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| 1.0 | General |  |
|  | 1.1 | The intent of this specification is to have the manufacturer furnish the equipment and material specified herein complete and operable. |
|  | 1.2 | All standard accessories to the equipment specified shall be supplied even if not specifically mentioned in this specification. |
|  | 1.3 | Material used in the fabrication of the specified equipment shall be new, unused, and of the highest quality available. |
| 2.0 | Scope |  |
|  | 2.1 | Work Included |
|  |  | 2.1.1 Furnish assembly as detailed in Sections 3.0 through 12.0 of these specifications. Any drawings or data sheets attached to the inquiry shall be considered part of this specification. The equipment shall be complete and operable. |
|  |  | 2.1.2 Provide production tests and inspections as detailed in Section 13.0 of this specification. |
|  |  | 2.1.3 To reasonably prevent the possibility of shipping damage, the manufacturer shall prepare the equipment for transportation to the jobsite and monitor the load out of this material. |
|  |  | 2.1.4 It shall be the responsibility of the manufacturer to furnish all material, connections, splices, links, special tools, and information required to completely reassemble the PCR in the field or to facilitate the installation of the PCR when performed by an electrical contractor. |
|  |  | 2.1.5 Guarantee the performance of the Power Control Room during a reasonable warranty period. This warranty shall, at a minimum, cover the equipment for eighteen (18) months from time of shipment or twelve (12) months from date of energization whichever occurs first.2.1.6 Manufacturer shall provide a device to monitor temperature humidity and shock/vibration monitor during transportation and storage of the Power Control Room. Readings are available to customer access and to manufacturer for warranty |
|  |  | 2.1.7 Supply all drawings, documentation, and information detailed in Section 14.0. |
|  | 2.2 | Optional Field WorkThe PCR manufacturer must provide an option to perform the following work: |
|  | * + 1. Field installation of equipment enclosure.
			1. The manufacturer will be required to provide labor to install the equipment enclosure. Field installation shall include
				1. Inspection of the PCR section(s) upon arrival with emphasis towards shipping damage or unusual movement of equipment within the building sections during the shipping process.
				2. Provide advisory and check compliance with Manufacturer’s provided Power Control Room installation and reassembly instruction.
				3. Grounding of the PCR
				4. Mechanical reconnection of PCR sections
				5. Electrical reconnections of PCR interconnects
				6. Installation of Ship Loose items (excluding any ironwork, i.e. stairs and landings)
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| 2.2.2 Site Acceptance Testing and Start-up of the equipment 2.2.2.1 The manufacturer will be required to provide an option to perform Site Acceptance Testing (SAT) and Start-up support of the equipment. SAT and Start-up shall include;* Equipment Manufacturer’s field service representative(s) shall test the electrical distribution equipment in accordance with equipment instructions and industry standards.
* Provide field service technician(s) for testing labor
* Testing definitions:
	+ Baseline Testing: Component testing prior to applying control power (temporary or permanent)
	+ Functional Testing: Component testing following the application of control power (temporary or permanent)
* Provide complete test plan and testing sheets for all required tests.
* Provide complete testing report following Site Acceptance Test(s)

2.2.3 Field Items that are not included or will be the responsibility of others, unless specifically stated; 2.2.3.1 Connection of incoming cables or bus. |
|  2.2.3.2 Connection of outgoing cables or bus. |
|  2.2.3.3 Connection of external control cables, wiring, or grounding. |
|  2.2.3.4 Design and construction of foundation piers or slabs and anchoring. 2.2.3.5 Crane(s), Rigging, rigging personnel, man lifts, fork lifts, and lift plan 2.2.3.6 Installation of Batteries into the racks and electrical connections of the batteries. |
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1. Applicable Codes and Standards
	1. The applicable codes and standards listed below should be considered as part of this specification. The latest revision or edition enforced by the local authority having jurisdiction in effect at time of inquiry shall apply for all standards referenced.
		1. American Society of Civil Engineers (ASCE)
		2. National Electric Code (NEC)
		3. NFPA (National Fire Protection Association)
		4. American National Standards Institute, Inc. (ANSI) – applicable sections
		5. American Society for Testing and Materials (ASTM) – applicable sections
		6. American Welding Society (AWS)
		7. American Iron and Steel Institute (AISI)
		8. American Society of Steel Construction (AISC)
		9. Occupational Safety and Health Administration (OSHA) – applicable sections
		10. International Code Council (ICC), including IBC, IMC, IFC, IECC
		11. Nationally Recognized Testing Laboratory (NRTL)– applicable to building components
	2. It shall be the manufacturer's responsibility to be knowledgeable of these standards and codes.
	3. **Specifically for US installations**
		1. **As a minimum the Power Control Room design should meet, or exceed the requirements of all state or local adopted codes and associated amendments.**
		2. **Where required by state law, the manufacturer of the PCR must be duly licensed, registered, and, or certified with the all applicable state agencies or delegated agents.**
		3. **Where required by state law, all calculations and drawings shall be sealed by a Professional Engineer or Architect registered in the state where the PCR will be installed.**
		4. **Where required by the state law, the plans and calculation must be reviewed and approved by a licensed or recognized Drawing Review Agency and the unit must be inspected by an independent third party inspection firm recognized and approved by the state.**
		5. **Where required by state law, the appropriate insignia or decal shall be permanently affixed to the structure before shipment from the manufacturing facility.**
2. Service and Environmental Conditions
	1. Unless otherwise specified this equipment is intended for use in ambient temperatures that do not exceed a maximum of 40°C (104°F) or a minimum of -30°C (-22°F).
3. Basic Construction
	1. The equipment supplied shall be of metal construction and shall be self-supporting and free standing. All metal work shall be free from burrs and sharp edges. Elements may be connected by bolts, thread forming screws, or welds.
	2. The equipment shall be suitable for industrial or utility service.
	3. The PCR base shall be constructed of structural members sized by design structural calculations and reinforced to meet or exceed specified static and dynamic loads. Structural members shall be located to coordinate with the enclosed equipment so as to properly support it and allow maximum access to equipment floor openings for cable penetration.
	4. The base shall be designed with base lifting lugs capable of lifting the fully equipped structure at the specified lifting points with deflection not to exceed L/240.
	5. The steel floor plate shall be ¼” steel stitch welded to the structural base assembly.
	6. The installed structure shall be capable of supporting a minimum open floor loading of 150 pounds per square foot.
	7. Structure walls shall consist at a minimum of a formed, interlocked, self-framing outer wall of 18 gauge minimum galvanized steel and an inner wall of 16 gauge galvanized steel.
	8. Structure walls shall be insulated between the inner and outer walls as required by building and energy conservation code specifications at project location, or as specified on the data sheets if no local codes apply.
	9. Structure walls shall be able to withstand a wind loading as specified on the data sheets.
	10. The ceiling and roof structure shall consist of two layers of formed interlocked panels, 18 gauge minimum galvanized steel roof and an inner ceiling panel of 18 gauge minimum galvanized steel.
	11. The ceiling and roof structure shall be insulated as required by building and energy conservation code specifications at project location, or as specified on the data sheets if no local codes apply.
	12. The roof shall be able to withstand a minimum live load of 20 pounds per square foot, as specified in the IBC.
	13. It shall be the manufacturer's responsibility to coordinate all necessary alignment and interconnection between component sections. The entire assembly, to include installed equipment, must be electrically and mechanically assembled into one single building prior to final factory inspection and shipment.
	14. Two-story applications shall be constructed with each floor as a complete PCR design.
	15. The PCR must be shipped complete, without missing components or "ship shorts". Purchaser may waive this requirement upon request prior to shipment.
4. Doors
	1. The minimum number and the location of doors in the PCR is determined to comply with NEC and NFPA required egress specifications.
	2. A minimum of two doors, located at opposite ends of the PCR, are typically required. Additional doors can be provided as specified on the drawings
		1. One equipment door measuring 4' by 8' shall be provided to allow for equipment entry and removal.
		2. A minimum of one personnel door measuring 3' by 7' shall be provided to allow for personnel entry and exit.
		3. Personnel and equipment doors shall have a 12” by 12” safety glass window. For double pane doors, the window shall be located in the operable pane of the door.
		4. For small protected aisle applications only one door may be furnished, subject to code requirements for egress.
	3. Access doors will be provided for any installed equipment and future planned spaces to allow for rear access to the installed switchgear.
		1. Equipment access doors shall be sized to match the installed equipment.
		2. Equipment access doors shall be hinged and have the ability to be padlocked for restricted entry.
		3. Equipment doors shall have a gasket to provide a weather seal.
		4. When providing rear access to arc-resistant switchgear from the outside, equipment access doors shall be of vault style with arc resistant properties. Vault doors shall be integrated into PCR and be the only door for access to switchgear rear compartments. A door handle shall be used for opening doors, bolted doors or panels are prohibited.
5. Grounding
	1. A minimum of two external ground pads shall be bonded to the base assembly to serve as an equipment ground connection point to a grounding grid.
	2. As a minimum, each piece of installed equipment will be bonded with a ground wire to the base assembly in order to provide a continuous ground path.
	3. Optionally, a continuous bare copper ground bus (loop) around the interior perimeter of the PCR shall be installed. Where installed, a ground bus loop shall be mounted approximately 1-2’ below ceiling height.
6. Environmental
	1. The PCR shall be cooled and/or heated with air conditioning equipment sized to meet the temperature and/or humidity conditions as specified in the data sheets. Customer shall be responsible for determining the required temperature limits and providing the ambient conditions for the jobsite.
	2. Air conditioning units may be wall, roof, or pad mounted depending on size and physical limits.
	3. Redundancy, or automatic cycling of air conditioning equipment can be provided if specified on the data sheets. Oversizing can be provided only within the limitations of the applicable energy codes, where they are enforced.
	4. Air filtration from dust, or chemical filtration of other contaminates can be provided if specified on the data sheets.
	5. Slight positive pressure of the PCR can be provided, if specified on the datasheet.
	6. Optional positive pressurizing of the PCR per NFPA 496 can be provided for explosive areas if specified on the data sheets.
	7. Stairs and landings shall be provided as a bolt on erector set, fully finished, shipped directly to the jobsite for quick assembly. Stairs and landings shall comply with applicable standards and codes, including the latest OSHA provisions.
	8. Provisions for the bolted connection of stairs and landings shall be provided on the PCR base. Connections of landing to the PCR base is for lateral bracing only.
7. Mechanical
	1. Cable tray shall be installed to facilitate external and internal connections per drawings.
	2. Internal partition walls shall be installed as requested so as to provide separation of battery rooms, personnel, or other equipment. Where required by the code, battery room partition walls shall have a 1-hr fire rated construction tested or listed according to UL263 / ASTM E119.
	3. Removable lifting lugs shall be shipped with the PCR for off-loading purposes (see Section 5.4).
	4. Electrical equipment shall be installed within the PCR as specified. The equipment shall be electrically and mechanically functional after installation.
	5. Sufficient aisle space shall be provided to withdraw removable elements and otherwise properly maintain and service the equipment, or to meet the NEC requirements, whichever is greater
	6. Electrical
	7. Each Power Control Room shall have a power panel for enclosure services.
	8. If enclosure services power is not provided from an external source, a transformer shall be provided capable of providing needed power for lighting and environmental equipment.
	9. Cabling and wiring interconnection of all factory-installed equipment shall be the responsibility of the manufacturer unless otherwise specified in drawings and/or contractual documentation.
	10. Third party manufactured equipment supplied and factory-installed by the PCR manufacturer will be tested at its place of manufacture and test reports provided.
	11. Third party manufactured equipment supplied by the PCR Manufacturer and customer furnished equipment will not be functionally tested inside the PCR.
8. Safety Systems
	1. Smoke detectors shall be provided throughout the PCR.
	2. Battery room smoke detection system shall comply with applicable building code requirements.
	3. Optional strobe lights can be provided.
	4. Optional addressable fire alarm system can be provided.
	5. Optional fire suppression systems can be provided
	6. Optional fire extinguishers can be provided at each exit door. Fire extinguishers are carbon dioxide Type C for energized electrical equipment, 10-lb (4.54-kg) capacity, hand-carry, with hanging bracket, hose, hose nozzle, and hand-squeeze valve control.
9. Finish of Walls, Ceiling, and Roof
	1. Coating process shall be either:
		* Powder Coat with an electrostatically applied polyester powder with a final baked on average thickness between 2.0 and 4.0 mils.
		* Factory applied SMP (Silicon Modified Polyester) paint

Standard finish shall be white.

* 1. Finish shall have a minimum pencil hardness of 2H as tested per ASTM D3363.
	2. Finish shall pass the ASTM B117 salt spray test for a minimum of 1000 hours.
	3. Test reports for compliance with 12.3 and 12.4 shall be available upon request.
1. Finish of Structural Base and Upper Structure Steel Frames
	1. Base assembly shall be grit blasted prior to finishing through Commercial Blast Standard SSPC-6 as published by AISC.
	2. Upper structure steel frames such as portal frames, backbones and split frames shall be grit blasted prior to finishing through Commercial Blast Standard SSPC-6.
	3. A coat shall be applied to the entire base and structural frames using an industrial grade, high solid, and high build epoxy. This coat shall be a minimum of 4 mils DFT.
	4. All structural elements including channels and angles shall be caulked or foamed to seal gaps and spaces.
	5. An additional 4 mil DFT undercoat shall be applied to the bottom of the base assembly.
	6. The sides of the base assembly shall be finished using polyurethane paint to a minimum thickness of 2 mils DFT.
2. Inspection and Testing
	1. Component bill of material shall be checked for proper quantity, description, and part number.
	2. Physical dimensions shall be checked against approved drawings.
	3. All equipment enclosed in the PCR shall be functionally tested by the equipment manufacturer at its place of manufacture in accordance with applicable standards and specifications.
	4. Interconnect wiring to/from factory installed equipment shell be verified and tested, unless specifically excluded.
	5. The PCR Manufacturer shall have in place a system of recording, correcting, and verifying resolution of discrepancies discovered during the inspection and testing process. The PCR manufacturer shall be ISO 9001 certified.
	6. Certified production test reports indicating satisfactory completion of all inspection and test procedures shall be available upon request.
	7. Upon request the equipment shall be made available for customer inspection prior to shipment.
3. Documentation
	1. Drawings
		1. Prior to fabrication, the following drawings shall be submitted by the manufacturer for approval.
			1. Specification Sheet
			2. Internal equipment layout diagram.
			3. External elevation views.
			4. Base plan including mounting details, cable entry area, and door swing requirements.
			5. Enclosure services electrical diagram.
			6. Component bill of material indicating quantity, description, and part number.
			7. Detailed electrical interconnection diagram for all equipment installed within the PCR.
			8. Cable tray layout.
		2. Diagrams shall be based upon data sheets, interconnection documents, and system design requirements attached to this specification.
		3. After the return of approval drawings or after any change made to previously approved drawings, the manufacturer shall submit a record copy of any and all drawings that contained revisions.
		4. After completion of the inspection and testing procedures the manufacturer shall submit a complete set of “as built” drawings. These drawings shall function as a record of the final construction of the equipment at the time it left the factory.
		5. Drawings may be provided in any of the following forms as requested by the customer:
			1. Digital files in the latest version of Autodesk AutoCAD.
			2. Digital file format may be dwf, pdf, dgn, or dwg as specified.
		6. Each drawing prepared by manufacturer shall show, at a minimum, the name, jobsite location, purchase order or contract number, and equipment identification number in addition to any information required by manufacturer.
	2. Operating and Maintenance Manuals
		1. At time of shipment, the manufacturer shall provide an electronic copy of the operating and maintenance instructions for all major components contained in the PCR assembly. This does not include equipment provided “free issue” by the customer for installation within the equipment enclosure.
		2. Manuals shall contain a table of contents to allow for easy reference and be a text searchable documents.
		3. Instruction Bulletins and manuals may be provided in electronic form (Adobe pdf format).
	3. Spare Parts List
		1. Upon completion of the engineering phase, a quotation for one (1) year’s recommended spare parts shall be submitted.

For assistance regarding these specifications or with support questions, please contact Powell directly:

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