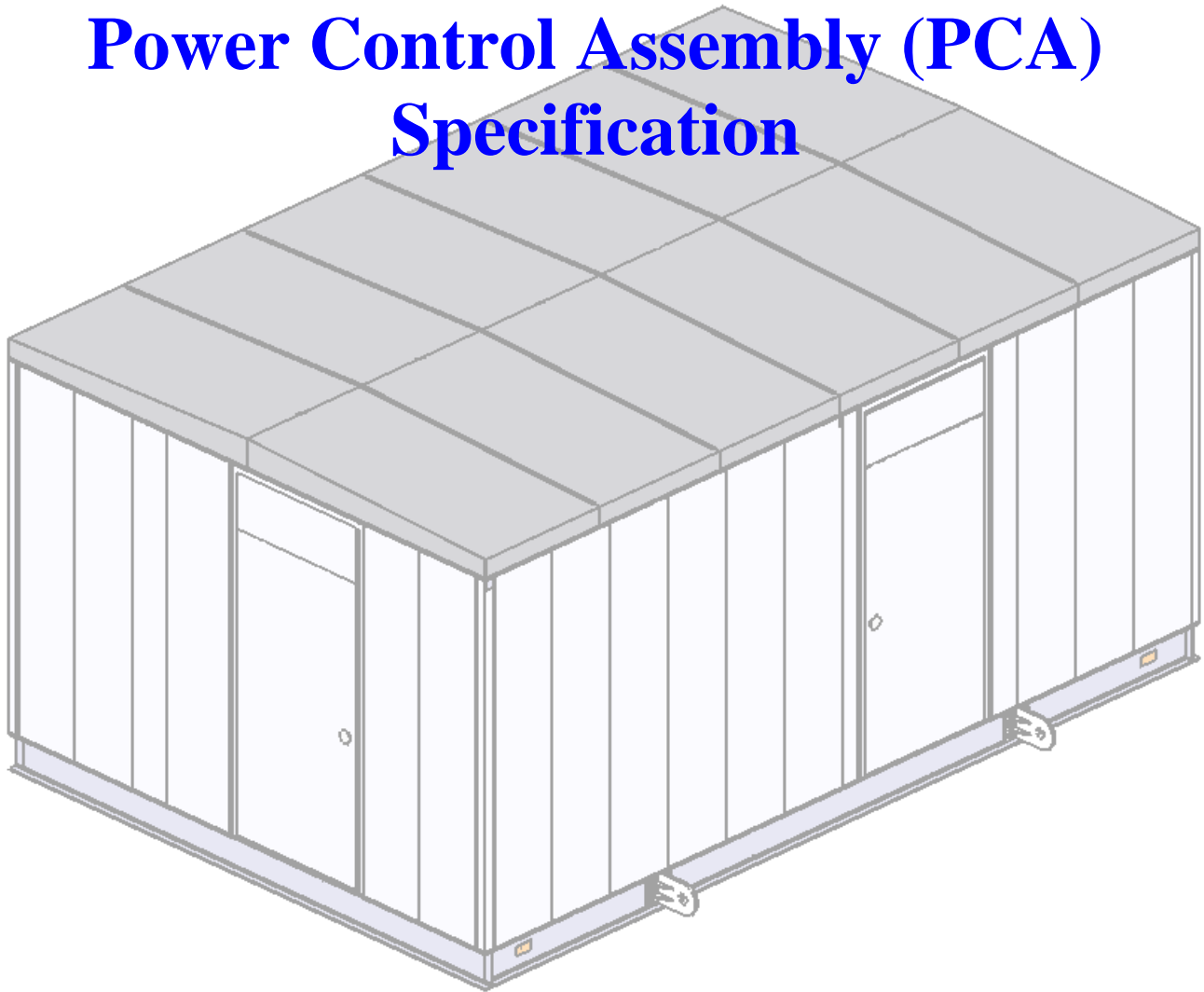




# Power Control Assembly (PCA) Specification



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**I. Scope**

This document presents a general description, design criteria, manufacturing process and testing procedure necessary for a complete Power Control Assembly.

**II. Description**

The Power Control Assembly is a pre-designed, pre-fabricated and pre-tested enclosure that is delivered to the customer's site to eliminate on-site fabrication and minimize testing.

The Power Control Assembly is a weather tight enclosure designed to house and protect any type of the following electrical equipment but not limited to:

- a. Low Voltage Switchgear
- b. Medium Voltage Switchgear
- c. Substation Control Equipment
- d. Distribution Transformers
- e. Instrumentation Panels
- f. Control Switchboards
- g. Communication Panels

**III. Design Standards**

The Power Control Assembly shall be designed to comply with the most recent edition of the following:

- a. American Iron and Steel Institute (AISI)
- b. American Institute of Steel Construction (AISC)
- c. American National Standards Institute (ANSI)
- d. American Society for Testing and Materials (ASTM)
- e. Air Conditioning Contractors of America (ACCA)
- f. Institute of Electrical and Electronics Engineers, Inc. (IEEE)
- g. International Building Code (IBC)
- h. National Electrical Manufacturers Association (NEMA)
- i. National Electric Code (NEC)
- j. Steel Structures Painting Council (SSPC)

**IV. Design**

The Power Control Assembly shall be designed to withstand seismic loads as described in the latest edition of the International Building Code (IBC). An analysis report by a registered Professional Engineer will be supplied with the PCA.

IBC Seismic Zone is to be determined by final location of Power Control Assembly.

Standard Design Loads (Other loading conditions are available):

- a. Roof – 85 pounds per square foot
- b. Floor – 250 pounds per square foot with deflection not to exceed ½ inch every 10 feet

- c. Exterior Walls – Withstand wind loading up to 125 miles per hour
- d. Interior Walls – Support 50 pounds per linear foot

Power Control Assemblies can also be designed to withstand seismic criteria as described in IEEE 693 “Recommended practice for seismic design of substations.”

**V. Construction**

The construction of a Power Control Assembly shall be as described in the following paragraphs.

**a. Base**

The Power Control Assembly base shall be a welded construction of ASTM A-36 structural steel members sized and positioned to maximize strength and durability to withstand the loads and stresses of lifting, transporting and everyday control assembly operation.

The base is designed to be mounted on a concrete slab or concrete piers. Other foundations are acceptable if location soil conditions permit.

The base comes complete with removable lifting eyes to assist with lifting and transportation. The preferred lifting technique is by crane utilizing a single point lift, with suitable rigging.

**b. Floor**

The Power Control Assembly floor shall be a minimum of ¼ inch steel plate welded to the base members. The floor will be designed to withstand no less than 250 pounds per square foot at any location in the PCA.

If required the floor construction can be upgraded to withstand heavier loads or to reduce deflection.

Cutouts can be placed in the floor to match existing site requirements for field wiring and routing of power cables.

Computer floors are available to allow wiring and cable running underneath the finished floor. The 2’ x 2’ removable tiles are supported one foot above base floor, and can support 100 PSF.

**\*\*\*No floor buildings are also available.**

**c. Walls**

All walls are to be nominal 3 inches thick. All wall panels are to be 16 gauge galvanized steel. Wall framing shall consist of 3 inch square structural steel tubing welded to the base to minimize deflection and deformation during lifting and under environmental loads. All openings (doors, window, etc.) shall be framed with 3 inch steel tubing. All structural frames and wall opening connections shall be continuously welded.

Interior wall panels are designed to hold insulation in place and to provide a flat mounting surface for equipment.

The standard interior height from floor to ceiling is 10 feet (120 inches). If required, interior wall height may be more or less.

**d. Roof and Ceiling**

All roof joints are liberally caulked. A roof cap fully covers each roof seam to prevent moisture penetration. All exterior roof panels and roof trusses shall be formed from 12 gauge galvanized steel. Trusses and roof panels can be sloped to provide a single slope or a gabled two degree pitch.

Ceiling panels shall be made of 16 gauge galvanized steel. These panels are designed to hold insulation in place as well as provide a flat mounting surface.

Two louvered ventilation openings are provided on each end of the PCA. These are to prevent condensation from accumulating in the attic space.

**e. Weatherproofing**

The PCA is designed to comply with NEMA 3R enclosure standards.

All joints shall be liberally caulked to prevent conditioned air from escaping the PCA and moisture from entering.

All door frames are gasketed to ensure moisture and dust does not enter when doors are closed.

Roof caps cover each roof seam to provide a weather tight seal.

**f. Hardware**

All hardware used in the manufacturing of the PCA shall have a corrosion resistant coating. If PCXA is subject to harsh environments, stainless steel hardware shall be used.

Power Control Assemblies may be constructed in multiple sections to accommodate shipping requirements. The shipping split shall be supported during transportation and installation to prevent any distortion. Shipping split shall also be fully enclosed to protect the internal equipment from the elements during shipping.

Also available are Power Control Assemblies constructed entirely of stainless steel. This includes the welded base construction, structural steel framing, and all wall and roof panels. This provides protection against exposure to corrosive chemicals and harsh environmental conditions.

## **VI. Material**

The overall size and layout of the Power Control Assembly shall be made in accordance with the Purchaser's drawings. The following items are standard on all Power Control Assemblies unless specified by the Purchaser.

### **a. HVAC**

Heating, ventilating and air condition units shall be sized in accordance with Air Conditioning Contractors of America's "Manual N Commercial Load Calculation." HVAC unit sizing will be based on an interior temperature of 60-80 degrees Fahrenheit. Other design considerations will be exterior conditions based on control assembly destination and heat loads from current and future equipment. All HVAC units shall be BARD self contained wall mount units, complete with supply and return grills. Thermostat and a disposable air filter will be provided unless otherwise specified.

### **b. Doors**

All doors shall be hollow metal doors with and insulating core (R11). Size and quantity of doors are to be determined as shown on purchaser's drawings. All doors will come equipped with the following hardware:

- i. Three or four heavy duty hinges
- ii. Low profile panic bar exit device
- iii. Exterior knob with cylinder lock – Removable cores are available so purchaser can match existing locks.
- iv. Door closer with hold open feature
- v. Threshold with weather stripping
- vi. Drip shield over each door

Pull handles and safety glass windows are available if specified.

If specified, a removable transom can be provided to allow the top of each door to be removed so oversized equipment can be loaded into the PCA.

**c. Paint**

The underside of the base shall be sand blasted per SSPC SP6 to remove rust and scales and then painted with VOC compliant Sherwin Williams heavy duty Macropoxy three to six mils thick to protect the steel from corrosion.

The exterior walls and roof shall be thoroughly cleaned with an Iron Phosphate bath prior to powder coating. One coat outdoor quality polyester powder will be applied to match the Purchaser's color selection. Final coating thickness will be a minimum of 2 mils DFT. An additional primer coat may be applied if PCA is destined for harsh or marine conditions.

The interior walls and ceiling shall be thoroughly cleaned with an Iron Phosphate bath prior to powder coating. One coat outdoor quality polyester powder will be applied. Interior walls and ceiling will be semi-gloss white unless specified otherwise by Purchaser. Final coating thickness will be a minimum of 2 mils DFT.

The floor shall be thoroughly cleaned, etched, primed and painted with one coat Rust-Oleum GripTek Primer and then with one coat non-skid Carboline 890 Epoxy. Color of floor shall be light gray (ANSI 70 gray) unless specified otherwise. Final coat thickness will be two to four mils.

All framing and structural steel shall be primed with Sherwin Williams Controls Rust Primer.

**d. Insulation**

At minimum R-11 rigid board insulation shall be provided in the walls and roof. If specified, insulation values of R-30 can be achieved in the walls. Rigid board insulation can be used in the roof to provide insulation values of up to R-38. Two part spray foam can be applied under the floor to provide and insulation value up to R-38.

**e. Lighting**

Interior lighting shall be four foot long fluorescent light fixtures numbered and spaced to provide adequate lighting throughout the PCA. These lights will be controlled by three-way switches located next to each door.

Exterior lighting shall be wall mounted high pressure sodium light fixtures suitable for use in wet conditions located above each exit/entry door.

Emergency lighting if specified shall be LED light fixtures that switch on automatically once AC power is lost and provide 1.5 hours of continuous illumination. Emergency lights may also be incandescent DC powered light fixtures if the proper power sources are available.

Lighted exit signs can be provided above each entry/exit door if specified.

**f. Receptacles and Switches**

Duplex receptacles rated 120 VAC, 20A, commercial grade, shall be provided next to each door and wherever specified. GFCI receptacles can be used when specified.

If specified, exterior receptacles shall be GFCI receptacles in weatherproof boxes.

Three-way switches will be used to control all lighting in the Power Control Assembly.

**VII. Wiring**

**a. Wire**

All lighting and power wiring shall be single conductor THHN wire with a minimum size of No. 12 AWG. All wiring shall be installed in the wire way, conduit or other approved raceway as specified by NEC.

All conduit shall be EMT sized for the amount and type of wire in accordance with NEC. Rigid Steel Conduit can be used if required.

**b. Wire way**

A minimum 4" wire way with hinged cover shall be provided around the perimeter of the Power Control Assembly. The size of the wire way will be determined based on the amount of wire required for the PCA.

**c. Grounding**

The grounding bus bar and/or cable will interconnect all electrical equipment in the PCA. The ground loop will be at minimum 4/0 bare copper wire connected to ground pads located at each corner of the PCA. The grounding pads shall facilitate the connection to existing grounding grid with NEMA 2 hole connectors.

**VIII. Optional Features or Installed Equipment**

- a.** AC and/or DC Panelboards
- b.** Termination/Interface Cabinets
- c.** Control and/or Relay Panels
- d.** Low and Medium Switchgear
- e.** Removable End Wall
- f.** Battery/Charger Systems
- g.** Alarm and Fire Detection Equipment
- h.** Windows
- i.** Cable Trays

**IX. Testing and Quality Assurance**

Prior to shipment, an electrical/mechanical quality inspection are completed to ensure all components of PCA are working correctly. Evidence of these reports will be made available upon request from the Purchaser. Witness testing by customers' is always encouraged.

**X. Documentation**

The following documents will be submitted for review and approval prior to starting fabrication of any Power Control Assembly.

- a. Plan View – General arrangement of all equipment and overall size, weight and center of gravity of PCA.
- b. Elevation – Location of equipment with respect to each wall in PCA. This will include all wall openings and sizes.
- c. Bill of Material – List of all equipment to be installed in PCA. The location of each piece of equipment can be determined by the plan view and elevation drawings.

**XI. Warranty**

PCA shall come standard with (2) year warranty from date of building placement that covers all material and workmanship.

PCA shall come with standard with (5) year warranty on all paint and powder coating. This covers against corrosion, cracking, peeling, chipping and blistering of paint.

Extended warranties are available to cover all equipment for longer periods of time.