or inadvertent entry,
enclosure construction shall not utilize any externally
accessible hardware.

e) The base shall consist of continuous 90-degree flanges,
turned inward and welded at the corners, for bolting to the
concrete pad.

f) The door openings shall have 90-degree flanges, facing
outward, that shall provide strength and rigidity as well as
deep overlapping between doors and door openings to guard
against water entry.

g) In consideration of tamper resistance, the enclosure shall
conform to or exceed the requirements of ANSI/IEEE
C57.12.28.

h) A heavy coat of insulating "no-drip" compound shall be applied
to the inside surface of the roof to reduce condensation of
moisture thereon. The roof shall be removable with bolts
accessible in termination compartments.

i) Lifting tabs shall be removable. Sockets for the lifting-tab
bolts shall be blind-tapped. A protective material shall be
placed between the lifting tabs and the enclosure to prevent
the tabs from scratching the enclosure finish. This material
shall be non-hygroscopic to prevent moisture from being
absorbed.

j) To prevent moisture ingress, the roof shall be one-piece
construction and shall not include any gasketed joints or
any unground weld butt joints exposed to the exterior.

The following optional feature may be specified:

k) A steel (specify compartmented or non-compartmented)
base spacer shall be provided to increase the elevation of
2. **Barrier Assembly**
   Insulating barriers shall be provided in each switch and fuse compartment as required to achieve necessary insulation levels. This barrier system shall be constructed of fiberglass reinforced polyester (NEMA rated GPO-3).

3. **Doors**
   a) Doors shall be constructed of 11-gauge hot-rolled, pickled-and-oiled steel sheet.
   b) Door edge flanges shall overlap with door opening flanges and shall be formed to create a mechanical maze that shall guard against water entry or discourage tampering or insertion of foreign objects.
   c) Doors shall have a minimum of three stainless steel hinges and hinge pins. The hinge pins shall be secured in place to guard against tampering.
   d) One active and one passive door shall be provided. In consideration of controlled access and tamper resistance, each active door shall be equipped with a positive-action three-point auto-latch mechanism and padlock hasp.
   e) Each active door shall be provided with a hinged stainless-steel cover over the operating bolt. The cover shall be padlockable and shall incorporate a hood to protect the padlock shackle from tampering and access to the operating bolt. Each handle shall be provided with a recessed pent-head (hex optional) bolt for additional security.
   f) Each passive door shall be independently secured and latched to the enclosure and shall not require a tool for opening.
   g) Doors providing access to fuses shall have provisions to store spare expulsion type fuse units or refills.
   h) Each door shall be provided with a stainless-steel door holder located above the door opening. These holders shall be hidden from view when the door is closed. It shall not be possible for the holders to swing inside the enclosure.

4. **Finish**
   a) Full coverage at joints and blind areas shall be achieved by processing enclosures independently of components such as doors and roofs before assembly into the unitized structures.
   b) All exterior seams shall be sanded or ground smooth for neat appearance.
   c) All surfaces shall undergo a chemical cleaning, phosphatizing or zirconization and sealing process before any protective coatings are applied in order to remove oils and dirt, form a chemically and anodically neutral conversion coating, improve the finish-to-metal bond, and retard underfilm propagation of corrosion.
   d) The finishing system shall be applied without sags or runs.
   e) After the enclosure is completely assembled and the components (switches, bus, etc.) are installed, the finish shall be inspected for scuffs and scratches.
   f) Blemishes shall be carefully touched up by hand to restore the protective integrity of the finish.
   g) Unless otherwise specified, the color shall be Munsell No. 7GY3.29/1.5, dark green.
   h) To ensure that the finishing system is capable of resisting corrosion, the manufacturer shall provide on request, certification that representative test panels, protected by the manufacturer’s finish system, have passed the coating system performance requirements in section 5.5 of ANSI C57.12.28 as verified by an independent third party certifier, such as UL®.

**D. Basic Components**

1. **Interrupter Switches**
   a) Interrupter switches shall have a three-time duty-cycle fault-closing rating equal to or exceeding the short circuit rating of the integrated pad-mounted gear assembly. These ratings define the ability to close the interrupter switch either alone (unfused) or in combination with the appropriate power fuses three times against a three-phase fault with asymmetrical current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current. Tests substantiating these ratings shall be performed at maximum design voltage with current applied for at least 10 cycles. Certifed test abstracts establishing such ratings shall be furnished upon request.
   b) Interrupter switches shall utilize a quick-make, quick-break mechanism installed by the switch manufacturer. The quick-make, quick-break mechanism shall be integrally mounted on the switch frame, and shall swiftly and positively open and close the interrupter switch independent of the speed of the switch operating handle.
   c) Interrupter switches shall be operated by means of an externally accessible switch operating hub. The switch operating hub shall be located within a recessed stainless-steel pocket mounted on the side of the pad-mounted enclosure. The switch operating hub pocket shall include a padlockable stainless-steel access cover that shall incorporate a hood to protect the padlock shackle from tampering. Labels or targets to indicate switch positions shall be provided in the switch operating hub pocket.
   d) Each interrupter switch shall be completely assembled and adjusted by the switch manufacturer on a rigid mounting frame. The frame shall be of heavy-gauge steel construction.
   e) Interrupter switch shall be provided with contact blades and interrupters for circuit closing, including fault-closing, continuous current carrying, and circuit interrupting. Spring loaded auxiliary blades shall not be permitted.
   f) Circuit interruption shall be accomplished by use of an interrupter which is positively and inherently sequenced with the blade position. It shall not be possible for the blade and interrupter to get out of sequence.
   g) Interrupter switches shall have a readily visible open gap when in the open position, which shall be viewable through a mar-resistant clear barrier to allow positive verification of correct switch position. In addition, an open/close label shall be provided in the termination compartment to give a supplemental visual indication of switch position.
   h) Each interrupter switch shall be provided with a switch operating handle. The switch operating handle shall be secured to the inside of the switch operating hub pocket and shall be stored behind the switch operating hub access cover.
   i) To increase contact separation speed, interrupter switch contacts on both sides of the arcing area shall be spring assisted to reduce arcing time and to rapidly increase the dielectric gap.
   j) To further insure arc extinction, air shall be compressed and simultaneously injected into the arcing area to cool the arc and thereby not rely solely on blade travel to insure arc extinction.
2. Switch Compartments
   a) Switch terminals shall be equipped with 600 ampere rated bushings that include removable silver-plated copper threaded studs to accommodate a choice of termination systems.
   b) Bushings and bushing wells shall have interfaces in accordance with ANSI/IEEE Standard 386 (ANSI Standard C119.2) to accept all standard separable insulated connectors and inserts.
   c) Parking stands are provided adjacent to each bushing and bushing well to accommodate horizontal feed-throughs and standoff insulators.
   d) All medium-voltage switch and fuse components are completely encased in an inner grounded steel compartment. The component compartment floor shall be of 18-gauge galvanized steel sheet to exclude foliage and animals. The floor shall be cross-kinked and shall have a small stainless-steel screen in each corner.
   e) Viewing windows are provided within the termination compartments to allow visual verification of switch position, observation of switch-position open/close labels and inspection of blown-fuse indicators on power fuses.

3. Fuse Compartments
   a) Fuse terminals are equipped with 200 ampere rated bushing wells designed to accept 200 ampere bushing inserts and shall have removable, silver-plated copper studs.
   b) Bushings and bushing wells shall have interfaces in accordance with ANSI/IEEE Standard 386 (ANSI Standard C119.2) to accept all standard separable insulated connectors and inserts. Parking stands are provided adjacent to each bushing and bushing well to accommodate horizontal feed-throughs and standoff insulators.
   c) Fuse access panels shall have a mechanical interlock that guards against gaining access to the fuse before opening the load-break separable insulated connector at the fuse terminal.
   d) The fuse shall be accessible only when de-energized and isolated — for full-view non-loadbreak disconnection and removal with a shotgun stick. This mounting features positive latching in both the energized and de-energized positions. When latched in the open position, the de-energized fuse is electrically isolated and readily accessible to operating personnel for removal with full visibility of contact interfaces on both sides of the fuse.
   e) Access to the compartment containing energized components when fuses are being changed shall be blocked by a GPO-3 panel that is secured in position.
   f) Individual parking stands shall be provided for each fuse mounting to allow convenient installation of elbow accessories to accommodate grounding. A ground rod shall be installed across the full width of the fuse compartments for connecting of cable concentric neutrals. Fuse phases shall be equipped with cable guides to assist in cable training and to prevent cables from interfering with movement of the fuse-access panel.
   g) To provide maximum service life and to prevent corrosion of moving parts, all latches and pivots in the fuse-handling mechanism shall be either painted steel, stainless steel, or zinc-plated.

The following optional features may be specified:

h) Fuse storage hooks shall be provided on fuse-termination compartment access door(s). Each set of hooks shall allow the storing of three complete fuse assemblies for power fuses. Storage hooks shall be for two holders when current-limiting fuses are used.

E. Labeling

1. Warning Signs
   All external doors shall be provided with approved “WARNING — HIGH VOLTAGE — KEEP OUT” signs.

2. Nameplate, Ratings Labels & Connection Diagrams
   a) The outside of both the front and back shall be provided with nameplates indicating the manufacturer’s name, catalog number, model number, and date of manufacture.
   b) The inside of each door shall be provided with a ratings label indicating the following: voltage ratings; main bus continuous rating; short-circuit ratings (amperes, RMS symmetrical and MVA three-phase symmetrical at rated nominal voltage); the type of fuse and its ratings including duty-cycle fault-closing capability; and interrupter switch ratings, including duty-cycle fault-closing capability and amperes, short-time, RMS (momentary asymmetrical and one-second symmetrical). A label indicating equipment is UL® Listed shall be included when applicable.
   c) A three-line connection diagram showing interrupter switches, fuses and bus along with the manufacturer’s model number shall be provided on the inside of both the front and rear doors, and on the inside of each switch-operating hub access cover.

F. Accessories

End fittings or holders, and fuse units or refill units for original installation, as well as spare fuse unit or refill unit for each fuse mounting, shall be furnished in accordance with the client’s requirements when specified.