PART 1 - GENERAL

1.01 The pad-mounted gear shall conform to the following specification.

1.02 The pad-mounted gear shall consist of a single self-supporting enclosure, containing interrter switches and power fuses with the necessary accessory components, all completely factory-assembled and operationally checked.

1.03 RATINGS

The ratings for the integrated pad-mounted gear shall be as designated below. (Select values from one of the columns shown in the table on page 2.)

<table>
<thead>
<tr>
<th>Kv, Nominal</th>
<th>14.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kv, Maximum</td>
<td>17.0</td>
</tr>
<tr>
<td>Kv, BIL</td>
<td>95</td>
</tr>
<tr>
<td>Main Bus Continuous, Amperes</td>
<td>600</td>
</tr>
<tr>
<td>Three-Pole Interrupter Switches</td>
<td></td>
</tr>
<tr>
<td>Continuous, Amperes</td>
<td>600</td>
</tr>
<tr>
<td>Load Dropping, Amperes</td>
<td>600</td>
</tr>
<tr>
<td>Fuses with Integral Load Interrupter</td>
<td></td>
</tr>
<tr>
<td>Maximum, Amperes</td>
<td>200E</td>
</tr>
<tr>
<td>Load Dropping, Amperes</td>
<td>200</td>
</tr>
<tr>
<td>Short-Circuit Ratings</td>
<td></td>
</tr>
<tr>
<td>Amperes Rms Symmetrical</td>
<td>14,000</td>
</tr>
<tr>
<td>Mva Three-Phase Symmetrical at Rated Nominal Voltage</td>
<td>350</td>
</tr>
</tbody>
</table>

The momentary and two-time duty-cycle fault-closing ratings of switches, momentary rating of bus, interrupting ratings of fuses, and one-time duty-cycle fault-closing capabilities of fuses with integral load interrupters shall equal or exceed the short-circuit ratings of the pad-mounted gear.
1.04 CERTIFICATION OF RATINGS

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

B. 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.

1.05 COMPLIANCE WITH STANDARDS AND CODES

The pad-mounted gear shall conform to or exceed the applicable requirements of the following standards and codes:

A. All portions of ANSI C57.12.28, covering enclosure integrity for pad-mounted equipment.

B. Article 490-21(3) 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 ANSI, IEEE, and NEMA standards applicable to the basic switch and fuse components.

1.06 ENCLOSURE DESIGN

A. 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.

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

PART 2 - CONSTRUCTION—ASSEMBLY

2.01 INSULATORS

The interrupter-switch and fuse-mounting insulators shall be of a cycloaliphatic epoxy resin system with characteristics and restrictions as follows:

A. Operating experience of at least 15 years under similar conditions.
2.02 HIGH-VOLTAGE BUS

A. Bus and interconnections shall consist of aluminum bar of 56% IACS conductivity.

B. Bus and interconnections shall withstand the stresses associated with short-circuit currents up through the maximum rating of the pad-mounted gear.

C. Bolted aluminum-to-aluminum connections shall be made with a suitable number of 1/2”—13 galvanized steel bolts and with two Belleville spring washers per bolt, one under the bolt head and one under the nut. Bolts shall be tightened to 50 foot-pounds torque.

D. Before installation of the bus, all electrical contact surfaces shall first be prepared by machine 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.

2.03 GROUND-CONNECTION PADS

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

B. The ground-connection pad shall be constructed of 3/8” thick steel, which shall be nickel plated and welded to the enclosure, and shall have a short-circuit rating equal to that of the pad-mounted gear.

C. Ground-connection pads shall be coated with a uniform coating of an oxide inhibitor and sealant prior to shipment.
3.01 ENCLOSURE

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

B. The basic material 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. The gas-metal-arc welding process shall be employed to eliminate alkaline residues and to minimize 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. Enclosure top side edges shall overlap with roof side edges to create a mechanical maze which shall allow ventilation to help keep the enclosure interior dry while discouraging tampering or insertion of foreign objects.

H. A heavy coat of insulating "no-drip" compound shall be applied to the inside surface of the roof to minimize condensation of moisture thereon.

I. Insulating interphase and end barriers of NEMA GPO3-grade fiberglass-reinforced polyester shall be provided for each interrupter switch and each set of fuses where required to achieve BIL ratings. Additional insulating barriers of the same material shall separate the front compartments from the rear compartments and isolate the tie bus (where furnished).

J. Full-length steel barriers shall separate side-by-side compartments.

K. Interrupter switches shall be provided with dual-purpose front barriers. These barriers, in their normal hanging positions, shall guard against inadvertent contact with live parts. It shall also be possible to lift the barriers out and insert them into the open gap when the switch is open. These barriers shall meet the requirements of Section 381G of the National Electrical Safety Code (ANSI Standard C2).

L. Interrupter switches shall be provided with window panels to allow viewing of the switch position without removing the dual-purpose front barriers. Window panels
shall be removable to facilitate phasing and shall be secured to the enclosure with stainless-steel or zinc-nickel-plated hardware.

M. Each fuse shall be provided with a dual-purpose front barrier. These barriers, in their normal hanging positions, shall guard against inadvertent contact with live parts. It shall also be possible to lift these barriers out and insert them into the open gaps when the fuses are in the disconnect position. These barriers shall meet the requirements of Section 381G of the National Electrical Safety Code (ANSI Standard C2).

N. The enclosure shall be provided with an instruction manual holder.

O. Lifting tabs shall be removable. Sockets for the lifting-tab bolts shall be blind-tapped. A resilient material shall be placed between the lifting tabs and the enclosure to help prevent corrosion by protecting the finish against scratching by the tabs. To further preclude corrosion, this material shall be closed-cell to prevent moisture from being absorbed and held between the tabs and the enclosure in the event that lifting tabs are not removed.

P. Inner barrier panels that meet the Rural Electrification Association's requirements for "dead-front" and the requirements of Section 381G of the National Electrical Safety Code (ANSI Standard C2) shall be provided—one for each door opening providing access to high voltage. These panels shall be secured in place with recessed pentahead bolts. When so secured, they shall guard against inadvertent contact with live parts.

Q. A steel-compartmented base spacer shall be provided to increase the elevation of live parts in the pad-mounted gear above the mounting pad by 12 inches.

S. Polyurethane self-adhesive bumpers shall be placed on the left-hand door channel to prevent the right-hand door from abrading the paint, and on the center door divider to prevent the left-hand door from rubbing against the center door divider.

3.02 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 and discourage tampering or insertion of foreign objects, but shall allow ventilation to help keep the enclosure interior dry.

C. Doors shall have a minimum of two extruded-aluminum hinges with stainless-steel hinge pins, and interlocking extruded-aluminum hinge supports for the full length of the door to provide strength, security, and corrosion resistance.
Mounting hardware shall be stainless steel or zinc-nickel-plated steel, and shall not be externally accessible to guard against tampering.

D. In consideration of controlled access and tamper resistance, each door (or set of double doors) shall be equipped with an automatic three-point latching mechanism.

1. The latching mechanism shall be spring loaded, and shall latch automatically when the door is closed. All latch points shall latch at the same time to preclude partial latching.

2. A pentahead socket wrench or tool shall be required to actuate the mechanism to unlatch the door and, in the same motion, recharge the spring for the next closing operation.

3. The latching mechanism shall have provisions for padlocking that incorporate a means to protect the padlock shackle from tampering and that shall be coordinated with the latches such that:

   (a) It shall not be possible to unlatch the mechanism until the padlock is removed, and

   (b) It shall not be possible to insert the padlock until the mechanism is completely latched closed.

E. Doors providing access to solid-material power fuses shall have provisions to store spare fuse units or refill units.

F. Each door shall be provided with a zinc-nickel-plated steel door holder located above the door opening. The holder shall be hidden from view when the door is closed, and it shall not be possible for the holder to swing inside the enclosure.

3.03 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 filled and sanded smooth for neat appearance.

C. To remove oils and dirt, to form a chemically and anodically neutral conversion coating to improve the finish-to-metal bond, and to retard underfilm propagation of corrosion, all surfaces shall undergo a thorough pretreatment process comprised of a fully automated system of cleaning, rinsing, phosphatizing, sealing, drying, and cooling before any protective coatings are applied. By
utilizing an automated pretreatment process, the enclosure shall receive a highly consistent thorough treatment, eliminating fluctuations in reaction time, reaction temperature, and chemical concentrations.

D. After pretreatment, protective coatings shall be applied that shall help resist corrosion and protect the steel enclosure. To establish the capability to resist corrosion and protect the enclosure, representative test specimens coated by the enclosure manufacturer's finishing system shall satisfactorily pass the following tests:

1. 4000 hours of exposure to salt-spray testing per ASTM B 117 with:
   (a) Underfilm corrosion not to extend more than 1/32" from the scribe as evaluated per ASTM D 1645, Procedure A, Method 2 (scraping); and
   (b) Loss of adhesion from bare metal not to extend more than 1/8" from the scribe.

2. 1000 hours of humidity testing per ASTM D 4585 using the Cleveland Condensing Type Humidity Cabinet with no blistering as evaluated per ASTM D 714.

3. 500 hours of accelerated weathering testing per ASTM G 53 using lamp UVB-313 with no chalking as evaluated per ASTM D 659, and no more than 10% reduction of gloss as evaluated per ASTM D 523.

4. Crosshatch adhesion testing per ASTM D 3359 Method B with no loss of finish.

5. 160-inch-pound impact adhesion testing per ASTM D 2794 with no chipping or cracking.

6. Oil resistance testing consisting of a 72-hour immersion bath in mineral oil with no shift in color, no streaking, no blistering, and no loss of hardness.

7. 3000 cycles of abrasion testing per ASTM 4060 with no penetration to the substrate.

Certified test abstracts substantiating the above capabilities shall be furnished upon request.

E. After the finishing system has been properly applied and cured, welds along the enclosure bottom flange shall be coated with a wax-based anticorrosion moisture barrier to give these areas added corrosion resistance.
F. A resilient closed-cell material, such as PVC gasket, shall be applied to the entire underside of the enclosure bottom flange to protect the finish on this surface from scratching during handling and installation. This material shall isolate the bottom flange from the alkalinity of a concrete foundation to help protect against corrosive attack.

G. After the enclosure is completely assembled and the components (switches, fuses, bus, etc.) are installed, the finish shall be inspected for scuffs and scratches. Blemishes shall be touched up by hand to restore the protective integrity of the finish.

H. The finish shall be olive green, Munsell 7GY3.29/1.5.

3.04 To guard against corrosion, all hardware (including door fittings, fasteners, etc.), all operating-mechanism parts, and other parts subject to abrasive action from mechanical motion shall be of either nonferrous materials, or galvanized or zinc-nickel-plated ferrous materials. Cadmium-plated ferrous parts shall not be used.

PART 4 - BASIC COMPONENTS

4.01 INTERRUPTER SWITCHES

A. Interrupter switches shall have a two-time duty-cycle fault-closing rating equal to or exceeding the short-circuit rating of the pad-mounted gear. These ratings define the ability to close the interrupter switch twice 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 voltage with current applied for at least 10 cycles. Certified test abstracts establishing such ratings shall be furnished upon request.

B. Interrupter switches shall be operated by means of an externally accessible 3/4" hex switch-operating hub. The switch-operating hub shall be located within a recessed stainless-steel pocket mounted on the side of the pad-mounted gear enclosure and shall accommodate a 3/4" deep-socket wrench or a 3/4" shallow-socket wrench with extension. 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. Stops shall be provided on the switch-operating hub to prevent overtravel and thereby guard against damage to the interrupter switch quick-make quick-break mechanism. Labels to indicate switch position shall be provided in the switch-operating-hub pocket.

C. Each interrupter switch shall be provided with a folding switch-operating handle. The switch-operating handle shall be secured to the inside of the switch-operating-hub pocket by a brass chain. The folded handle shall be stored behind the closed switch-operating-hub access cover.
D. 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 switch-operating-hub speed.

E. Each interrupter switch shall be completely assembled and adjusted by the switch manufacturer on a single rigid mounting frame. The frame shall be of welded steel construction such that the frame intercepts the leakage path which parallels the open gap of the interrupter switch to positively isolate the load circuit when the interrupter switch is in the open position.

F. Interrupter switch contacts shall be backed up by stainless-steel springs to provide constant high contact pressure.

G. Interrupter switches shall be provided with a single blade per phase for circuit closing including fault closing, continuous current carrying, and circuit interrupting. Spring-loaded auxiliary blades shall not be permitted. Interrupter switch blade supports shall be permanently molded in place in a unified insulated shaft constructed of the same cycloaliphatic epoxy resin as the insulators.

H. 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. Circuit interruption shall take place completely within the interrupter, with no external arc or flame. Any exhaust shall be vented in a controlled manner through a deionizing vent.

I. Interrupter switches shall have a readily visible open gap when in the open position to allow positive verification of switch position.

J. Ground studs shall be provided at all switch terminals. Ground studs shall also be provided on the ground pad in each interrupter switch compartment and on the terminals and ground pad in any bus compartment. The momentary rating of the ground studs shall equal or exceed the short-circuit ratings of the pad-mounted gear.

K. Key interlocks shall be provided to prevent paralleling the two source interrupter switches.

L. Key interlocks shall be provided to guard against opening fuse-compartment door(s) unless all switches (series tap switch only, where furnished) are locked open.

M. Base-mounted distribution-class surge arresters, metal-oxide type rated 10 kv shall be provided at all source switch terminals.
N. Mounting provisions only for base-mounted distribution-class surge arresters rated 9 kv shall be provided at all source switch terminals.

O. Mounting provisions shall be provided to accommodate one three-phase fault indicator with three single-phase sensors and with viewing window in door in each switch compartment (except series tap switch, where furnished).

4.02 FUSES

A. Solid-Material Power Fuses

1. Fuses shall be disconnect style, solid-material power fuses, and shall utilize refill-unit-and-holder or fuse-unit-and-end-fitting construction. The refill unit or fuse unit shall be readily replaceable and low in cost.

2. Fusible elements shall be non-aging and non-damageable so that it is unnecessary to replace un-blown companion fuses on suspicion of damage following a fuse operation.

3. Fusible elements for refill units or fuse units rated 10 amperes or larger shall be helically coiled to avoid mechanical damage due to stresses from current surges.

4. Fusible elements, that carry continuous current, shall be supported in air to help prevent damage from current surges.

5. Each refill unit or fuse unit shall have a single fusible element to eliminate the possibility of unequal current sharing in parallel current paths.

6. Solid-material power fuses shall have melting time-current characteristics that are permanently accurate to within a maximum total tolerance of 10% in terms of current. Time-current characteristics shall be available which permit coordination with protective relays, automatic circuit reclosers, and other fuses.

7. Solid-material power fuses shall be capable of detecting and interrupting all faults whether large, medium, or small (down to minimum melting current), under all realistic conditions of circuitry, with line-to-line or line-to-ground voltage across the fuse, and shall be capable of handling the full range of transient recovery voltage severity associated with these faults.

8. All arcing accompanying operation of solid-material power fuses shall be contained within the fuse, and all arc products and gases evolved shall be effectively contained within the exhaust control device during fuse operation.
9. Solid-material power fuses shall be equipped with a blown-fuse indicator that shall provide visible evidence of fuse operation while installed in the fuse mounting.

B. Fuse-mounting jaw contacts shall incorporate an integral load interrupter that shall permit live switching of fuses with a hookstick.

1. The integral load interrupter housing shall be of the same cycloaliphatic epoxy resin as the insulators.

2. The integral load interrupter shall be in the current path continuously. Auxiliary blades or linkages shall not be used.

3. Live switching shall be accomplished by a firm, steady opening pull on the fuse pull ring with a hookstick. No separate load-interrupting tool shall be required.

4. The integral load interrupter shall require a hard pull to unlatch the fuse to reduce the possibility of an incomplete opening operation.

5. Internal moving contacts of the integral load interrupter shall be self-resetting after each opening operation to permit any subsequent closing operation to be performed immediately.

6. Circuit interruption shall take place completely within the integral load interrupter with no external arc or flame.

7. The integral load interrupter and the fuse shall be provided with separate fault-closing contacts and current-carrying contacts. The fuse hinge shall be self-guiding and, together with the fault-closing contacts, shall guide the fuse into the current-carrying contacts during closing operations. Circuit-closing inrush currents and fault currents shall be picked up by the fault-closing contacts, not by the current-carrying contacts or interrupting contacts.

8. Integral load interrupters for fuses shall have a one-time duty-cycle fault-closing capability equal to the interrupting rating of the fuse, and a two-time duty-cycle fault-closing capability of 13,000 amperes rms asymmetrical at 14.4 kv or 25 kv. The duty-cycle fault-closing capability defines the level of available fault current into which the fuse can be closed the specified number of times (once or twice), without a quick-make mechanism and when operated vigorously through its full travel without hesitation at any point, with the integral load interrupter remaining operable and able to carry and interrupt currents up to the emergency peak-load capabilities of the fuse.
D. Fuse terminal pads shall be provided with a two-position adapter, making it possible to accommodate a variety of cable-terminating devices.

E. Ground studs shall be provided at all fuse terminals. One ground stud shall also be provided on the ground pad in each fuse compartment. The momentary rating of the ground studs shall equal or exceed the short-circuit ratings of the pad-mounted gear.

F. A fuse storage compartment shall be provided in two source interrupter-switch compartments. Each fuse storage compartment shall provide space for storing three spare fuse holders or fuse units with end fittings for solid-material power fuses, or one spare electronic power fuse holder.

PART 5 - LABELING

5.01 HAZARD-ALERTING SIGNS

A. All external doors shall be provided with "Warning—Keep Out—Hazardous Voltage Inside—Can Shock, Burn, or Cause Death" signs.

B. The inside of each door shall be provided with a "Danger—Hazardous Voltage—Failure to Follow These Instructions Will Likely Cause Shock, Burns, or Death" sign. The text shall further indicate that operating personnel must know and obey the employer's work rules, know the hazards involved, and use proper protective equipment and tools to work on this equipment.

C. Interrupter switch compartments shall be provided with "Danger" signs indicating that "Switches May Be Energized by Backfeed."

D. Fuse compartments shall be provided with "Danger" signs indicating that "Fuses May Be Energized by Backfeed."

E. Barriers used to prevent access to energized live parts shall be provided with "Danger—Keep Away—Hazardous Voltage—Will Shock, Burn, or Cause Death" signs.

5.02 NAMEPLATES, RATINGS LABELS, AND CONNECTION DIAGRAMS

A. The outside of each door (or set of double doors) shall be provided with a nameplate indicating the manufacturer's name, catalog number, model number, date of manufacture, and serial number.

B. The inside of each door (or set of double doors) 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-
C. A three-line connection diagram showing interrupter switches, fuses with integral load interrupter, and bus along with the manufacturer's model number shall be provided on the inside of each door (or set of double doors), and on the inside of each switch-operating-hub access cover.

PART 6 - ACCESSORIES

6.01 End fittings and fuse units shall be furnished.

END OF SECTION 26 13 00