



**STANDARD SPECIFICATION
FOR
PACKAGED CONTROL ROOMS
HD-TYPE A**

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TABLE OF CONTENTS

<u>SECTION</u>	<u>INFORMATION</u>	<u>PAGE</u>
1.0	Overview	3
2.0	Description	3
3.0	Standards	3
4.0	PCR Application	4
5.0	Design Criteria	4-6
6.0	Weather Proofing	6-7
7.0	Preparation for Painting	7
8.0	Painting	7-8
9.0	Heating, Ventilation, and Air Conditioning	8
10.0	Lighting and Receptacles	8
11.0	Wiring	9
12.0	Quality Program	9-10
13.0	Documentation	10-11
14.0	Shipment	11

1.0 Overview

The Packaged Control Room (PCR) is a factory fabricated and assembled module designed to house and environmentally protect electrical controls or equipment as specified by the user. It is a portable structure, totally self-supporting from the base and can be mounted directly to framework, piers, pads, or foundations with all equipment installed. The PCR is transported to the job site by common carrier and designed to be off loaded with user-supplied crane.

2.0 Description

This specification is for the Koontz-Wagner HD-Type A (Heavy-Duty Type A) Packaged Control Room. The HD-Type A Packaged Control Room is a self-framing structure utilizing a Koontz-Wagner designed and factory formed interlocking wall and roof panel system. Assembled, these paintable, galvanized panels create a rigid, self-supporting, self-framing structure offering a smooth wall exterior appearance. This is an economical construction, and offers the advantage of varying the gauge of the exterior wall panels to meet special conditions. Our control room construction has been tested and certified to meet all applicable requirements of NEMA 3R, ANSI C37.20.2, and IEC-IP 54, IP55.

3.0 Standards

The design, materials, manufacturing, testing and performance of the Packaged Control Room shall meet the requirements of the applicable sections of the latest revisions of the standards listed below:

- NEMA - National Electrical Manufacturers Association
- ANSI - American National Standards Institute
- AISC - American Institute of Steel Construction
- NEC - National Electrical Code
- IBC - International Building Code
- NFPA - National Fire Protection Association
- SSPC - Steel Structures Painting Council
- OSHA - Occupational Safety and Health Administration
- AISI - American Iron and Steel Institute
- ASTM - American Society for Testing and Materials
- ICEA - Insulated Cable Engineers Association
- UBC - Uniform Building Code
- BOCA - Building Officials and Code Administrators
- IEEE - Institute of Electrical and Electronics Engineers, Inc.
- AWS - D1.1 - Structural Welding Code - Steel
- AWS - D1.2 - Structural Welding Code - Aluminum
- AWS - D1.3 - Structural Welding Code - Sheet Steel
- IEC - 60529 Degrees of Protection Provided by Enclosures (IP54 & IP55)

4.0 PCR Application

The Packaged Control Room is designed and fabricated to the customer's engineering specifications, and to the physical requirements of the control system and installed equipment. Typical installed equipment might be:

- Protective Relay Panels
- Medium and Low Voltage Switchgear
- Power Controllers
- Motor Isolation Contactors
- Motor Control Centers
- Motor Drives
- Transfer Switches
- Interface Controllers
- Distribution Panels
- Air Conditioning Equipment
- Computer Equipment
- Motor/Generator and Frequency Conversion Systems
- Industrial Control Panels

5.0 Design Criteria

The design elements and construction details of the HD-Type A Packaged Control Room are separated into major component parts and individually addressed as follows:

5.1 Base

- 5.1.1. The base of the HD-Type A Packaged Control Room is an all welded construction utilizing structural shapes and beams to provide a minimum floor loading of 150 lbs/sq. ft. Base members will be chosen and arranged to provide the necessary structural integrity, and to receive any floor mounted equipment.

All structural steel is certified to ASTM 36 standards, and all welding to ANSI/AWS procedures.

- 5.1.2. The base is supplied with an 18 ga. galvanized steel liner welded to and covering the entire bottom of the base. This serves not only as a barrier from rodents, but also holds the base insulation in place and forms the bottom of the internal base wireways. This feature also provides for convenient penetration into the PCR for external cables and wiring. The entire base is considered a wireway because all points throughout the structure are accessible from the sub-floor wireway system.

5.1 Base (continued)

- 5.1.3. The base is constructed to minimize deflection during transport and off loading through placement on purchaser's level foundation, piers or pad.
- 5.1.4. The base can be provided with holes, slots, couplings, bushings, or gasketed cover plates around the perimeter or through the bottom liner to facilitate cable entry in the field.
- 5.1.5. The base is designed for lifting the completed structure with all equipment installed at only the lifting lug locations as provided by Koontz-Wagner. A minimum of four lifting lugs are provided to facilitate lifting the PCR by crane.

5.2 Floor

- 5.2.1. The floor of the PCR is minimum 1/4 inch thick flat steel. Floor plates are normally removable, but can be welded in place if access to the sub-floor is not required.

When removable, sections are securely held in place with countersunk 1/4-20 stainless steel screws. Other floor coverings are available.

- 5.2.2. When equipment is installed in the Packaged Control Room, the floor plate is arranged around the equipment. This allows unrestricted access to the sub-floor wireway through the bottom of the equipment for ease of interwiring.

5.3 Exterior Walls and Roof

- 5.3.1 Exterior wall and roof panels are manufactured from a minimum 18-ga. paintable, galvanized sheet steel formed as interlocking panels in 16-inch width. During assembly, panels are fastened to the base and each other using zinc plated self tapping screws. This process creates a rigid, self-supporting, self-framing structure with a 3-inch wall thickness. After painting, all seams are caulked. Roof panels are assembled with the interlocking rib facing up. The standard roof pitch is 2 degrees to retard standing water. Standard design wind loading is 125-mph maximum and roof loading is 40-psf minimum live load up to 11.5' wide.
- 5.3.2 Exterior metal gauges and/or panel widths can be changed as required to accommodate heavier wind or roof loadings, or to accommodate structure placement in high seismic or severe duty locations.

5.4 Interior Walls and Ceiling

- 5.4.1. Interior wall panels are manufactured from flat, 18-gauge galvanized sheet steel and are riveted or screwed to the interior rib of the exterior wall panels.

5.4 Interior Walls and Ceiling (continued)

- 5.4.2. Interior ceiling panels are formed from 18 ga. galvanized steel to 14-inch, U-shaped panels, and are fastened together using self tapping screws. A perimeter ceiling tray, which is fastened to the interior wall panels, supports the ceiling panels. The ceiling panels provide the necessary cavity to accept the roof insulation.
- 5.4.3. If required, the roof/ceiling system will be designed to support special loads such as overhead cable trays, duct work, or suspended ceilings.

5.5 Doors

- 5.5.1. Standard man door size is 3'0" x 7'0". Doors are insulated, double-walled, 16-gauge steel and fastened to an all-welded steel frame. Man doors are equipped with lockable, panic-type hardware and automatic door closures. Door hardware and hinges are corrosion resistant.
- 5.5.2. For taller or wider PCR access, optional single doors can be provided to 108" high and 48" wide. Standard double doors can be provided to 84" high by 72" wide.
- 5.5.3. Exterior equipment access doors are sized as required and fabricated from minimum 12-gauge steel. Rigid foam insulation board is applied to the interior surfaces, where practical.
- 5.5.4. A drip shield is included above all doors.

5.6 Insulation

- 5.6.1. Exterior walls and roof to be insulated with fiberglass thermal batt insulation or equivalent of sufficient quantity to yield a minimum thermal resistance rating of R-11.
- 5.6.2. When required, the base is insulated with thermal fiberglass batts applied against the lower liner. Minimum insulation value is R-11.

6.0 Weather Proofing

- 6.0.1. Exterior joints are designed to minimize or eliminate loss of the conditioned environment from within the Packaged Control Room. The PCR design has been tested and certified to be in accordance with IEEE Std C37.20.2-1993 Sub-Clause 5.2.9 (test report available).
- 6.0.2. All seams and areas of possible moisture penetration are liberally caulked with polyurethane caulking or equivalent.

6.0 Weather Proofing (continued)

- 6.0.3. All openings into the PCR are properly flashed, caulked, and provided with other weather protection as applicable.
- 6.0.4. Door jambs are provided with adjustable gasketing material around the interior of the door frame to ensure proper sealing of the doors.
- 6.0.5. Door thresholds are provided with flexible gaskets for weather protection at the bottom of the door.

7.0 Preparation for Painting

- 7.0.1. The perimeter C-channel and structural I-beams that constitute the base are sandblasted to SSPCF.SP6 standard to remove all traces of mill scale and surface corrosion and to provide a suitable anchor for paint. This is performed prior to assembling and welding of said members to construct the final base. Weld spatter and excess wire is removed and corners and wedges are rounded and smoothed as required. The base weldment is then thoroughly cleaned and iron phosphate treated using a combination of high pressure spray (1100-psi) and hot water (140-180 ° F) with metered chemical release. After drying, surfaces are prime coated within 24 hours with no tampering of treated surfaces allowed.
- 7.0.2. All manufactured interior and exterior wall, roof, and trim pieces are inspected for proper tolerances. Edges are trimmed, rounded and smoothed as applicable. All sheet steel panels are either dry wiped or solvent cleaned as necessary prior to painting.
- 7.0.3. Expose surfaces of other structural members such as tube framing are dry wiped or solvent clean as necessary prior to painting.

8.0 Painting

- 8.0.1. Base Weldment Painting – 4 - 7 mils minimum dry film thickness of (2) part high build epoxy primer is used for the prime coat. Exterior of base is then finish coated with 2 - 3 mils minimum dry film thickness of (2) part Acrylic Urethane paint. Standard color is ANSI 70 or special color custom mixed to match customer supplied paint chip.
- 8.0.2. Exterior Walls and Roof – Panels are primed with 4 - 6 mils minimum dry film thickness of (2) part epoxy primer, and finish coated with 2 - 3 mils minimum dry film thickness of (2) part Acrylic Urethane. Standard color is ANSI 70 or special color custom mixed to match customer supplied paint chip.
- 8.0.3. Interior Walls and Ceiling – Walls are coated with 2 ½ - 3 mils minimum dry film thickness of (2) part epoxy primer/ finish coat. Standard color is white.

8.0 Painting (continued)

8.0.4. Doors and Jambs – Doors and door jambs are purchased primed by the door manufacturer, then finish coated to match interior and exterior paint thicknesses and colors using applicable coating systems.

8.0.5. Floor Plate – Floor plate is inspected and power washed to remove all traces of corrosion and mill scale, then primed with 4 - 7 mils minimum dry film thickness of (2) part high build epoxy primer. A coat of enamel non-skid paint is applied after electrical work is completed.

8.0.6. Standard Paint Systems –

Prime Coat: Pittsburg Paints Aquapon High Build Semi-Gloss Polyamide epoxy 97-130 series or the Pitt-Guard Rapid Coat Epoxy Mastic 95-245 series @ 4 to 7 DFT.

Finish Coat: Pittsburg Paints Pitthane Ultra acrylic-aliphatic urethane 95-812 series.

9.0 Heating, Ventilation, and Air Conditioning

9.0.1 Air Conditioning – Packaged Control Rooms are normally supplied with wall mount type HVAC systems. HVACs are sized and located according to site conditions, heat load and dimensional envelope requirements as defined by the customer.

When outside air is introduced into the PCR through the air conditioning system, the air is filtered via internal filters incorporated in the standard air conditioning unit.

10.0 Lighting and Receptacles

10.0.1 Lighting – The Packaged Control Rooms are supplied with twin, 48” tube, 40 watt fluorescent fixtures with protective lenses. Illumination will be a minimum of 30 foot candles measured 3 feet above the floor. Lights will be placed as close as practical to the center of each aisle way. Switches located inside and next to each man door will operate interior lighting.

10.0.2 Emergency Lighting – Packaged Control Rooms can be supplied with self-contained battery back-up emergency lights, normally mounted near each man door.

10.0.3 Convenience Receptacles – A convenience outlet is located beside each man-door. An additional outlet is provided as wall space allows or per customer specification. Outlets are grounding-type, specification grade, and rated 120 volt 20 amp.

11.0 Wiring

- 11.0.1 Wiring will be run in surface mounted EMT conduit or in the sub floor raceway. 120 volt PCR lighting and receptacle circuits are grounded and wired with 12 AWG stranded copper wire sized to National Electrical Code (NEC) standards.
- 11.0.2 Lighting and distribution panel boards are provided to supply power and branch circuit protection that is sized according to load. Panels are wall surface mounted with means provided for customer connection.
- 11.0.3 The Packaged Control Room main ground will be a 4/0 bare copper cable located in the PCR base. This cable will run the length of the PCR and will be attached to (2) stainless steel ground pads welded to the base at two locations, normally at each end of the PCR at opposite corners. Individual equipment grounds are #2 bare copper pigtails cadwelded to the main ground loop.

12.0 Quality Program

The purpose of the quality program is to ensure that our customers receive the highest quality product available anywhere. Our quality assurance program is compliant to the ISO 9001-2008 Standard. Our Quality Operating System (QOS) is available for review upon request.

- 12.0.1 Prior to construction, a quality plan is created for each PCR which identifies unique and critical features to be addressed by the factory floor. Inspection and test requirements are listed in the quality plan and are based on customer specs/drawings along with Koontz-Wagner internal requirements.

12.0 Quality Program (continued)

12.0.2 In-process inspections are performed at various stages of construction and results of inspections are recorded. Inspections include but are not limited to the following:

- Continuity test of all electrical control and power wiring
- Verify all lighting, receptacles and low voltage circuits are properly connected and functioning
- Check lighting and distribution panels for appropriate identification and marking
- Check all Koontz-Wagner purchased equipment for assembly, function, and operation.
- Assemble and functionally test HVAC

12.0.3 A final inspection is performed to ensure all requirements of the quality plan have been fulfilled.

12.0.4 The quality plan, which includes inspection/test reports, is provided upon request.

13.0 Documentation

13.0.1 A typical documentation package for a Packaged Control Room system with equipment installed would consist of the following:

Structural outline drawings
Equipment location and layout
Material lists
Installation and maintenance manuals
Utility wiring

13.0.2 Drawing Approval

A timely drawing approval process is essential to maintain fabrication and final delivery schedules. The following typifies the procedures:

- 1) After receiving an order, structural drawings, equipment layout drawings, and bills of material are prepared and submitted to the customer for approval. Time span: 3-4 weeks.
- 2) Customer reviews drawings and returns with mark-ups and comments. Time span: 1-2 weeks

13.0 Documentation (continued)

13.0.3 Final Submittal

- 3) As built drawings, and installation and maintenance manuals are prepared and issued at the time of shipment. Fabrication can normally begin in this period prior to customer return.

14.0 Shipment

14.0.1 The Packaged Control Room will be shipped to the jobsite or designated location after it has passed all Koontz-Wagner tests, and the customer or his agent has inspected and released the PCR for shipment.

14.0.2 Most Packaged Control Rooms are shipped by overland motor carrier with consideration and precautions taken to protect the equipment from vibration and stresses inherent in transportation.

14.0.3 If the Packaged Control Room is to be shipped in more than one piece, openings are rigidly braced and protected by wood or steel. All loose, fragile, or easily removed items are identified, protected, and fastened to the floor of the PCR prior to shipment.

14.0.4 For lifting the completed PCR into place, removable lifting lugs and hardware for attachment to the PCR are shipped with the PCR.