

GENERAL SPECIFICATIONS FOR BOX PADS

1. TECHNICAL SCOPE

- 1-A.** These specifications cover precast Fibercrete® (G.F.R.C.) box pads manufactured by Concast Incorporated in Zumbrota, Minnesota. The manufacturer must have experience in design and fabrication of these products and also the facilities for fabricating them with the quality specified herein and without delay to the agreed upon schedule.
- 1-B.** The box pads shall be designed and constructed to provide a serviceable life of 35 years and warranted for 5 years when installed outdoors in full sunlight and without any protection from the weather at any location in the continental United States or Canada.
- 1-C.** The Supplier shall design, construct, perform dimensional and quality control tests, and prepare the pads for truck shipment. Shipping and delivery responsibilities shall be defined in the project specific purchase documents. The Supplier shall provide all necessary documentation as stated in this specification.
- 1-D.** The box pads provided must be RUS approved " List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers".

2. DIMENSIONS AND DESIGN

- 2-A.** Drawings shall be made available for engineering approval and field installation identification; in PDF, SolidWorks, or AutoCAD format. Standard PDF format component drawings shall also be available online.
- 2-B.** The tolerances of the dimensions of each Fibercrete® box pad shall not exceed $\pm 1/8"$. These tolerances apply to the components when ready for shipping, when set on a flat and level surface with no loads applied to it.
- 2-C.** The manufacturer's design dimensions must be approved by the Purchaser prior to fabrication.
- 2-D.** Box pads shall be made available to fit design requirements and dimensions of the equipment being supported.
- 2-E.** Provisions, such as cast-in threaded inserts, must be offered for lifting any pad. Mounting holes must be adequately reinforced to avoid damaging the pad and to provide an ultimate strength of at least 5 times the pad weight when the part is lifted in accordance with the manufacturer's instructions.
- 2-F.** Standard box pads shall be of one piece; constructed with internal support columns extending the entire depth of the box pad to ensure full support of the upper lip of the box pad. When necessary, internal support columns shall also span the width of the box pad beneath the top surface.
- 2-G.** Covers shall be made available by the manufacturer for all size box pads. They can be used in delayed equipment installations to prevent box damage, unwanted litter, and accidental falls.
- 2-H.** The box pad shall have a rigid, flat, and stable top surface.
- 2-I.** The box pad shall be designed and constructed so that it and any related hardware will not trap or hold water when required, and so that it shall be able to withstand repeated freeze and thaw cycles.
- 2-J.** The box pad color shall be a natural concrete gray unless otherwise required and agreed upon.
- 2-K.** The box pad shall have a top surface lip sized to permit secure fastening of equipment all around.
- 2-L.** If required, a molded-in integrated tunnel must be supplied to bridge the gap between the box pad and turbine foundation. This tunnel shall have a clear cross-section to provide a direct path for below grade cable to travel from the turbine footings to the transformer. The end of the tunnel must have a radiused face to match the turbine foundation which ensures a tight fit.
- 2-M.** The box pad shall be designed to support specific equipment and applications.

Concast Box Pad Specifications

- 2-N.** If required, the box pad shall have a center divider to completely separate the high and low voltage sides of the box interior. This divider must be non-flammable, and constructed from Fibercrete® or an approved equal.
- 2-O.** The precast components are designed to conform to requirements stated in ASTM C857-07 "Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures, ASTM C858-07 "Specifications for Underground Precast Concrete Utility Structures".

3. PERFORMANCE AND MATERIALS

- 3-A.** All box pads shall be composed of cement mortar reinforced by alkali resistant glass fibers; fabricated via the Concast spray lay-up method which incorporates a minimum of 4 percent volume A.R. glass fibers.
- 3-B.** Cement shall conform to the requirement of ASTM C150 - Type I, II or ASTM C595 - Type IL.
- 3-C.** Fine aggregates shall conform to ASTM C33 "Specification for Concrete Aggregates".
- 3-D.** Boxes shall conform to AIA Masterspec Section 03491 for Glass Fiber Reinforced Concrete and quality control procedures per PCI# MNL-130-91.
- 3-E. Mechanical Properties after 28 days of age:**
 - 3-E.1** Minimum Compressive Strength of 7500 PSI
 - 3-E.2** Flexural Strength of 3200 PSI
 - 3-E.3 Shear Strength:** Material shall meet or exceed the following results when tested under ASTM D695-08.
 - Peak Load-1,187 lbf
 - Peak Stress-2,125 psi
 - Modulus-391 ksi
 - 3-E.4 Strength and Deflection:** Box pads shall meet or exceed the following when tested simulating equipment footprint and show no signs of failure or significant deflection.
 - Small Box Pads (sectionalizers, 1 phase transformers) shall withstand 12,000 lbs.
 - Large Box Pads (large switchgear, 3 phase transformers) shall withstand 28,000 lbs.
 - 3-E.5 Sidewall Loading:** Box Pads shall meet or exceed a sidewall deflection of .037" with 2,000 lbs. applied.
- 3-F. Chemical Resistance:** Material shall show no signs of swelling, crazing, blistering, cracking, deformation, erosion or loss of 25% or more of the initial flexural strength when exposed to the following chemical under normal service conditions.
 - 5% Calcium Chloride-CaCl₂
 - 0.1 N Sodium Sulfate-Na₂SO₄
 - 0.1 N Sodium Hydroxide -NaOH
 - 5% Sodium Chloride-NaCl
 - 5% Calcium Hydroxide-Ca(OH)₂
 - Transformer Oil
 - Kerosene

- 3-G.** With equipment installed; the box pad shall be capable of withstanding temperature variations of -40° Fahrenheit to 149° Fahrenheit without cracking, splitting, or otherwise deforming. Material shall be have been tested and conform to ASTM C666/C666M-03
- 3-H.** The box pad must not warp, rust, be UV degradable, or sustain combustion.
- 3-I.** When required, site-specific, PE stamped, seismic calculations shall be provided.
- 3-J.** Fire Resistance: Per ASTM E-84 surface burning test must provide Class A level with a flame spread index of 0 and smoke developed index is also 0.
- 3-K.** Concrete properties will vary depending upon the particular formulation of the concrete mix design. Customized properties can be achieved by using nonstandard ingredients, by changing or adding reinforcements, and by tailoring the overall mix design.

3-L. METAL COMPONENT PERFORMANCE

3-L.1 All galvanized steel covers, hardware, and embedments shall meet the following requirements:

- Steel Deck Plating - ASTM A786 | Steel Sheet - A1011 HSLAS Gr 50
- Steel Angles & Flats - ASTM A-36 | Galvanized Covers - ASTM 123
- Galvanized Hardware - ASTM 153

3-L.2 All stainless steel hardware and embedments shall meet the following requirements:

- Stainless Steel Angles & Flats Type 304 - ASTM A276
- Stainless Steel Sheet Type 304 - ASTM A-240

3-M.3 All aluminum covers, hardware, and embedments shall meet the following requirements:

- Aluminum Flats 6061-T6511 - ASTM B221 | Aluminum Sheet Smooth 5052-H32 - ASTM B209
- Aluminum Deck Plating 3003 - ASTM B209 or 6061 - ASTM B632
- Aluminum Angles 6061-T6 - ASTM B308 | Aluminum Channels 6061-T6 - ASTM B308

4. INSTALLATION REQUIREMENTS

- 4-A.** When the bottom of the excavation is soft, or where in the opinion of the soils engineer unsatisfactory foundation conditions exist, the contractor shall over excavate to a depth to ensure a proper foundation as directed by the soil engineer. The excavation can then be brought back up to the prescribed grade with a thoroughly compacted granular material.
- 4-B.** Materials used in the production of the box pad must be alkali resistant in order to be installed into a lean concrete pad. Three to six inches of the pad shall be under the flanges of the box pad. The lean concrete shall have a minimum compressive strength of 3000 psi prior to installation of the transformer.
- 4-C.** All box pad excavations shall be backfilled to restore pre-existing conditions or to the final grade as specified by the owner.
- 4-D.** All backfill material shall be a granular material as required by the soils engineer. Box pads shall be designed to save no limitations of backfill height.
- 4-E.** Installation guidelines shall be made available online.