

Concrete Requirements

1 Scope

This specification outlines the minimum material requirements for concrete equipment bases and enclosures to be used in conjunction with PacifiCorp owned primary-rated equipment. The specification applies whether the equipment base or enclosure is to be installed by company personnel, contractors, customer, or the supplier.

2 Applicable Documents

The latest revisions of the documents listed below, in effect on the date of invitation to bid, apply to the extent specified herein.

2.1 PacifiCorp Documents

- ZG 301, *General Equipment Base and Enclosure Requirements*
- ZG 501, *Padvault — Single-Phase Residential 48" x 48"*
- ZG 506, *Padvault — Large Single-Phase Residential Lid*
- ZG 521, *Padvault — Three-Phase Transformer*
- ZG 531, *Padvault — Three-Phase Sectionalizing Cabinet*
- ZG 532, *Flat Pad — Three-Phase Transformer*
- ZG 541, *Padvault — Single-Phase Fusing Cabinet Lid*
- ZG 551, *Padvault — Three-Phase Fusing Cabinet*
- ZG 562, *Padvault — 15, 25 and 35 kV, 600-Amp, Dead-Front Switchgear*
- ZG 571, *Padvault — Metering Cabinet Lid*
- ZG 616, *Padvault — 4-Foot by 6-Foot (48" x 72")*
- ZG 621, *Padvault — 5-Foot by 7-Foot (56" x 84"), for Three-Phase Transformers, Sectionalizing Cabinets and Metering*
- ZG 622, *Padvault — 7-Foot by 9-Foot (84" x 108"), for Three-Phase, 15 kV Padmounted Switchgear*
- ZG 631, *Manhole — 6-Foot by 6-Foot (72" x 72")*
- ZG 641, *Vault — Shallow, 7-Foot by 7-Foot (84" x 84")*
- ZG 701, *Manhole — 7-Foot by 12-Foot (94" x 155")*
- ZG 711, *Vault — Shallow, 7-Foot by 12-Foot (94" x 155")*
- ZG 715, *Sleeve—15, 25 and 35 kV, 600-Amp, Dead-front Switchgear, Padvault*
- ZG 811, *Full-Traffic Cover and Frame Assembly*
- ZG 821, *Incidental-Traffic Cover For Padvaults*

2.2 Codes and Standards

Western Underground Committee Guide 2.13, *Security for Padmounted Equipment Enclosures*

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Concrete Requirements



16 Dec 11

ZG 311
Page 1 of 6

ZG 311

Western Underground Committee Guide 2.15, *Flat Single Phase Transformer Pads*
ANSI/SCTE 77, 2007, (Greater side wall strength may be specified for some projects.)
ASTM A 615, *Grade 60 Carbon–Steel Bars for Concrete Reinforcement*
ACI 211, *Standard Practice for Selecting Proportions for Normal Heavyweight and Mass Concrete*
ACI 212, *Chemical Admixtures for Concrete*
ACI 237, *Self-Consolidating Concrete*
ACI 304, *Guide for Measuring, Mixing and Placing Concrete*
ACI 305, *Hot Weather Concreting*
ACI 306, *Cold Weather Concreting*
ACI 347, *Guide to Formwork for Concrete*
American Welding Society D12.1, *Recommended Practices for Welding Reinforcing Steel Metal Inserts and Connections in Reinforced Concrete Construction*

3 General

3.1 Application Information

This specification states material and construction requirements which are applicable only to all concrete equipment bases or enclosures.

3.2 Authorized Material Specification

This material specification shall not be considered valid until each page contains the approval signature or initials of the persons named in the title blocks.

4 Design and Manufacturing Requirements

The purpose of a concrete equipment base is to support the weight of primary-rated padmount equipment. Enclosure are used to contain primary rated equipment below grade or provide an area for cable pulling or splicing.

4.1 Concrete Materials

Cement used shall be a standard brand of Portland cement, Type II or III conforming to ASTM C–150, latest edition. Aggregates shall consist of natural sands and gravels, crushed rock, crushed slag, or other inert materials having clean, uncoated grains of strong durable material which conforms to ASTM C–33 and ACI 318–89.

Concrete strength at twenty-eight days shall be at least 4000 lbs. per square inch.

4.2 Forms

Forms may be of wood or metal selected to produce a smooth surface finish They shall be constructed sufficiently tight to prevent leakage of concrete, and securely braced and



Concrete Requirements

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ZG 311
Page 2 of 6

16 Dec 11

shored to prevent displacement and safely support construction loads. Forms shall be removed in a manner and at a time which will ensure the complete safety of the structure.

4.3 Cold Weather Requirements

When the ambient air temperature is below forty degrees Fahrenheit, concrete shall be at least sixty (60) degrees Fahrenheit when poured, and shall be maintained at least a minimum of fifty (50) degrees Fahrenheit for seventy-two (72) hours. All forms shall be frost free.

4.4 Surfaces

The finished surface shall be flat and free of aggregate pockets and honey-comb. Where minor defects occur, they shall be painted with cement grout, patched with a one-to-one cement / sand mixture, and finished to match adjacent surfaces while the concrete is still green.

4.5 Curing

All concrete shall be cured for not less than seven (7) days by keeping the surface wet by sprinkling. Membrane compound may be used in lieu of water curing. The component parts must be poured at least seven (7) days prior to shipment to stores or installation at the site, as required in individual equipment base and enclosure specifications.

4.6 Air Entrainment

Approved air entraining agents shall be used to provide an air content at 6 %, + or - 1.5%.

4.7 Reinforcement

The supplier shall determine the proper placement of steel reinforcement to ensure compliance with strength requirements. Reinforcement shall consist of 4 4 - 6/6 steel reinforcing mesh and #4 through #6 steel rebar, placed as required to meet the load requirements of individual equipment base and enclosure specifications. Mesh shall meet the requirements of ASTM A-185. Rebar shall be Grade 60, and shall meet the requirements of ASTM A-615.

The supplier shall ensure that the holding strength of pulling eyes and irons meets the requirements description in each of PacifiCorp's specifications.

Some pads require a plastic board (or boards) for securing the cabinet onto the pad. Plastic boards shall have a holding strength of 1000 lbs. per linear foot.

4.8 Concrete Test Reports

PacifiCorp has the right to request certified concrete compressed air test reports.

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Concrete Requirements



16 Dec 11

ZG 311
Page 3 of 6

ZG 311

4.9 Certifying Suppliers Quality Assurance Program

The vendor shall be required to provide details of their Quality Compliance program before being added as a qualified supplier. Included in the audit will be documents showing that the vault designs are certified by a Licensed Professional Engineer.

4.10 Vault Manufacturing Inspection

Observation by a PacifiCorp representative of the vault manufacturer, including inspection of the facility, testing and/or a vault tear-down, is the option of PacifiCorp.

4.11 Marking

The manufacturer shall provide the following marking on an internal wall:

1. Manufacturer's name.
2. Date of construction (showing month and year).

4.12 Grounding Grid

PacifiCorp may request the viewing of the ground grid prior to the vendor's acceptance as a supplier. The viewing may be a visit to the plant to see the different steps in the manufacturing process. Alternative to a plant visit are electronic pictures of the reinforcing cage, showing how the grounding grid is integrated into the structure, and a Licensed Professional Engineer's stamp on the design documents.

4.13 "C"-Channel Material

C-channels shall be galvanized or fiberglass $1\frac{5}{8}'' \times 13/16''$. See the vault specification for length and rotation.



Concrete Requirements

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4.14 Composite Board Lumber

The composite board lumber shall be 2" x 4" winchester gray color with high-quality and 200 psi or higher shear strength design value. The composite plate shall be attached to the concrete by using the 5/16" x 4" zinc bolts. The attachments shall be strong enough to have a solid bond with concrete and shouldn't be pulled off when installing enclosures to the composite board.

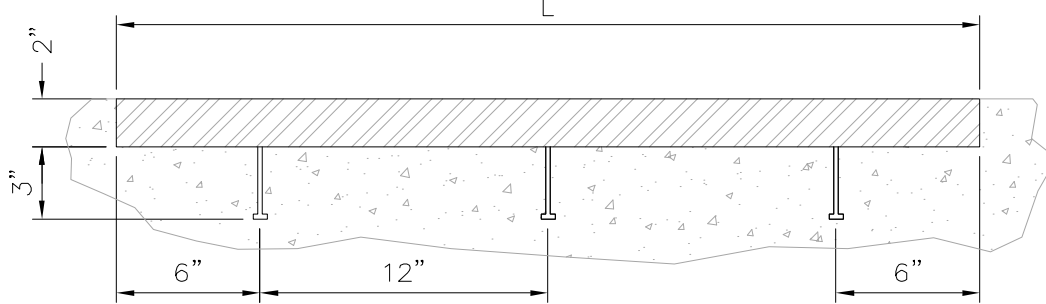


Figure 1—Composite Board Lumber

5 Issuing Department

The Engineering and Asset Management Documentation department of PacifiCorp published this document. Questions regarding editing, revision history and document output may be directed to the lead editor at (503) 813-5293. Technical questions and comments may be directed to Ehsan Maleki, Standards Engineering, (503) 813-7089.

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Concrete Requirements



16 Dec 11

ZG 311
Page 5 of 6

ZG 311

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Concrete Requirements

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ZG 311
Page 6 of 6

16 Dec 11