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(ISO 9001-2008 CERTIFIED)

SPECIFICATION
FOR
RUGGEDSPEC™ POWER DISTRIBUTION CENTER

FOR SWITCHGEAR, MOTOR CONTROL, CENTERS
VARIABLE FREQUENCY DRIVES, ETC.
(250 PSF FLOOR LOADING)

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1.0 SCOPE

This specification presents a general description, design criteria and the construction requirements for factory-fabricated *RuggedSpec Power Distribution Centers* for housing electrical equipment.

2.0 APPLICABLE STANDARDS

The design, material, manufacture, testing and performance of the *RuggedSpec Power Distribution Center* shall meet the requirements of the applicable sections of the latest revisions of the standards listed below:

- AISC American Institute of Steel Construction
- AISI American Iron and Steel Institute
- ANSI American National Standards Institute
- ASTM American Society for Testing and Materials
- AWS American Welding Society (U.S.A.)
- BOCA Building Officials & Code Administrators
- CE CODE Canadian Electric Code (CAN.)
- CSA-A660 Quality Certification for Steel Building Systems
- CSSBI Canadian Sheet Steel Building Institute
- CWB Canadian Welding Bureau (CAN.)
- FIPRECAN Fire Prevention Canada (CAN.)
- IBC International Building Code (U.S.A.)
- ICEA Insulated Cable Engineers Association
- IEEE Institute of Electrical and Electronics Engineers, Inc.
- ISO International Standards Organization
- MBMA Metal Building Manufacturers Association
- NBC National Building Code (CAN.)
- NEC National Electric Code
- NEMA National Electrical Manufacturers Association
- NFPA National Fire Protection Association
- OSHA Occupational Safety and Health Administration
- SSPC Steel Structures Painting Council

3.0 GENERAL DESCRIPTION

3.1 The *RuggedSpec Power Distribution Center* consists of a coordinated grouping of electrical distribution, power conversion, control, and supervisory equipment contained within an all-weather enclosure. The *RuggedSpec Power Distribution Center* is delivered to the customer's site as a pre-designed, factory assembled and tested unit.

3.2 The *RuggedSpec Power Distribution Center* is a factory fabricated metal enclosure with environmental control, and is specifically designed to house selected electrical equipment. Any type of electrical equipment may be installed in the *RuggedSpec Power Distribution Center*, including:

- Medium voltage switchgear
- Low voltage switchgear
- Variable Frequency Drive
- Medium voltage motor controllers
- Low voltage motor control centers
- Grounding resistors
- Distribution transformers
- PLC's
- Lighting and distribution panelboards
- Batteries and battery chargers
- Uninterruptible power supply (UPS) systems
- Control switchboards
- Supervisory control systems
- Annunciator and alarm panels
- Communication panels
- Instrumentation packages

3.3 The completed *RuggedSpec Power Distribution Center* shall be suitable for shipment to the customer's project site or other designated location. The *RuggedSpec Power Distribution Center* shall be designed and fabricated so the fieldwork at the installation site is minimized.

3.4 Construction of the *RuggedSpec Power Distribution Center* shall be performed in the highest manner of workmanship using only new and unused, top quality materials. The *RuggedSpec Power Distribution Center* shall be guaranteed against defects in materials and workmanship for one (1) year from the date of shipment.

4.0 DESIGN, CONSTRUCTION AND MATERIALS

4.1 GENERAL

4.1.1 The basic design and construction of the *RuggedSpec Power Distribution Center* shall be as described in the following paragraphs. The *RuggedSpec Power Distribution Center* dimensions and arrangement shall be as shown on Purchaser's drawing.

4.1.2 For seismic requirements the structure of the *RuggedSpec Power Distribution Center* shall be designed and constructed to safely support the seismic loads specified in International Building Code (USA) or National Building Code (CAN.). A structural analysis report prepared by a Professional Engineer will be supplied, when specified.

4.2 SERVICE CONDITIONS

The *RuggedSpec Power Distribution Center* shall perform satisfactorily when installed outdoors. Unless otherwise specified, the *RuggedSpec Power Distribution Center* shall be suitable for installation in a 40 Degree C (104 Degree F) maximum temperature, -10 Degree C (14 Degree F) minimum temperature, and at an elevation below 1000 meters (3300 feet).

4.3 BASE

4.3.1 The *RuggedSpec Power Distribution Center* base shall be all welded construction of ASTM A-50 (for primary) and A-36 (for secondary) structural steel members, sized and arranged for proper strength and durability, and shall be able to withstand the stress and loads which will result when lifting the completed factory fabricated *RuggedSpec Power Distribution Center*. The base structural members shall not interfere with or obstruct the areas designated for routing of power cables or control wiring.

4.3.2 Deflection during lifting shall not exceed L/240. Base shall be designed for mounting on concrete piers provided by Purchaser. Concrete slab, concrete curb, steel beams, crushed rock or dressed grade foundations are permissible if local soil conditions allow.

4.3.3 Base structure extensions without walls and roof, shall be supplied when required for supporting outdoor components such as transformers, heat exchangers, and reactors. Deflection of base extensions may exceed L/240.

4.3.4 The base shall have removable lift lugs to facilitate handling and installation. The normal lifting for transportation and installation shall be by means of a crane making a single point lift using suitable rigging.

4.3.5 The base shall have two (2) copper grounding pads located at diagonally opposite corners of the structure. The entire ground pads shall be mechanically bonded to the base steel and to a 4/0 AWG bare copper ground loop located under the floor plate. Each ground pad assembly shall include two 3/8”-16 UNC threaded brass studs to permit connection of a NEMA 2-hole cable lug.

4.4 FLOOR

4.4.1 The *RuggedSpec Power Distribution Center* floor shall be a minimum of 1/4-inch steel plate welded to the perimeter members and to the cross members of the base. The floor loading shall be rated not less than 250 pounds per square foot distributed load, or a 1300 pound concentrated load in a 2.5 square foot area located anywhere in the *RuggedSpec Power Distribution Center*.

4.4.2 When bottom access is required for electrical equipment, floor cutouts with gasketed removable 12 gauge steel cover plates shall be provided.

4.5 FRAME

4.5.1 The entire *RuggedSpec Power Distribution Center* shall be framed with 3" x 3" x 1/8"T square ASTM A500 structural grade steel tubing to provide moment resisting welded connections at base to walls, side walls to end walls, and walls to roof, so as to minimize overall deflection, twisting, and elastic instability during lifting and transporting.

4.5.2 All wall openings, such as doors, windows, etc., shall be similarly framed with 3-inch square steel tubing. All frame connections shall be welded.

4.6 WALLS

4.6.1 The height from floor to ceiling shall be 120 inches (10'-0"). The exterior and interior walls shall be 16 gauge paint quality galvannealed steel, and shall consist of formed interlocking vertical panels. The nominal thickness of the wall, including the required frame structure shall be 3". If specified higher interior walls can be provided.

4.6.2 Hinged doors shall be provided, if specified, in the walls to allow access to the rear of equipment mounted against the interior walls. Each rear access door shall be formed from 12-gauge steel, and will be sealed with a continuous neoprene gasket attached to the doorsill. Each access door will be secured using four bolts with captive nuts and will include a door prop, drip shield, and provisions for a padlock. If specified a 3-point latch with pad lockable handle can be provided.

4.6.3 The walls shall be designed to withstand wind loading of up to 125 miles per hour.

4.6.4 The walls shall be designed and assembled to allow for future lateral expansion of the *RuggedSpec Power Distribution Center*, if specified.

4.6.5 Interior walls, supporting panels, and structural, shall be designed so that interior loads of 400 pounds per linear foot of wall length may be attached to the wall without compromising the 125 MPH design wind loads.

4.6.6 Should damaged exterior wall panels need to be replaced, the tubular frame design will facilitate replacement without disrupting the integrity of the roof and adjoining wall panels or adjacent walls.

4.7 ROOF AND CEILING

4.7.1 The exterior roof shall be 12 gauge paint quality galvannealed steel panels with fully welded seams. The roof design load (dead load and live load) shall be rated 85 PSF for singlewide units and 45 PSF for doublewide units. The roof shall have a one directional slope with a 2-degree pitch and shall be designed to support interior or exterior equipment loads without compromising the roof load design.

4.7.2 Roof trusses shall consist of formed 12 gauge (up to 12 Ft. Wide) or 10 gauge steel sections. Trusses shall be sloped to provide a 2-degree pitch or .42" per foot and have a 1-1/2" upper and lower horizontal flange for attachment of equipment.

4.7.3 Doublewide units up to 60' long will have a free-standing roof and no vertical supports to support the roof ridgebeam.

4.7.4 The ceiling shall consist of formed 16 gauge paint quality galvannealed steel panels attached to the trusses. The ceiling assembly shall be designed to retain the insulation and to provide a smooth ceiling surface.

4.7.5 Two (2) louvered ventilation openings shall be provided, one at each end of the *RuggedSpec Power Distribution Center* roof structure, to prevent condensation in the attic space.

4.8 DOORS

4.8.1 The *RuggedSpec Power Distribution Center* shall have one (1) 36" by 84" personnel door, and one (1) 72" by 84" equipment double door. When specified, larger doors and/or removable wall sections above doors shall be provided to allow for future addition or removal of equipment.

4.8.2 All doors shall open outward and have a minimum swing of 105 degrees.

4.8.3 Doors shall be 18 gauge, double wall steel construction with R-15 thermal insulation, reinforced for closure and rim exit type panic hardware and hinge preps for three stainless steel 4" x 4" hinges per door. Doors shall have a fire rating of 1-1/2 hour class B.

4.8.4 All active entry/exit doors shall have a low profile rim exit device Russwin-Corbin, a knob outside trim with cylinder lock in the knob Russwin Corbin Global Knob, and a heavy duty reversible door closure with hold/open feature.

4.8.5 A drip shield shall be provided above each door and all wall openings.

4.8.6 Windows in doors shall be 10" x 10" safety glass, when required.

4.9 WEATHER PROOFING

4.9.1 All *RuggedSpec Power Distribution Center* joints shall be designed to minimize the loss of conditioned or pressurized air and to prevent entry of rain, sleet, snow or moisture.

4.9.2 All wall seams and areas where metal to metal contact is made shall be liberally caulked with a polyurethane based elastomeric adhesive/sealant. (Sika-Flex Brand)

4.9.3 All roof seams are completely welded.

4.10 INSULATION

Three- (3) inch fiberglass insulation providing R-13 value shall be provided in the roof and walls. Sagging of wall insulation shall be prevented with a minimum of two metal retainers fastened near the top. Equipment rear access doors and removable access panels can be insulated, if specified. Floor insulation shall be provided, if specified.

4.11 PAINT

4.11.1 Steel Structures Paint Council standards shall be followed in all preparation and application of coatings. The interior wall and ceiling panels shall be thoroughly cleaned, prepped, and finished with water base interior paint. Final coat thickness is 1.0 – 2.0 DFT.

4.11.2 The exterior wall and roof panels shall be thoroughly cleaned, and finished with a minimum of 3 - 5 mils of AZZ-Enclosure Systems standard two-component high solids acrylic urethane 3-5 mils dry, ANSI 70 light gray. Other colors can be provided, if specified.

4.11.3 The base exterior shall be sandblasted smooth to SSPC-SP6, free from scale and rust, and coated with two-component high solids epoxy primer 5 – 8 mils DFT to match the *RuggedSpec Power Distribution Center* exterior. The bottom of the base shall be coated with 8 mils (DFT) of fibered asphalt emulsion corrosion resistant for protection against the environment.

4.11.4 The floor shall be thoroughly cleaned, coated with a final coat of Aliphatic Gray #B65A16.

4.12 HVAC (Optional)

Heating, ventilating, and air conditioning (HVAC) equipment shall be sized and provided by AZZ-Enclosure Systems. HVAC equipment size shall be based on maintaining an interior temperature range of 60 - 80 degrees F, taking into consideration the heat load of present and future equipment and the site conditions. HVAC equipment shall consist of self contained wall mount units, complete with supply and return grilles, lockable circuit breaker or disconnect switch, manual thermostat, barometric fresh air damper, and a one-inch disposable air filter. The following controls shall be supplied: high-pressure controls, low-pressure control, low ambient control, compressor anti-cycle relay, and alarm relay. Condenser and evaporator coils shall be phenolic coated, when specified.

4.13 LIGHTING AND RECEPTACLES

4.13.1 Interior lighting shall consist of open type, 4 ft., 32 watt, T8, two tube industrial grade fluorescent fixtures that provide 50-foot candles of light at a level three feet above the floor. This lighting shall be controlled by a single pole or three-way switches located at each personnel door.

4.13.2 Exterior lighting, if specified, shall be provided above each personnel door. Exterior light fixtures shall be wall mounted 70W HPS suitable for use in wet locations and have automatic dusk to dawn photo control.

4.13.3 Emergency lighting, if specified, shall be a self-contained battery powered unit with two directionally adjustable illuminating heads. The unit shall switch on automatically upon loss of AC power and provide 1.5 hours of continuous illumination, and then recharge when AC power is resumed.

4.13.4 Duplex receptacles rated 120VAC, 20A, spec grade, shall be located near each door. Additional receptacles shall be provided as specified.

4.14 WIRING

4.14.1 A 4" x 4" metal wireway, with hinged cover shall be provided around the *RuggedSpec Power Distribution Center* perimeter at the junction of the walls and ceiling. This wireway shall contain all *RuggedSpec Power Distribution Center* facilities wiring.

4.14.2 All *RuggedSpec Power Distribution Center* lighting and power wiring shall be single conductor, stranded copper, with THHN/THWN 600V insulation with a minimum size of No. 12 AWG. Control, instrumentation, and alarm wiring shall be no smaller than No. 24 AWG. All wiring shall be installed in the 4" x 4" perimeter wireway, EMT conduit, or other approved raceway in accordance with the National Electric Code.

4.14.3 The ground bus of all electrical equipment within the *RuggedSpec Power Distribution Center* building shall be connected to the *RuggedSpec Power Distribution Center* 4/0 AWG, copper ground loop cable. The *RuggedSpec Power Distribution Center* ground cable shall be connected to the two- (2) grounding pads on the RuggedSpec Power Distribution Center base.

4.15 MISCELLANEOUS

Other requirements and special features may be provided. Typical additional requirements could be:

- Wall bulkheads with gasketed cover plates
- Windows
- Pressurizing system for hazardous locations
- Space heaters
- AC and/or DC panelboards
- Battery enclosures
- Convenience plumbing
- Control wiring termination cabinets
- Roof mounted accessories
- Outdoor welding receptacles
- Fire detection/suppression equipment
- Telephone equipment
- Cable tray
- Computer floor
- Generators
- Platforms and stairs

5.0 TESTING AND CHECKOUT

After the *RuggedSpec Power Distribution Center* is fabricated and the electrical equipment is installed, AZZ- Enclosure Systems will perform a wet spray test, an electrical inspection, and a quality inspection. Copies of completed test reports will be made available upon request.

6.0 SHIPMENT

6.1 The *RuggedSpec Power Distribution Center* building shall be shipped to the designated location after it has passed the tests and has been inspected for compliance to the specification.

6.2 When shipping sections are necessary, the open area of each section shall be sealed with plywood, 2 x 4's, and all seams caulked with silicone to provide adequate temporary bracing for the roof and wall structures to prevent damage during shipment.

6.3 Components that are not fastened to the *RuggedSpec Power Distribution Center* structure at time of shipment will be securely packed inside the *RuggedSpec Power Distribution Center* if possible. Each item will have an identifying tag and will be listed on a pro-forma packing list.

7.0 QUALITY

7.1 All *RuggedSpec Power Distribution Centers* will be ISO 9001-2008 certified and go through a rigorous in-line inspection, process as per ISO.

8.0 DOCUMENTATION

8.1 AZZ-Enclosure Systems will prepare engineering documents using the latest AUTOCAD and Microsoft WORD Version. Electronic copies of these documents are available on CD-ROM, or via e-mail upon request.

8.2 AZZ-Enclosure Systems shall submit for approval two copies of each of the following documents.

Outline-Plan View	(general arrangement, center of gravity, weight, floor opening size and locations)
Outline-Elevation	(general arrangement in elevation, recommended pier and tie down locations, wall opening sizes and locations)
Outline-Legend/Design Criteria	(design criteria, drawing legend, and bill of material)

8.3 After approval drawings are returned, AZZ-Enclosure Systems shall prepare structural fabrication detail drawings and electrical wiring drawings as required.

8.4 Professional Engineer stamped calculations and as-built drawings can be provided, if specified.